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Article

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Optimization of Urban Budget Allocation Based on Spatial Justice Indicators (Case: Mashhad Metropolis)

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Abstract: One of the main responsibilities of urban managers is to create justice in the area of fair and equal access of citizens to urban services. By objective realization of spatial justice concept, while providing the citizens with the appropriate services, the ground of reducing urban problems is prepared. Spatial justice is one of the main concepts of sustainable urban development. This can be achieved by making the right decision about the allocation of the city budget. Recognizing prosperous and non-prosperous areas fair and informed allocation of financial resources among urban areas require the use of a technique that takes into account different and sometimes conflicting criteria for decision making. In this research, using PROMETHEE V-C technique, it has been tried to examine Mashhad metropolitan financial resources to thirteen areas, taking into account the criteria of spatial justice, in the form of a case study. The results indicate that the holy city of Mashhad is not in desirable position in terms of spatial justice indicators. Samen area is recognized as the most prosperous and district 3 as the most deprived area in the city of Mashhad. The high ability of the proposed technique to allocate budget equitably with multiple indicators has been shown in this study; therefore, this technique can be used as an effective tool for urban decision-making.

Keywords: Spatial Justice, Resource Allocation, Urban Facilities, Multi-Criteria Decision-Making Techniques, PROMETHEE V-C
JEL Classification: R53 , C63, C52, N15

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1- Introduction

One of the principles of urban planning is the fair access of all citizens to urban public utilities (Heidari et al., 2017). Considering the importance of balanced distribution of services in urban areas, which is one of the main factors in the distribution of urban population, as well as the high percentage of urbanization in the world, the importance and necessity of quantitative and qualitative distribution of urban services, is inevitable (Varesi & Ghanbari, 2012). Therefore, spatial equity is always considered as one of the main concepts of sustainable urban development (Roostayi et al., 2013). Managing and serving all citizens correctly, while implementing the concept of spatial equity, it will benefit citizens from services and also reduce urban problems. Analysis of the indicators of spatial equity is important for understanding the distribution of resources and the prevention of inequalities (Mousavi et al, 2017). However, today one of the most important challenges facing cities in the world, especially cities in developing countries, is the issue of shortcomings in providing these services (Hataminejad et al., 2012).

Spatial equity means the distribution of functions, services and facilities, as well as adequate access to service and activity centers (location of the facility), without discrimination and differentiation between residents of a city and urban areas (Nazmfar et al., 2016). Public service organization, which involves public-benefit economic activities, is a public authority, although it may also be part of the private sector's investment (Cho, 2004). The relative urban space is a general commodity and its exploitation should be done in a fair manner (Shokooyi, 2014). The creation of cities that provide the ideal place for the lives of all people is the main purpose of urban planning (Zarabi et al., 2012). Considering the importance of fair utilization of the urban residents and the rapid growth of urban population, which has led to the disruption of the urban distribution system, the most important mission of urban planners in this field is to achieve the goal of "equality of opportunity" in the access of the various groups of the community to urban community services. (Dadash-Pour & Rostami, 2011). How to access these services is an essential aspect of providing city services, which comes with such things as proper distribution of facilities, a fair decision in the distribution of resources and budget, and appropriate access to these facilities. In less-developed countries, the spatial difference of cities has intensified due to the greater socioeconomic differences (Hataminejad et al., 2008).

Injustice is not limited to measure economic inequalities, because space is a fundamental dimension in human society and social justice is flowing in space and justice and injustice appear in space (Tahmasbizadeh & KhademHosseini, 2018). Despite the attention to the issue of spatial justice in the distribution of public urban services in developed countries, unfortunately, limited studies have been conducted in this regard in our country. In this regard, in order to realize the spatial justice in a city, it should examine several indicators in various fields such as cultural, religious, security, urban infrastructure, and so on. In this study, the city of Mashhad has been evaluated as a cultural religious center and the second largest city in Iran. First, we analyzed the distribution of spatial justice indicators in urban areas, and then the spatial justice level was investigated in urban areas of Mashhad

and ranked in terms of urban facilities. Thereafter, the budget of Mashhad reforming has been allocated to each region of 13 regions of the city with the proposed model.

2- Literature Review

a) Foreign Researches

Tan & Samsudin (2017) have considered the effects of the spatial scale on the assessment of spatial justice based on Singapore's park space. The results of the research have shown that in this city uneven distribution of parks' space has taken place based on wealth and income. They found that the scale plan (the whole city, metropolitan area, region and district) for parks and green spaces in the pursuit of justice is effective in the realization of space justice. Their solution to improve this situation is to direct the planning of small-scale neighborhood parks rather than planning for the whole city or urban areas.

Boyles (2015), in a paper titled "Equity and network- level maintenance scheduling," tries to plan the maintenance of vast regional roads, taking into account justice, in addition to paying for cost-benefit rates. In this research, Boyles uses an innovative method that minimizes both cost and inequality.

Lee et al, (2017) evaluated public service and living standards of residents in China based on the data of the refugee groups during 2001 to 2013 to analyze the impact of the implementation of public services on the regional differences in China. The results based on spatial econometric models showed that the implementation of a variety of public services could promote regional equality of income and consumption. Evidences show that regional differences are affected by other economic and social factors.

Ouyang et al., (2017) evaluated immigrant deprivation levels in terms of public services, including education, culture, park, sports, health care, public transportation and postal facilities through a combination of population census data, online data and polls in the suburbs Shanghai. They provided audiences with questionnaires in fourteen immigrant and local communities to obtain accurate social and economic information from residents, as well as the degree of satisfaction and how they use public services. Ultimately, this paper addresses proposals for distributing social spaces fairly and comprehensively in China.

Lio et al., (2017) examined recreational services from urban parks to the place of residence, and how spatial erosion is affected by factors associated with providing services. The results of this study showed that spatial distribution and distance as well as factors such as park space, access to other services, transport facilities, and the age and sex of visitors to the park are for recreational services of urban parks. Moreover, findings have also shown that measuring spatial erosion and identifying its related factors can lead to preventing undesirable spatial distribution of parks so that a fair and efficient park system can be made available to all citizens.

b) Iranian Researches

Dadashpoor & Rostami (2017) measured space justice in the city of Gorgan. The results showed that this city is not desirable in terms of spatial justice. The central and northern parts of the city have a much higher degree than its southern section. The research suggests city policymakers to realize and apply the

concept of spatial justice in order to take action actively to reduce urban inequalities.

Yazdani & Mojande (2017) investigated the spatial distribution of public utilities of different regions of Ardebil to assess where and how distribution and distribution of public usage. The research method is descriptive-analytical and has an applied aspect based on its nature. The results indicate that the distribution of general types of public usage in the city of Ardebil has been formed unevenly and differently from each other, while differing in the pattern of distribution among applications, has led to the formation of different areas of the type of need that need to be reviewed. It uncovers policies in locating them. Finally, Ardebil Municipality District 2 is at the highest level and has considerable gaps than other areas.

Dalayi & Kheyroddoin (2017), using the ARCGIS software and Network Analysis Technique, investigated the public transportation system in four districts of Tehran (2, 3, 4, and 5) based on access standards to the station. The results showed that the existing public transportation network covered a very limited level of quadrant areas covered by the service so that the total area of the four areas is 14.5%, 48%, 36% and 33.5% are covered by public transportation services.

Mirabadi et al., (2017) conducted a study using socioeconomic, economic and physical indicators as well as the model of VIKOR, cluster analysis model, Gini coefficient and Moran coefficient, ranking urban areas of Mahabad city, as well as measuring the concentration and spatial autocorrelation in this City in 2015. Findings from the VIKOR model showed that most of the urban areas of Mahabad are underdeveloped. Furthermore, using the Gini coefficient and Moran coefficient, it was determined that the focus is on the indicators of urban facilities and services. It was also concluded that in most cases, the centers were located in the north and northwest of the city and the deprived centers were in the south of Mahabad.

Marsusi & Khazaee (2014) did a research aimed at assessing the role of urban spatial distribution in the sustainable development of Tehran. The results indicate the inappropriate spatial distribution of urban services in 22 districts of Tehran, and the difference in level of satisfaction is one of the most important factors of developmental instability in the city of Tehran. The results also showed that the mere existence of services in a city, even if it is more than real needs or equal to standard per capita, could not meet the needs of all city residents and lead to city stability rather, it is important to consider how these services are distributed and how their spatial distribution follows.

Roustae et al. (2013) by using the Fuzzy TOPSIS technique, ranked areas of Tabriz city based on the availability of urban services. In this regard, after determining the indicators, Tabriz Municipality areas were graded using the Fuzzy TOPSIS Model and the planning priorities for each region were presented with respect to each indicator. The results indicate that the city of Tabriz does not have the proper level of spatial justice in the distribution of these services. District 2 is in perfect condition, while districts 4 and 10 do not have these conditions. Urban districts of 8, 5 and 6 are classified in the range and districts 3, 1 and 7 are half enjoyed.

Ziyari et al., (2013) examined the level of access to the 11 neighborhoods of Babolsar in terms of urban public utilities. The results showed that the population as the most important effective factor on the provision of services and the level of enjoying the city's various neighborhoods is not proportional to the urban services, and most residents of the neighborhoods are not satisfied with the access to these services.

3- Theoretical Background

The concept of justice is from the word "fairness" meaning "to put everything in its place," but justice means to be fair and social justice points to the justice that everyone should have in the community (Moein, 2002). Khandouzi (2005) defines justice as a mechanism for choosing individuals. Justice is also one of the main concepts of sustainable urban development (Khakpour & Bavanpur, 2009). Gradually, with the formation of different dimensions of justice and the attention of scholars to social life, the concept of social justice was formed. Globally in the late 1960s, the concept and function of social justice entered the geographic literature (Rahnama & Zabihi, 2011). In the urban concept, justice can be viewed from two perspectives, spatial and social (Feng & Timmermans, 2014).

Harvey (1973) defined the term "spatial equalization," also called "spatial equity" (Pitarch Garrido, 2013). But the root of this kind of human geography which strives to achieve social justice comes back to Peter Kropotkin's proposals in the fight against poverty, European nationalism and racism more than a century ago (Shokooyi, 2003). Spatial equity derived from the concept of social justice means that it must be treated equally with residents wherever they live. In other words, spatial equity is the intersection of space and social justice. From a geographic point of view, social justice of the city is synonymous with the fair distribution of resources and facilities between different urban areas and achieving equal access for citizens (Hataminejad, 2008). The main concern of "space equity" is the level of injustice that people and communities experience in the environment. Webster defines "justice" as a legal system that foundations and laws are adjusted to correct a system failure in identifying things that are fair and equitable (Morrill, 2015). Equality is generally defined as fairness or justice in the distribution of effects (both the benefits and harms) of an action in two or more subgroups. Geographically, spatial equity in the city is synonymous with the equitable distribution of resources and resources between different regions and equal access for citizens (Ammanpour et al., 1393). Spatial equity in an inclusive concept concentrates on respecting equal rights for human beings or social actors, the maintenance and protection of their human dignity, the provision of basic living needs and social self-esteem. Spatial equity believes that various living spaces, such as marginalized settlements, is a living reflect of the deliberate or unconscious will of human beings, various political and social institutions, and national macro policies (Qaderi Hajat & Mokhtari, 2017). One of the consequences of urban rapid growth in recent decades is the unbalanced distribution of public utilities resulting in unequal citizens' access to urban services (Yazdani & Firoozi, 2017). One of the most important questions about urban management is how public investment has been allocated. Is the distribution of

investment based on spatial equity carried out or influenced by political considerations? (Livert & Gainza, 2018). Decisions based on political considerations are one of the reasons of not realizing space equity in cities. The inadequacy of urban management and the dominant ideology is another important reason for the failure of achieving spatial equity. The concentration of service centers in one place not only creates bipolar areas but also it led to population flood into these areas that led to environmental, traffic and pollution pressure (including noise and air (Marsusi & Khazaee, 2014). Due to the concentration of facilities, services, population, and centralized management, metropolitan cities in developing countries are struck by phenomena such as slum, poverty, and social imbalances (Ghaedrahmati, et al., 2018). The concept of spatial equity can be very frustrating to prevent this problem. With regard to the concepts presented, it is clear that the need for the implementation of spatial equity in a city is the optimal and informed allocation of urban budget to its different regions.

Many cities in the world face severe social stratification (Boone, 2013). This feature can be a sign of inequality between social groups that existed throughout the history of human society (Pringle, 2014). Urban inequality existed before the modern history of global urbanism. Since the formation of cities, some urban residents have limited access to some socio-cultural, economic and political opportunities, while these opportunities have been provided for others (Mirabadi et al, 2017). In the concept of spatial inequality, there are some obscure aspects, most of which relate to the concept of "space" (Rahmati, 2014). Space inequality means unequal distribution of social opportunities and positions in space (Mirabadi, et al., 2017). One of the important points for urban planners is that social classifications have a lot to do with spatial issues. This relationship can be seen as an environmental disparity that results from unequal geographical classification of socio-economic groups in the city. In the last three decades, researchers have studied these environmental disparities with a chapter on environmental justice and spatial justice (Tan & Samsudin, 2017). Iran has faced increasing population growth in its cities in recent decades. This undesirable population growth has been shaped by the two factors of the natural growth of the urban population and the migration from small towns and villages to middle and large cities. This has not led to the development of urban spaces and infrastructure required for this population growth (Yazdani & Mojandeh, 2017).

In the present study, the main groups of spatial justice indicators were selected using Roustai et al., (2013) research entitled "Spatial Equity Assessment in the Distribution of Urban Services in Tabriz". Indicators used in each of these main groups have been selected regarding the availability of the necessary information and consultation with the experts.

30 indicators used in this study are divided into 12 main categories: educational, urban facilities, residential, passages, fire station, green area, commercial & services, art & culture, sport, health care, religious and urban equipment as shown in Table (1). In order to study the health-medical index, the ratio of the number of hospitals in the region to the population of the region was extracted from Shokouhi et al., (2012). The regions ranked from the lowest deprivation (the highest) to the most deprived area

Table1. Selective Indicators of Spatial Justice

Educational	The ratio of the number of educational centers to the population over six years
	The ratio of the number of public libraries to the population
Green area	The ratio of the green space area to the total area of the district
	Ratio of green space area to population of the district
Urban facilities	The ratio of the number of faucet under the supervision of the municipality to the area of the district
	The ratio of the total area of the existing pavements to the total area of the district
	The ratio of the number of public health services to the area
	The ratio of the total area of the existing pavements to the total area
Fire station	The number of fire stations divided by the number of residential units
	The number of fire stations divided by the area of district
Sport	The ratio of the number of outdoor sports spaces to the population
	The ratio of the number of indoor sports spaces to the population
Urban equipment	Percentage of accessing of the public water supply network drinking water
	Percentage of residential units connected to the public wastewater network
Religious	The ratio of the number of active mosques to the population
Health care	The ratio of the number of hospitals in the region to the population of the region
	The ratio of the number of clinics in the region to the population of the region
	The ratio of the number of health bases in the region to the region's population
	The ratio of the number of emergency bases in the area to the population
Residential	Percentage of residential units lacking metal frame and reinforced concrete
	The percentage of worn out ordinary residential buildings
	Ratio of textured area to total area
Art & Culture	The ratio of the number of cultural centers to the population
	The ratio of the total amount of art space available at the disposal of the municipality to the population
	The ratio of the number of cultural centers available to the municipality to the population
Passages	the ration of the length of the passages to the district area
Commercial & Services	The ratio of the number of taxi lines to the area of the district
	The total capacity of private and public parking lots to the population
	The ratio of the number of fuel sites to the population
	The ratio of the number of fruits and vegetables market to the population

4- Research Methodology

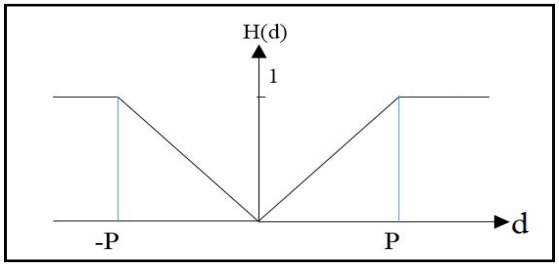
The current research approach is descriptive and applied. In order to collect information, the library method has been used and the required statistics and information have been extracted from the statistical journal of the municipality of Mashhad in 2016 and the selected indicators of Mashhad city in 2016, which have been extracted from the Iranian statistics website. The statistical population of this research includes 12 districts of Mashhad metropolitan and Saamen region of this city. In order to analyze the extent of realization of spatial equity among urban areas, 13 districts have been ranked in terms of availability of urban facilities according to available

indicators of spatial equity using the PROMETHEE V- C optimal technique. The population of each region can be considered as the amount of space demand for supplied urban services (Omer, 2006; Lotfi & Koohsari, 2009). Therefore, most of the indicators used are expressed in terms of population per capita. Finally, in order to provide a solution to the realization of spatial equity in Mashhad metropolitan area, a hypothetical case has been solved in which a limited budget that is not enough for the improvement of all regions, has been devoted to the most desirable set of urban areas for reforming, using of PROMETHEE V- C optimal model.

In the present study, in order to implement PROMETHEE Technique, the PROMETHEE II technique was first used with Microsoft Excel software. The Lingo software was used to implement the PROMETHEE V- C optimal model. The use of multi-criteria decision-making methods in financial decision-making is increasing, because using these methods can monitor multifaceted projects and financial decisions and make an optimal decision in all directions." (Mavrotas et al., 2004). In this regard, in order to achieve higher accuracy and flexibility in decision-making, PROMETHEE family multi-criteria decision making methods have been used.

The PROMETHEE II technique is one of the ranking methods of the famous family of PROMETHEE. The purpose of this assessment technique is to select the preferred option from among the two or more possible options, taking into account the criterion of decision-making. To do this, first, compare the preference option A due to the decision-making index over option B and show it in the form of the function H (A, B). The preferred H function can be expressed in terms of six different types, depending on the options and indicators (Fig. 1).

Fig1. Function of linear preference of A to B



The vertical axis represents the amount of preference A to B and the horizontal axis represents the difference between the values of A and B in the index (d). For this function, in the positive interval, 3 states can be considered.

1) H (A, B) = 0: This means that the two options A and B do not have any preferences relative to each other.

2) H (A, B) = 1: This means that option A is quite preferable to option B.

3) 0<H (A, B) <1: In this case, the closer the H (A, B) 1, A's preference to B is greater, and the closer to 0, the lower its preference.

The function of figure (1) can be represented by Equation (1):

$$H(d)=\begin{cases} 0 & \text{if} \quad |d|\le q \\ (|d|-q)/(p-q) & \text{if} \quad q<|d|\le p \\ 1 & \text{if} \quad p<|q| \end{cases} \qquad (۱)$$

The right side of the curve is used for indicators with a direct (maximum) and left-hand side of the graph for the inverse (minimum) indices. In addition, the value of "q" for each index is equal to the difference of the largest number of options in the index with the smallest, so that in each index, the largest option is the only one with complete preference compared with the smallest (H (q) = 1). The above calculations must be made for all options.

After doing the above comparisons, total utility of each option should be calculated in the form of input and output flux. Therefore, it is necessary to calculate the amount of output flux (ϕ^+) and input flux (ϕ^-) for each possible option using relationships (2) and (3).

$$\phi^+(A) = \sum_{J \in M} \pi(A, J) \tag{2}$$

$$\phi^-(A) = \sum_{J \in M} \pi(J, A) \tag{3}$$

In which the value of the function π is calculated from equation (4).

$$\pi(A,B) = \frac{\sum_{i=1}^{k} W_i \cdot H_i(A,B)}{\sum_{i=1}^{k} W_i} \tag{4}$$

W_i is equal to the weight of the index i, K is equal to the number of indexes

$$\phi(A) = \phi^+(A) - \phi^-(A) \tag{5}$$

Used and $H_i(A,B)$ is the function of preference of option A than option B in the i-th index. Must be careful that $H_i(A,B) \neq H_i(B,A)$.

Any option with a higher flux (ϕ) has a higher r. In this research, because the purpose is to select the set of selected regions in which the most deprivation is, the greater the net flow means the further deprivation of each region. Therefore, the region with the lowest net flux has the lowest degree of deprivation and is therefore the most enjoyable region. After calculating the net flux, we define the set of chosen options {A_1, A_2, A_3,…}. In the PROMETHEE-V method, the goal is to find a set of these options that produce the highest "total utility" (ϕ). The selection set is obtained by means of relation (6).

$$\begin{aligned} &\text{Max} \sum \phi_i x_i \\ &\text{s.t.} \\ &\sum r_i x_i \le R \\ &x_i \in \{0,1\} \end{aligned} \tag{6}$$

In this relation, ϕ_i is the net flux of the i-th option obtained from the PROMETHEE II method. x_i indicates the presence or absence of the option "i" in the selected set which is a binary number. The third line of relation (6) represents the resource constraint. "R" represents the cost or withdrawal of the option "i" from the source. "R" also represents the total resource (total budget). The problem with this method is that it removes any options that have a negative flux from the selection set, even if it is not used from all available sources (total budget). Another problem with this method is that it creates sets that have more members, that is, if the utility of the option (ϕ_i) is high, but

its cost (r_i) is high, this method does not select this option. It chooses two or more options that have smaller r_i instead (Almeida & Vetschera, 2012). The PROMETHEE V-C Optimal technique has been developed to solve these problems. Relation (7) represents this method.

$$\begin{aligned} &\text{Max} \sum \phi_i x_i \\ &\text{s.t.} \\ &\sum r_i x_i \le R \\ &x_i \in \{0,1\} \\ &\sum x_i = C \end{aligned} \tag{7}$$

In this relation, another restriction has been added. The value of C in this relation specifies the number of members of the selected set. This method provides a number of different sets with different number of members depending on the value of C letting decision makers select the most appropriate set by comparing the costs of each selected set and the options in each collection. To implement this model, it is enough to insert the fluxes (ϕ_i) obtained from the PROMETHEE II method and also the constraint values, in relation (7). This model gives a selective set for each C.

The Scope of Research

The city of Mashhad, the center of Khorasan Razavi province, in 2016 with consideration of the districts of Toos and Gharqi with a total area of 328 square kilometers, is the second largest city in Iran, which is located in the northeast of Iran, 59 degrees longitude, 2 minutes to 60 degrees and 38 minutes, and width. The geographical range is 35 degrees, 43 minutes to 37 degrees and 7 minutes, between the Binalood Mountains and the Hezarmasjed. Mashhad metropolis is the second most populated city in Iran, according to the latest census of 2011 with a population of 2.807.464. The city has been named the second largest religious city in the Islamic world due to the presence of the Imam Reza Holy Shrine. Considering the importance of this metropolis in the world and the size and population of it, it is important to examine the distribution of facilities and services as well as the spatial justice that has been made in this city. The city of Mashhad has 13 municipality districts with demographic characteristics and the area of these areas listed in Table (2).

Table2. Demographic characteristics and area of 13 districts of Mashhad metropolitan

District	Area (m^2)	Population	District	Area (m^2)	Population
1	14,978,674	176,039	**8**	16,096,057	94,227
2	32,436,390	434,729	**9**	44,332,439	300,539
3	31,114,450	387,862	**10**	23,037,882	265,205
4	13,400,282	246,296	**11**	15,752,352	192,355
5	14,033,436	168,154	**12**	55,883,186	60,373
6	14,658,945	230,289	**13**	3,576,646	21,546
7	48,820,586	229,940	**Total**	328,121,325	2,807,464

Source: (Statistical Yearbook of Mashhad)

5. Results

First, in order to calculate the inequality in the distribution of spatial equity indicators, the coefficients of variation of the main groups of indicators are presented in form of the mean of the indices of each group in Table (3).

Table3. The coefficients of variation of main groups of indicators

Indices group	Educational	Green area	Urban facilities	fire station	Sport	Commercial & Services
Coefficient of variation	0.99169	1.14185	1.17321	1.15144	0.86830	1.39081
Indices group	**Residential**	**Religious**	**Urban equipment**	**Art & Culture**	**Passages**	**Health care**
Coefficient of variation	0.84456	1.48761	0.45586	1.65668	0.39386	0.98841

Using this method, it can be shown that each indicator is distributed unevenly (Kalantari, 2001). The coefficient of variation is obtained by dividing the standard deviation by the mean. The coefficients of variation shown in Table (3) indicate that the distribution of the group of Art & Culture indices is the most unequal and the Passages group has the highest equality in the distribution between the 13 districts of Mashhad.

In the next step, first, the value of the preference function (H_i) between the two regions was calculated as if the deprived region was preferable to the more favorable district. With this type of calculation, regions with less net flux are rich; areas with high net flux are deprived districts. The reason for this type of calculation is that in order to achieve the fair and optimal allocation of financial resources, areas with a greater deprivation should be allocated, hence areas with greater deprivation should have a higher net flow. Subsequently, the value of the function of π was calculated for all districts. Then, using the relations (2) and (3), the flux of the output and input of the regions was calculated. These values are listed in Table (4).

Table4. Input and output flux of the survey of the extent of the regions

District	Output flux (ϕ^+)	Input flux (ϕ^-)	District	Output flux (ϕ^+)	Input flux (ϕ^-)
1	1.5908	1.6693	8	1.0300	3.3017
2	1.5124	0.7535	9	1.3641	1.7380
3	1.9824	0.4433	10	1.1370	1.6691
4	1.6421	0.8302	11	1.4629	1.2628
5	1.7015	0.7956	12	1.5340	2.3558
6	1.7979	0.5557	Saamen	1.3144	5.2891
7	1.7683	0.8430	-----	-----	-----

Subsequently, the ranking of the regions in terms of the availability of urban facilities was carried out with the help of net flows of regions derived from relation (5). The net fluxes of the 13 districts of Mashhad and also the ranking of the regions in Table (5) are ranked respectively in the regions.

Table5. The net and flux density of 13 districts of Mashhad

District	Net flux	Ranking	District	Net flux	Ranking
Saamen	-3.9747	1	2	0.7589	8
8	-2.2727	2	4	0.8119	9
12	-0.8218	3	5	0.9059	10
10	-0.5320	4	7	0.9252	11
9	-0.3740	5	6	1.2422	12
1	-0.0758	6	3	1.5390	13
11	0.2001	7	-----	-----	-----

The results indicate that in terms of having urban facilities, according to the indicators used in this research, the Saamen area of Mashhad is ranked first and district 3 of Mashhad is ranked 13th. In the following, the goal is selecting a C-member set of districts of Mashhad city, which will create the highest utility in terms of budget rehabilitation. In this regard, it is assumed that the allocated budget for the improvement of the city of Mashhad (R) is 100 billion Tomans. Table 6 shows the estimated budget needed for each region to improve it, as an example. Due to the confidentiality of the budget needed to improve the areas and the problem of inaccessibility, the numbers in Table (6) are listed as an example. Using the ROMETHEE V-C Optimal model to solve the example, it was dealt with using the Lingo11 software. In Table 7, the sets selected for different values of C, which specify the number of members of the selected set, are also given as the net flux of each set and the total cost of the items. The total number of members can be at least 1 district. Because the sets of 1 member up to 3 members have low net flux, sets with more than 4 members were shown in Table (7). In this example, the maximum number of members was 10 members due to the total "R" restriction. If C is assigned to 11 members, the resultant set is an empty set that indicates the violation of the "R" restriction. In other words, in this example, there are no 11 sets of members and more that do not violate the overall budget limit.

Table6. The budget needed for the reconstruction of 13 districts of Mashhad

District	Required budget (r)- billion Tomans	District	Required budget (r)- billion Tomans
1	13	8	4
2	12	9	6
3	18	10	8
4	14	11	10
5	16	12	4
6	18	13	8
7	15	----	-----

Table7. Specification of selected collections for improvement by research model

C	Districts including in selected set	Selected set net flux	Selected set total cost- billion Tomans	C	Districts including in selected set	Selected set net flux	Selected set total cost- billion Tomans
4	{3,5,6,7}	4.6123	٦٧	**8**	{2,3,5,6,7,9,11,12}	4.3755	٩٩
5	{3,4,5,6,7}	5.4242	٨١	**9**	{1,2,3,4,7,9,10,11,12}	2.4288	١٠٠
6	{2,3,4,5,6,7}	6.1831	٩٣	**10**	{1,2,4,7,8,9,10,11,12,13}	-5.3576	٩٠
7	{2,3,4,5,6,7,9}	5.8091	٩٩	**11**	{Ø}	---	---

6. Conclusion and Discussion

Considering the special position of the Mashhad metropolitan in the internal and external spheres and the importance of realizing the spatial justice as a ground for sustainable development, in this research, we tried to rank Mashhad districts using the various indicators in terms of urban

services. In addition, by calculating the coefficients of variations in different groups of urban services, the level of justice in the distribution of these indicators was determined in Mashhad. These results allow urban planners to try harder, taking into account the deprivation of the regions, in order to create greater equality in the distribution of services between the regions.

In this research, a model has been developed in which urban planners can easily allocate urban budget with appropriate and maximizing utility to different regions. The research findings indicate that the distribution of green area, urban facilities, fire station, religious, art & culture, and commercial & services are not well-positioned in terms of equity distribution. The coefficients of variations in the spatial justice indices resulting from the research indicate that the distribution of the group of art & culture indicator is the most unequal and the passages indicator has the highest equality in distribution among the 13 districts of the Mashhad. In spite of this, the inequality in the distribution of urban services, in addition to endangering the right to life of people in different parts of the city, can result in an asymmetric concentration of the population in the urban areas. This could create many problems in managing urban areas. In addition, the findings indicate that Saamen area (first districts in terms of enjoyment) is much higher than other areas in terms of utilization of urban services. This phenomenon, which is mainly due to the proximity of the area near the shrine of Imam Reza (AS), can cause many problems, such as concentration of population, increased population density, increased crime in the region, etc. To create the attraction of capital and active population to this region, due to the high availability of various facilities, will increase the disparity of the region's level with other regions and create a permanent destructive cycle to increase this disagreement. Therefore, it is recommended that decision makers of the metropolitan area make efforts to reduce this difference by allocating the city's resources properly. The findings indicate that the average net flow of the regions from the perspective of having urban services is equal to -0.1285, indicating that the eight regions 1, 11, 2, 4, 5, 7, 6, 3 are lower than average in terms of utilization of urban services. This indicates the focus of services in the 5 areas of the city of Mashhad. Therefore, it can be stated that the city of Mashhad is not in a good position in terms of the realization of spatial justice. The PROMETHEE V-C Optimal model presented in this study provides a simple and practical solution for decision makers to make better decisions in the means of spatial equity. The results from the implementation of this model indicate that with the given example numbers, the only difference between the five-member set versus the four-member set is the existence of a district 4 in the five-member set. This relationship goes on to seven-member set. This shows that if the goal is to use maximum budget in the most optimize form, the seven-member set is a more appropriate option than its predecessor. Because without violating the total budget limit, the greatest number of areas is being refurbished. The important point in this selective collection is that the areas selected in this collection are more deprived; the point becomes more specific when the members of the collection increase to eight members. It is

seen that this collection consists of districts number 11 and 12, but it does not include district 4. However, district 4 was ranked 9th but district 11 ranked 7th and district 12 ranked 3rd. Therefore, in this area, the deprived district 4 has been removed from the selected option and the semi-possessed district 11 and district 12 have been selected instead. This does not fit the concept of the realization of spatial equity. The PROMETHEE V-C Optimal model provides a number of selective sets that final decision makers can choose the most appropriate optimal set by comparing these sets and considering constraints that are not measurable. Looking at the net fluxes of selected collections makes it easy see this model superior to its predecessor. If the condition of the number of members of C is eliminated from the model relationship, the resulting collection of sets would be 6-membered. Because the largest flux of all sets belongs to this group. This is while the 7-member set, despite having less flux, is also includes district number 9 plus the 6-member set.

According to the results, it is suggested to decision makers and managers of Mashhad to use the concept of spatial equity in decision making and budgeting in Mashhad regions and to develop and improve the conditions of deprived areas expressed in the research. In order to make a comprehensive, fair and informed decision about the budget for improvement and development of the districts of Mashhad, urban managers can use the model presented in the research. In order to do this, it is first necessary to estimate the budget needed to improve the areas and to be placed in Table 6. Then, the budget of rehabilitation of areas replace with R. After this step, they should extract the values obtained from the implementation of the model by giving different values to C. Important indicators for decision makers, which were not included in the suggested indicators of the model, can be easily added to the model. This will help urban managers make informed and fair decisions.

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