



University of Mohaghegh Ardabili

Journal of Geography and Spatial Justice

Received:2018/04/06

accepted:2018/06/03



Analyzing the distribution of public land use from the spatial justice perspective: A case study of 10 districts of Shiraz Metropolitan

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ABSTRACT

In today's cities, a primary objective of the distribution of public land use zones is to achieve spatial justice. The absence of this justice has serious impacts on the nature and structure of the city and eventually leads to class division, which will impose even more challenges on urban management. This descriptive-analytical research aimed to analyze the inequalities in the distribution of public land use zones in Shiraz, Iran, from the spatial justice perspective based on library and field studies with the help of GIS. The distribution of land use zones that accommodate urban services over the study area was analyzed in a comparative fashion. After examining the disparities in the distribution of different types of public land use, it was found that the study area has a better condition in terms of office, tourism and hospitality land uses than in terms of other land uses. Unfortunately, sports, education, and utility land uses were found to be in critical condition. The results showed that in Shiraz, district 1 has the highest public land use per capita and districts 4 and 5 have the worst conditions in this respect. This suggests a lack of order in the spatial distribution of zones, especially in relation to population and land use. Hence, the urban management of this city needs to pay more attention to the disadvantaged districts in order to close the gaps in terms of mentioned criteria.

Keywords: *Public land use, Shiraz city, spatial justice, GIS*

Introduction

In developing countries, land use planning is a complex challenge that requires attention to issues far beyond the mere planning, as the problems such as scarcity and high price of urban lands and failure to provide proper housing typically manifest as political and social crises. In some countries such as Brazil, Chile, and Mexico, the issue of urban land has turned into political movements (Mehdizadeh, 2006).

Typically, a significant part of urban land is dedicated to public land use zones.

Urban public zones can be seen as a measure of citizens' welfare, and desirability and accessibility of these zones serve as basic indicators of urban development (Rashidi, 2000).

Examination of the distribution of land use zones contributes to achieving the goals of urban development by providing a clear picture of the current

urban landscape and allocation of urban spaces, and their developments over time (Cerda, 2009: 424-425). The issue of spatial justice, while being important in essence and definition is also essential because of its social, economic, and physical implications for the city (Rahnama & Zabihi, 2011; Dadashpour & Rostami, 2011). Although attention to the fair distribution of services has been intensified over the past two decades, researchers have not yet been able to provide a single comprehensive method for evaluating this concept or suggest proper criteria for using different methods (Karkehabadi et al., 2014). Because of this ambiguity, many researchers assess the spatial justice in terms of distribution of services based on a combination of criteria such as per capita indicators, access radius, service efficiency, etc.

Nevertheless, the presence of a gap in terms of spatial justice, created by the disproportionate distribution of public land use zones, has been confirmed by different methods and approaches. The issue is that the effect of traffic, noise pollution, and air pollution on the one hand and the absorption of complementary and parallel land use zones, on the other hand, have led to an intensive spatial polarization of the cities. The present research aims to evaluate the access of the districts of Shiraz (Fars, Iran) to each type of the nine public land use zones. It is self-evident that unfair and unbalanced distribution of access to these zones will reflect spatial inequality and injustice in zoning, and the threat of population imbalance and formation and institutionalization of socially and spatially unjust urban spaces.

Land use planning, location and spatial organization of urban activities and functions are based on the needs and demands of the urban community (Zarrabi et al., 2010: 21; Movahed and Samadi, 2011; 46; Meshkini et al., 2013: 260; Hekmat Nia, 2010: 84). The main thing is urban planning (Hekmat Nia, 2010: 84; Zayari et al., 2011: 31). Spatial thinking about justice makes the practical knowledge more efficient for achieving justice and democracy; therefore, planners should seek to find out how much inequality

has been created and which departments are most deprived in the pattern of location services and how they are distributed (Hewko, 2001: 5).

Therefore, studies that have so far been conducted on the analysis of spatial justice in the distribution of the city's uses, despite the urgency and importance of the issue. Among the studies carried out in connection with the research topic are: Habibi et al. (2011), in a study entitled "Analysis of the situation of social justice in the spatial structure of Sanandaj city", using the Williamson and Maurice Index, examined the status of distribution of social, economic and physical indices in 21 districts of Sanandaj and compared to levels of citizens' access to urban amenities and services.

Lotfi et al. (2012) in a research on the efficient study of urban spatial structure and service user distribution in linear cities of northern Iran analyzed the spatial structure of Fereydunkenar city and showed that commercial centers are moving towards compression and utilization of a state-of-the-art service formats. Ezzat Panah and Ganlou (2014), in an article entitled "Investigating patterns of distribution and spatial distribution of urban Urmia parks" using Arc View and the Williamson Index, explored how urban spaces and parks use spatial concentrations, and it was concluded that Urmia had a good position in terms of accessibility at some levels, but the proximity of the performance of parks and urban parks suggested that most of the residents did not have access to these services.

Parizadi et al. (2016) analyzed spatial disparities in the distribution of urban services from the perspective of spatial justice in Marivan city. Ezzat Panah et al. (2015) studied the distribution of urban land use factors in urban development plans from the perspective of social justice in Shahin Dezh city. Talen and Enselin (1988) used an access-based approach to assess the fairness of the distribution of local services. Heydari Chiane et al. (2017) in an article entitled "An analysis of spatial justice and GIS-based therapeutic uses: A case study of Tabriz Metropolis" using network

analysis and taking into account the per capita population, determined the demographic needs of Tabriz city and its shortcomings (Dadashpour & Rostami, 2011: 4).

Tissue et al. (2005) provided an integrated index of service radius, service impact, and quality for assessing access to services and used spatial correlation for spatial analysis of this indicator. Tzu (2005) explored the spatial justice of the general distribution facility in the Ren-De city of south-western Taiwan in an article entitled "Accessibility based on the integrated measurement of relative spatial justice in urban general facilities using GIS and self-localization". The result revealed a meaningful relationship between the general urban amenities and the spatial distribution.

Lotfi and Koohsari (2009) examined the extent of access to local services in the sixth area of Tehran based on two equal opportunity and justice-based approaches. For this purpose, the minimum distance and fuzzy assessment method were used.

Chank and Labao (2011) in a study entitled "An investigation of an integrated measurement of the partial spatial justice of public facilities in urban parks", in order to investigate the distribution and density of Tainan Urban Parks, proposed an integrated framework modelling to help assess fair space distribution in urban development. Bilody et al. (2011) conducted a study to assess the environmental justice of the spatial distribution of sports facilities in Paris. After examining comprehensive information from the French Sports Facilities Census, he concluded that there was a positive and negative correlation between the region's income and the existence of the facilities or its desirability. In the majority of previous studies, the emphasis is on land use and fewer public utilities have been considered. Therefore, this research has been conducted in the context of the analysis of the distribution of urban utilities from the perspective of spatial justice (case study of 10 provinces of the metropolitan area of Shiraz) seeking to measure the

distribution of public usage and its spatial distribution pattern in the city of Shiraz to assess its fairness.

With rapid population growth and physical development of Shiraz in recent decades followed by the formation of new neighbourhoods in the periphery of this city, inadequate zoning and poor planning have increased the disparity between its districts in terms of access to public zones, facilities, and services. The aim of this research is, therefore, to investigate the type and distribution of public land use zones in the districts of Shiraz in order to determine the advantaged and disadvantaged districts and ultimately the extent of spatial justice in the allocation of urban facilities and resources. In order to aid the urban management to acknowledge and fight the disparities between the districts of Shiraz, the research seeks to answer the following questions:

- How is the spatial distribution of urban land use zones in Shiraz?

- Is there a difference between the districts of Shiraz in terms of access to public facilities and services?

Theory and Methodology

This research is a descriptive evaluation performed based on library resources (articles, theses, reports, publications) with GIS data, satellite imagery and maps, and confirmed statistics used to analyze the land use changes and the distribution of public land use zones in the districts of Shiraz over the past decades. Satellite images of Shiraz over different periods were processed using a remote sensing software and required data were produced based on GIS Ready maps and satellite images. After tabulating the gathered data, using ArcGIS to study the distribution of public land use zones, and using Excel to calculate the land use per capita available to each zone, each district's shortage of each type of public land use zone was determined. Ultimately, the obtained results were used to draw a map of public land use shortage. The city of Shiraz is located as a metropolis of southern Iran and the center

of Fars province at 30 degrees and 25 minutes longitude, and 37 degrees and 29 minutes longitude. The current structure of the city of Shiraz is the result of a historical and dynamic process of population deployment on the natural surroundings of the city and their interactions, their content varies in each period with regard to the spatial, natural, economic, social, and political-cultural structures of the city which has had a fast-paced theme. The evolutionary study of the structure of Shiraz shows that the city has grown on a plain bed with a northern-southern plain limited to elevations in the north, south, west and Lake Maharloo, east of the plain (Nazareyan and Karimi, 1997: 28s). The process of urban development in Shiraz in the pre-

modern period has an intrinsic growth and has been proportional to the functional and structural coherence. In the modern period, it is also influenced by policies, city change, the expansion of modernity and the emergence of capitalist elements, population growth, and urban spatial structure in the direction of bipolarity, expansion around new axes and fields, development toward the west and north, deployment large-scale regional, urban, green and green spaces, the separation of the north and south, the integration of villages in the city, the emergence of marginalization, etc. Finally, there is a relative structural instability which, in general, results from the lack of utilization of capacities of infill development in Shiraz.

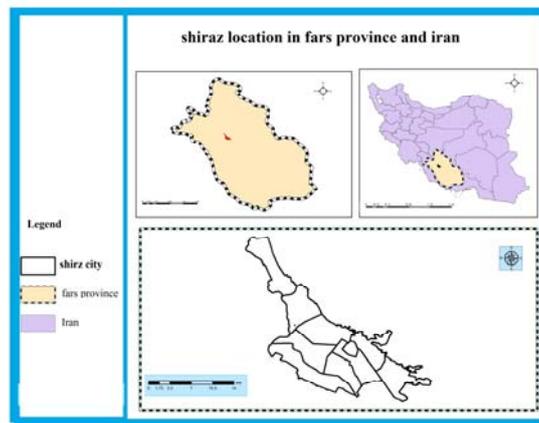


Figure 1: Location map of Shiraz in Iran and Fars province (Source: Authors, 2018)

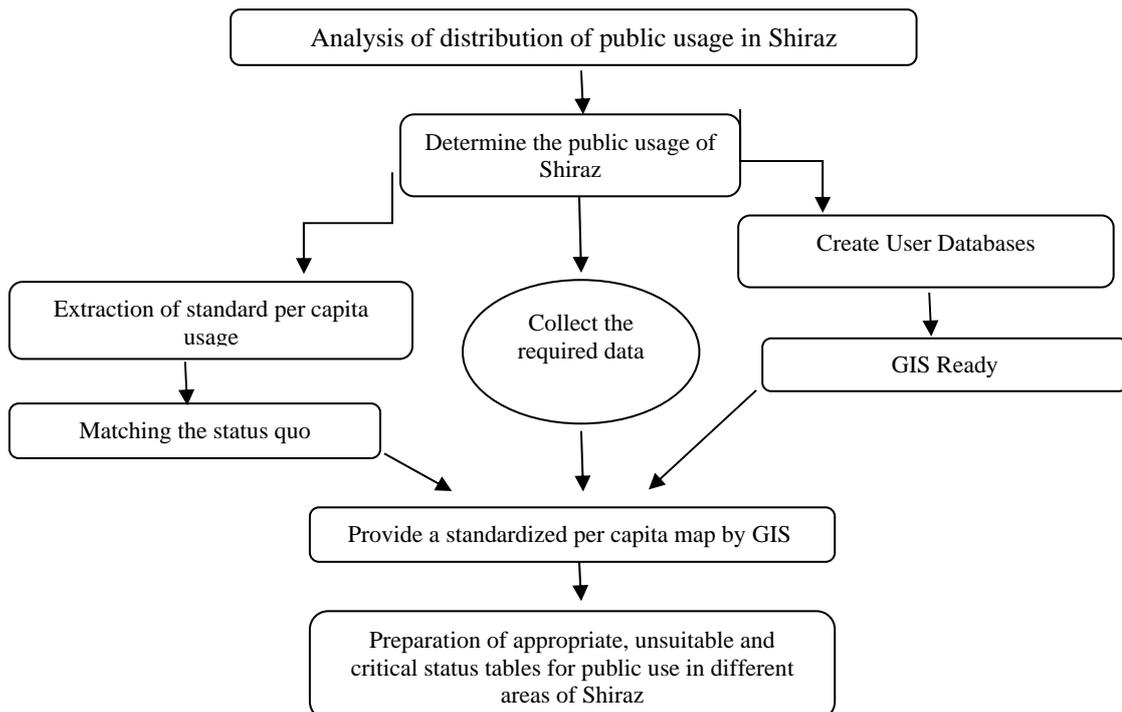


Figure 2: Conceptual model of the research

Results and Discussion

Evaluation of land use in Shiraz's ten districts

Every activity in the city has a special radius, which is also called the threshold of activity. According to this, the proportional level of the body of a city is allocated to that activity. Since this feature is different from city to city, due to its economic, social, cultural and geographical characteristics, it is necessary to plan, know, match and compare them in a realistic way (Pourmohammadi, 1993: 36). Determining the proportion of per capita in each city are important factors, because of the climate and natural conditions, social issues and customs, housing and technology, land prices, type and amount of income, type of livelihood, urban development opportunities, urban population requirements for welfare facilities and so on, and in proportion to the proposed density, and in relation to it, relative to each urban per capita is characterized involved in the art.

At the national level, there are no statutory norms and standards for determining all urban capitals. On the other hand, the use of other countries' standards for various urban applications is not due to the fact that their conditions are different from the point of view of the climate, cultural, economic and social

characteristics and the size of the empty households (Shi'a, 2014: 128).

Perhaps the easiest way to estimate the land needed for different uses is to calculate the actual needs of the city in the present, and to generalize and adapt the figures and quantities obtained with the future. As noted above, due to the differences in the level of economic, social, and national development, it can not be considered a single standard for all countries. Nevertheless, in order to provide an image of existing experiences, it is necessary to adapt and compare national and international usage. In Table 1, per capita applications in the regions of ten and Shiraz (researcher calculus), Iran (according to the Ministry of Housing and data of the planning and comfort consultant), and, in some cases, the world (based on the data of the hijackers) are compared. Table 1 shows the number of deficiencies in these applications in different parts of the city.

Table 1: Access to public utilities in Shiraz

Total	Facilities	green space	Official	Sports	Health	Tourism	cultural	religious	Educational	Land use	
59	1.2	8.4	2.1	1.2	0.6	0.4	0.3	0.4	1.4	Available	Shiraz city
64	5	8	1.5	2	0.75	0.2	0.75	0.75	3	Per capita	
7.25	3.8	0	0	-0.35	-0.35	0	0.35	1.5	1.6	Shortage	
6958	158	309	283	155	77.4	49	41.8	47.5	8.2	Area per hectare	
88.97	1.58	20.4	2.62	0.81	1.59	1.37	0.6	0.36	1.98	Available	Region 1
6.17	3.42	0	0	1.19	0	0	0.15	0.39	1.02	Shortage	
51.88	0.71	2.77	2.35	1.76	1.43	0.06	0.26	0.26	2.15	Available	Region 2
13.96	4.29	5.23	0	0.24	0	0.14	0.49	0.49	0.85	Shortage	
53.17	0.34	7.63	2.81	0.77	0.47	0.43	0.72	0.21	1.49	Available	Region 3
12.17	4.66	0.37	0	1.23	0.28	0	0.03	0.54	1.51	Shortage	
51.93	1.16	6.73	0.62	0.41	0.28	0.02	0.06	0.24	1.09	Available	Region 4
12.12	3.84	1.27	0.88	1.59	0.47	0.18	0.69	0.51	1.91	Shortage	
40.98	0.11	2.8	4.3	0.31	0.22	0	0.16	0.18	1.08	Available	Region 5
25.75	4.89	5.2	0	1.69	0.53	0.2	0.59	0.57	1.92	Shortage	
56.52	0.74	5.64	1.37	0.26	0.17	0.79	0.04	0.19	1.35	Available	Region 6
12.62	4.26	2.36	0.13	1.74	0.58	0	0.71	0.56	1.65	Shortage	
45.52	0.27	4.72	2.34	0.69	0.05	0.02	0.12	0.15	0.96	Available	Region 7
19.31	4.73	3.28	0	1.31	0.7	0.18	0.63	0.6	2.04	Shortage	
44.98	0.03	0.97	0.85	0.13	0.31	0.48	0.87	3.16	1.68	Available	Region 8
25.14	4.97	7.03	0.65	1.87	0.44	0	0	0	1.32	Shortage	
82.78	4.99	22.8	0.1	10.5	0.15	0	0.04	0.22	0.8	Available	Region 9
6.37	0.01	0	1.4	0	0.6	0.2	0.71	0.53	2.2	Shortage	
108.8	6.54	16.6	0.36	0.13	0.2	1.09	0.21	0.23	0.87	Available	Region 10
6.75	0	0	1.14	1.87	0.55	0	0.54	0.52	2.13	Shortage	

Source: Authors using Shiraz detailed design dat

District 1

District 1 as one of the largest areas of the city is a major part of the north, center and northwest of Shiraz. It covers an area of 3057 acres, about one sixth of the total area of the city of Shiraz. The population of the region is close to 160,963 people and its population density is 53 people per acre (Statistical Yearbook of Shiraz Municipality, 2015). Based on the available evidence, a large volume of investments and construction is taking place in the region. One of the most developed areas of Shiraz is District 1, which houses medium and high social groups. This area is not very well-suited for public utilities and is inadequate in terms of educational, religious, and cultural uses, sports, and equipment. The most common lack of utilization of facilities and equipment is 3.42 meters, which has the capacity to develop intermediate (unused and inappropriate uses) in this area to compensate for these shortcomings and achieve standard per capita in these applications. In general, there are 6.17 meters of per capita public usage in the area. The region is in a good position in terms of tourism, catering, medical, administrative, and green space. In terms of educational, religious, cultural, inappropriate status, and in terms of exercise, facilities and equipment, it is in critical condition.

District 2

Region 2 municipality, one of the 10th district of Shiraz, is located in the south and west of the historical texture. This area is limited to the north of the historical texture and the 3rd, 8th and 1th districts, west to district 1, east to the air base of Shiraz, and south to district 5 of the municipality. The area of the region is 1779 acres and extends linearly from northwest to southeast east of Shiraz to the west and southwest. The population of the region is 195651 and its population density is 110 inhabitants per acre (Statistical Yearbook of Shiraz Municipality, 2015). The area of the district two currently comprises two distinct parts: one surrounding the historical context, which has a history of more developed and more

ancient texture, the middle of the city is Shiraz, and the eastern and south-eastern parts of the city, which is the product of the last decade. If the scope of the historical-cultural area of Shiraz is considered as the first stage of urban development, other parts of the district have been the result of urban development forces in the past three decades, especially in the last two decades. District 2 is not suitable for public use. In the field of educational, religious and cultural applications, tourism, sports, green spaces, and facilities and equipment are in short supply and it is appropriate that the capacity for intermediate expansion (unused and inappropriate use) in the district to compensate for these deficiencies and to achieve per capita standard to these uses. In general, the district has a per capita deficit of 11.73 meters. It is in good condition in terms of health and medical applications. In terms of tourism, catering, educational, religious, sporting, green space, the situation is inappropriate and is in critical condition in terms of sports, facilities and equipment.

District 3

District 3 of the municipality is located in the east of the city of Shiraz. The total area of 1775 acres is 12% of the total area of the city of Shiraz. The population of the region is 205,775 people and its population density is 116 people per acre (Statistical Yearbook of Shiraz Municipality, 2015).

District 3 has a bad status in terms of public utilities and in terms of sanitary, therapeutic, religious and cultural uses, tourism and green space is inadequate and is only suitable for tourism, catering and administrative use, and is close to standard per capita. But on a per capita basis, training, sports facilities and facilities are in critical condition. In general, the area has a per capita footprint of 12.17 meters. The greatest shortage is related to the use of facilities and equipment with 4.66 meters. Therefore, it is appropriate that the capacity for intermediate expansion (unused and inappropriate use) in this area is

appropriate to compensate for these deficiencies and to reach the per capita standard for these uses.

District 4

District 4 of Shiraz Municipality is one of the 10 districts of Shiraz city located in the southwest of this city and since 1994 it was created as an independent municipality in Shiraz, and before that it was part of District 1 and is currently divided into two regions 4th and 9th segments. This area is adjacent to districts 1 in the north and 5 in the east. Although a small part of the area has a history of residence, but large parts of its center and southwest are still developing and building fast. The non-residential past of this region, the passing of the city's belt, the existence of a cement factory, and most importantly the operation as the gateway to the south and west of the city (Bushehr road), has led to the formation of large industrial and warehouses and heavy vehicle repair shops in the area. This is somewhat noticeable, which can be seen in the vicinity of the main streets of Amir Kabir and justice. The existence of large factories such as razmak and cement also confirms the industrial performance of the region. Also, the role of this region is very high due to the size and population added to the city of Shiraz. The total area of 2866 acres is 15% of the total area of the city of Shiraz. The population of the region is 241360 people and its population density is 84 people per acre (Statistical Yearbook of Shiraz Municipality, 2015).

District 4 has poor status in terms of public utilities. In the field of religious and cultural applications, tourism, office and green space is in poor condition, and it is in critical condition in areas such as sports, office, health and medical facilities and equipment. The largest shortage of per capita use of facilities and equipment is 3.84 meters and training use is 1.91 meters. It is appropriate to allocate the capacity for intermediate expansion (unused and inappropriate uses) in this area to compensate for these deficiencies and achieve a standard per capita for these uses. In

general, the area has a per capita deficit of 11.34 meters in public use.

District 5

The 5th Shiraz Municipality district with the current area of 1666 acres is located south of Shiraz, which is located in the north of the Army Boulevard and Shahid Hraf Street, and down to the south, down to the Abuzar Ghaffari Boulevard and Mehrab Street, and from the west to the Boulevard of Justice. The region's population is 15,956 people and 42,778 households in the area. The population density is 96 people per acre (Statistical Magazine of Shiraz Municipality, 2015). Five of the neighbourhoods of Kowsht Square, Ten Kaleh, Adel Abad, Ghaleh Qibla have been developed in recent years as residential buildings of 1-2 floors. District 5 is inadequate in terms of public utilities. This area is in good condition due to its administrative use and it is inadequate in terms of religious, cultural and green areas. In terms of educational, tourism, sanitary and therapeutic applications, sports, and equipment and facilities are in critical condition. The capacity for intermediate expansion (unused and inappropriate use) in this area is to compensate for these deficiencies and reach the standard per capita of these uses. This area is 15.59 meters second in terms of the lack of per capita use among Shiraz Municipality.

District 6

The region has a newly constructed texture that has been the product of the urban development of Shiraz to the northwest in recent decades. The construction of an electronics factory and Maaliabad apartment complexes and the establishment of proper access to this region-in the pre-revolution- provided the attraction necessary for the expansion of the residential development waves, and after the revolution, separation plans, often without respecting the minimum urbanization criteria, along with the activities of bourgeois retailers, bourgeoisie land has

started in this area. The sixth zone, due to the location of the deployment, the initial nucleus of its formation and the time of its expansion, is completely different from other areas of Shiraz. This difference in the role of the region on the city of Shiraz and the internal problems of the region have been crystallized. The total area of 556 acres is 3% of the total area of the city of Shiraz. The population of the region is 115,361 people and its population density is 207 people per acre (Statistical Yearbook of Shiraz Municipality, 2015).

The sixth district is in bad condition in terms of public utilities and in the field of religious, cultural, administrative, and green spaces in inappropriate mode, and in terms of educational, sporting, health and medical applications, and facilities with a critical state of affairs. The largest shortage of per capita is related to the use of facilities and equipment with 4.26 meters and green space usage of 2.36 meters. It is appropriate to allocate the capacity for intermediate expansion (unused and inappropriate uses) in this area to compensate for these deficiencies and achieve a standard per capita for these uses. In general, the area has a per capita footprint of 11.99 meters in public use.

District 7

District 7 of the municipality is located in the north of Shiraz. The area is 2347 acres, which is 9% of the total area of the city of Shiraz. This area is from the north to the mountains of Allah Akbar and the gate of Koran and Babakouh to Akbar Abad. The southern boundary is from the intersection of Ferdows baghehor Avenue along the Takht-e-Modarres Street to the Ghadir Pond. From the east to the Sardar Blvd from the Ghadir Bridge to the hillside and from the west of the Ferdowsi intersection, the bridge continues to the Ghat-e-Tahrt Crossroad and extends from the center of the foot to the mountain slope. The population of the region is 205,775 people and its population density is 83 people per acre (Statistical Yearbook of Shiraz Municipality, 2015). The area is also in bad condition in terms of public utilities. In the field of educational applications, facilities and equipment, health and

medical and sports facilities is in critical condition and in terms of religious and cultural applications, tourism and green spaces is in poor condition and only in standard administrative use is standard per capita. It is appropriate to allocate the capacity for intermediate expansion (unused and inappropriate uses) in this area to compensate for these deficiencies and achieve a standard per capita for these uses. In general, the area is 13.47 meters per capita in public utilities.

District 8

The study of the eighth district or central texture of Shiraz city, as is the case with most metropolitan areas of the country, shows that residential units with rooms and thick walls and clay coatings have become a dominant figure. What is first seen in this type of urban texture is the attention to social organism at the time of construction of these neighbourhoods and the non-conformance of this type of texture with urban facilities such as water, electricity, telephone, gas, etc., educational, recreational, cultural and also relief centers. Locating a lawyer market and other markets and passages in a worn-out and non-standardized area, crowded alleys, multi-storey shops, and the placement of various types of goods in an inappropriate atmosphere has added to the crisis in the region, which requires special attention. The area of eight is 379 acres, which is 2% of the total area of Shiraz. The population of the region is 47530 people and its population density is 125 people per acre (Statistical Yearbook of Shiraz Municipality, 2015). It has poor status in terms of public utilities and in the field of educational and administrative use is inadequate and is in a decent position in terms of tourism and catering, religious and cultural uses, but there is a shortage of green space in relation to educational, sports, facilities and equipment, sanitary and therapeutic applications, and is in a critical condition. The highest per capita consumption of green space is 7.03 m, the use of facilities and equipment is 4.97 m, and the use of sports is 1.87 m. It is appropriate to allocate the capacity for intermediate expansion (unused and inappropriate uses) in this area to

compensate for these deficiencies and achieve a standard per capita for these uses. In general, the area is 16.28 meters wide in public utilities, with a per capita shortage and due to the problems in this region, serious attention is needed.

District 9

District 9 of the municipality is located in the west and south of Shiraz. The total area of 2464 acres is 13% of the total area of the city of Shiraz. The population of the region is 116,909 people and its population density is 47 people per acre (Statistical Yearbook of Shiraz Municipality, 2015).

This area is not very well-suited for public utilities, but in other parts of the city of Shiraz it is better in terms of per capita. In the field of educational and tourism applications, there is a lot of shortage and is in critical condition. In terms of administrative, religious and cultural applications, facilities and equipment, health and medical conditions are inappropriate, and only in terms of utilizing green space and sports, there is a standard per capita standard. It is appropriate to allocate the capacity for intermediate expansion (unused and inappropriate uses) in this area to compensate for these deficiencies and achieve a standard per capita for these uses. In general, the area has a per capita deficit of 5.65 meters in public utilities.

District 10

The district of ten municipalities is at the end of the northwest of Shiraz, the area is located in the most beautiful lands of northwest of Shiraz. It has a newly constructed texture that is the product of Shiraz's urban development to the northwest in recent decades. The area of the region is 2434 acres, which is 13% of the total area of the city of Shiraz. The population of the region is 108,385 people and its population density is 80 people per acre (Statistical Yearbook of Shiraz Municipality, 2015). District ten is not well suited for public use. In the field of tourism and catering facilities, green space facilities is in good condition, but in terms of religious, cultural and administrative applications, it is in a poor situation. There is a shortage of sporting, health, and educational uses, and there is a critical state of affairs. The highest per capita shortage is related to educational applications with 2.13 m sports with 1.87 m and 0.55 m health care. It is appropriate to allocate the capacity for intermediate expansion (unused and inappropriate uses) in this area to compensate for these deficiencies and achieve a standard per capita for these uses. In general, the area has a per capita footprint of 6.75 meters in public use.

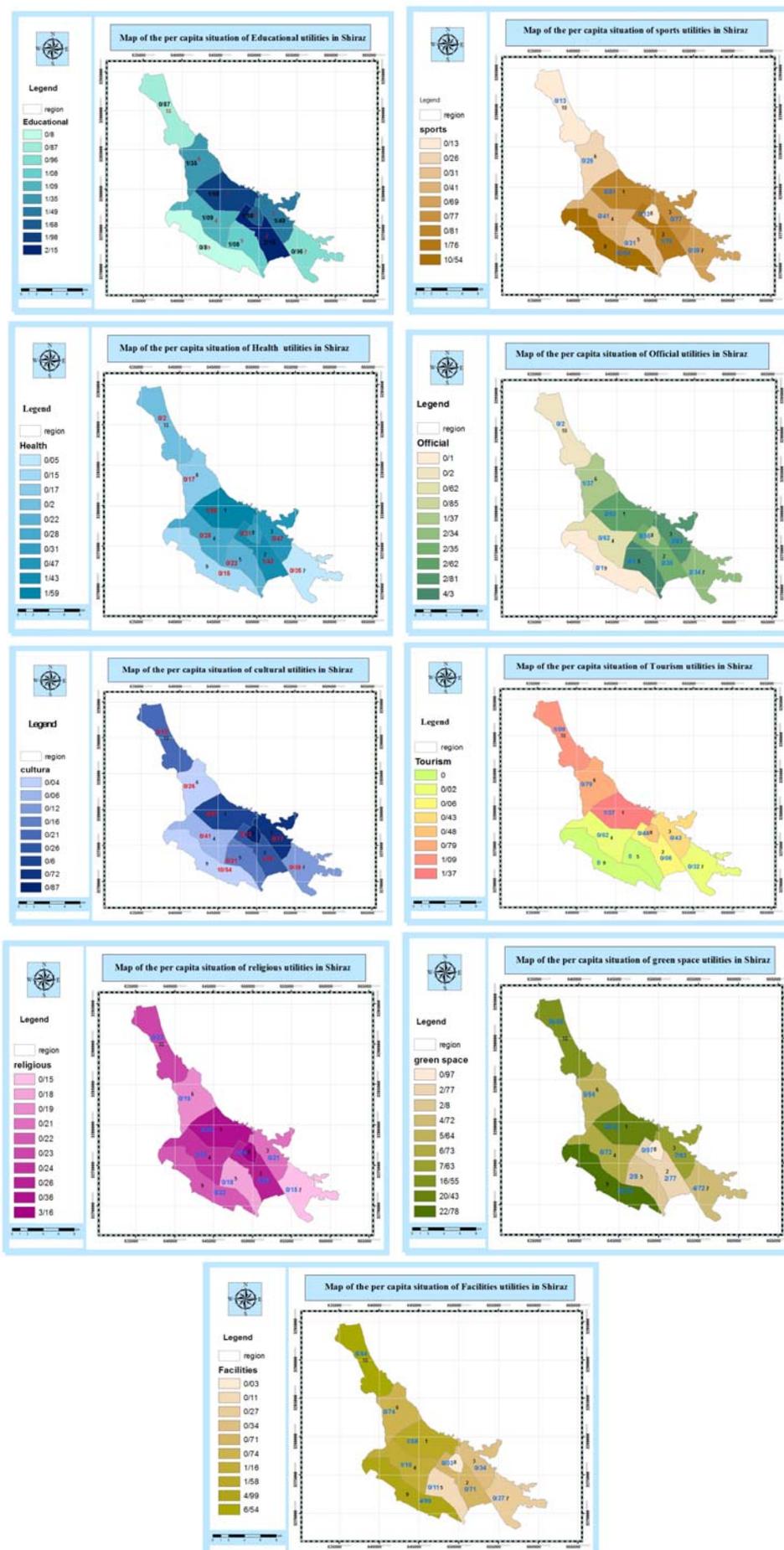


Figure 3: Map of the per capita situation of public utilities in Shiraz districts individually (Source: Authors)

General evaluation of land use in Shiraz

To evaluate the access of districts of interest to public land use zones, the map of land use per capita for the city of Shiraz was prepared. In general, Shiraz suffers from poor access to urban services and there is a deficiency of land use per capita across the board. There are about 5512.4 acres of unused or poorly used lands that can potentially be used to reduce the shortage of urban services. In case of reasonable planning, the existing land can fulfill the city's need for urban services. For the ease of analysis, the acquired maps were categorized into three categories of adequate (no deficiency), poor (more than 50% of the standard value) and critical (less than 50% of the standard value). In terms of educational land use per capita, districts 1, 2 and 8 are in poor condition, and districts 3, 4, 5, 6, 7, 9, and 10 are in critical condition. In terms of religious land use per capita, only district 8 has an adequate condition and the rest of districts have about 50% of standard per capita, which put them in the poor category. Although Shiraz is of significant historic and cultural importance for Iran, unfortunately, only one district (district 8) of this city has an adequate cultural land use per capita. In this respect, district 2 suffers from critical condition and districts 3, 4, 5, 6, 7, 9, and 10 are in poor condition. Given the history of Shiraz as a cultural capital of Iran, this poor condition

is troubling and deserves serious attention. In terms of tourism land use per capita, districts 1,3,6,8, and 10 meet the standard per capita, districts 2, 4 and 7 are in poor condition, and districts 5 and 9 have a critical condition. Only districts 1 and 2 of Shiraz have an adequate healthcare land use per capita, and aside from districts 3 and 9, which have a poor condition in this respect, the rest of districts have a critical healthcare land use per capita. A similarly unfortunate condition was observed in terms of sports land use, where aside from one district (district 9) with the standard condition and another district (district 9) with a poor condition, the rest of districts showed a critical condition. In terms of office land use per capita, districts 1,2,3,5, and 7 of Shiraz are in good condition and districts 4, 6, 8, 9 and 10 are in poor condition. It seems that Shiraz has a generally better condition in term of office land use than in terms of other land uses. Districts 1, 9 and 10 of Shiraz have an adequate green space per capita, while districts 2, 3, 4, 5, 6 and 7 are in poor condition and districts 8 is in critical condition in this respect. The worst condition was observed in terms of utility land use per capita, as districts 1, 2, 3, 4, 5, 6, 7 and 8 showed a critical condition, district 9 a poor condition, and district 10 a good condition in this respect.

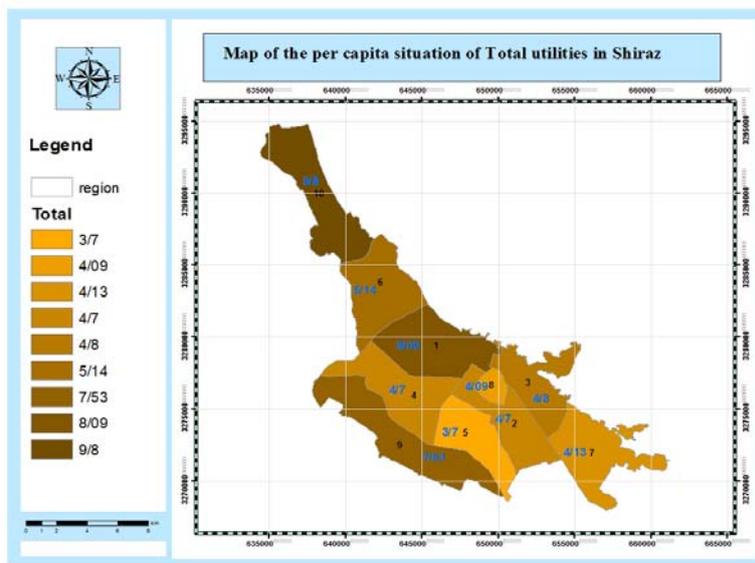


Figure 4: Map of per capita public usage in Shiraz Municipality

Table 2. Acute, incompatible, and compatible situation of use in different districts of Shiraz

Total	Facilities	green space	Official	Sports	Health - Therapy	Tourism and Acceptance	cultural	religious	Educational	Description
incompatible	acute	compatible	compatible	incompatible	incompatible	compatible	acute	incompatible	acute	
incompatible	acute	compatible	compatible	acute	compatible	compatible	incompatible	incompatible	incompatible	Region 1
incompatible	acute	incompatible	compatible	incompatible	compatible	incompatible	acute	incompatible	incompatible	Region 2
incompatible	acute	incompatible	compatible	acute	incompatible	compatible	incompatible	incompatible	acute	Region 3
incompatible	acute	incompatible	incompatible	acute	acute	incompatible	incompatible	incompatible	acute	Region 4
incompatible	acute	incompatible	compatible	acute	acute	acute	incompatible	incompatible	acute	Region 5
incompatible	acute	incompatible	incompatible	acute	acute	compatible	incompatible	incompatible	acute	Region 6
incompatible	acute	incompatible	compatible	acute	acute	incompatible	incompatible	incompatible	acute	Region 7
incompatible	acute	incompatible	incompatible	acute	acute	compatible	compatible	compatible	incompatible	Region 8
incompatible	incompatible	compatible	incompatible	compatible	incompatible	acute	incompatible	incompatible	acute	Region 9
incompatible	compatible	compatible	incompatible	acute	acute	compatible	incompatible	incompatible	acute	Region 10

Source: Authors, calculated based on detailed data of Shiraz city

Conclusion

One of the important goals of urban planning and management is the fair distribution and allocation of urban resources and services over the city districts in line with the needs of the people living in each area. After studying the city of Shiraz in this respect, it was

found that, in recent years, the city’s public services have not been expanded and the shortage of public land Use zones has steadily increased. These trends can be attributed to several reasons. The first reason is the ease of converting public land uses, as urban management is willing and able to sell public lands or to convert them to profitable zones (e.g. residential and

commercial) in order to solve budget problems at the expense of public zones. In addition, because of the rising price of urban lands, urban management and relevant organs cannot afford to purchase the private lands to expand the public zones where needed.

Moreover, poor land and housing policies have led to not only a disproportionate urban development but also the conversion of public land uses in the city's periphery to residential zones and infrastructures. This trend is clearly reflected in the expansion of city limits toward the northwest. Another important cause of the deficiency of public land use per capita is the expansion of informal settlements with a relatively high population density and without minimum public services in the city's periphery and especially on the lands originally designated as green space. Finally, an examination of disparities in the distribution of public land uses and services in Shiraz reveals that office, tourism and hospitality land uses have a better condition than others, and unfortunately, sports, educational, and utility land uses are in critical situation. District 1 was found to have the highest public land use per capita and districts 4 and 5 had the worst condition in this respect. This suggests a lack of order in the spatial distribution of zones, especially in relation to population and land use. Therefore, the urban management of Shiraz should pay closer attention to the planning of urban land uses, adoption and commitment to sound laws and policies on land use, and the use of effective methods for the preparation and implementation of urban plans and land use zones.

Comparison of these results with the results of previous studies shows that land use surveys and particularly public land use analysis are able to provide accurate results and thus promote citizen welfare by supporting urban managers in the decisions concerning service planning and provision. The resulting spatial and social justice in public land use distribution will contribute to the better development of the city in the future as well.

By extracting data from GIS and then calculating the per capita values accordingly, this study proved that building a purpose-specific GIS bank can significantly facilitate the regular update of land use data and their comparison with standard land use per capita, and is therefore suggested be addressed in future research.

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