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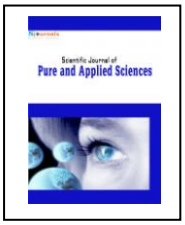

Original article

Analysis of the spatial-local distribution of the sport complexes using gis system (Case study: Kerman City)

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ABSTRACT

This article studies the exiting status of the sport spaces of Kerman city using geographical information system (GIS). After studying the exiting status of the sport spaces, it was found that the exiting distribution of sport spaces in the urban hierarchical level is not appropriate. In carrying out this research, first the field survey was performed using GPS, and then the resulted data were inserted in GIS software. After that, by applying the descriptive-analytical method using the resulted information, and also by applying the library method, the spatial- local distribution of the sport complexes of Kerman city was studied. The findings resulted indicate that distribution of the sport complexes centers of Kerman city, in contrast with other urban facilities, show lower abeyance from the urban categorical rules (urban zones, regions, areas and neighborhoods). In some regions, even sever shortage of sport complexes was observed. This article tries to provide some strategies for development of sport complexes towards meeting the citizens' needs.

1. Introduction

Use of urban lands and quality of their spatial- local distribution is an important factor towards optimized and desired use of urban spaces. The world where we live today is a global town that unfortunately contributes to being away from the natural environment and undesired acceptance of the unbalanced conditions which originates from the unbalanced relations of humans and urban spaces (Farid, 1996, 8). City is the reflection of the organized thoughts in a spatial- cultural region with its own rules. In short, city is not very simple to be defined, since, on one hand, it is constituted from forms, moralities, people, green spaces, landscapes, nature and natural material, and possesses different physical, morphological, social, moral and cultural buildings, and, on the other hand, city definers have had different specialties and visions, and any of them have defined city in proportion with their own attitudes (Rasool, 1993, 3). Accordingly, from the geographical point of view, city is a spatial composition consisting of different populations and forms (Grafemyer, Losep, 1994, 23). Therefore, urban lands use planning is a part of urban planning process which, while respecting its common relations with transportation and urban facilities planning, originally deals with position, extent and capitation of land required for different urban uses including residential, industrial, commercial, recreational, educational, cultural, religious, sport and treatment uses. Meanwhile, land use in connection with historical trend of the city evolution and spatial changes of urban anatomy are among factors in relation with which the city achieves its view and face during the time (Shalin, 1993, 9). In fact, land use can be considered as the spatial aspect of all activities of human being on the earth towards meeting his physical and cultural needs (Wirely, 1975, 77). In addition, it can be said that it is a series of measures organized towards meeting human being's physical and cultural needs which are related to land in any way (Mehdizadeh, 2000, 77). This planning tries to determine the pattern of urban lands in a scientific way and specify the position of different urban performances in coordination and balance with each other and with urban systems (Ziari, 1999, 125). In fact, without land use planning we can't provide a desired condition in cities for the citizens, since it requires using experts in all issues related to city. In most cities, lack of appropriate allocation of urban spaces and optimized elements and services to the sport complexes, and also the number of effective factors in positioning these centers, has resulted in ongoing increase of urban problems for the citizens. This indicates the necessity of using effective methods and optimized computer positioning systems for these centers more and more. In regard with Kerman city, we try to find out what is the status of use distribution of sport complexes in this city.

2. Research purposes

The followings are the most important purposes of carrying out this project:

- Evaluating the spatial distribution quality of sport complexes throughout Kerman city
- Using the facilities of the geographical information systems in recognizing the optimized locations for constructing sport complexes
- Providing spatial distribution map for presenting optimized services in sport complexes

3. Research method

In conducting this research, the position of sport complexes on the land was specified using the field survey method with GPS, and map was provided and position of the sport complexes was illustrated using GIS software. In addition, this research was written applying the library method and using different books, articles and sites. This article tries to present planning in a systemic manner. By systemic presentation we mean digitalizing the information including map, complications and descriptive data in the first step, and processing the data and analyzing and reviewing the information using GIS in the second step. Quantitative method was used for implementing the computations related to the capitations, and qualitative method was applied for investigating the adaptation status of sport complexes use with other uses, and also for investigating the spatial-local distribution of sport complexes.

4. The theoretical fundamentals of the research

4.1. Major goals in urban land use planning

The major goals relay on two main bases which are the sustainable development values and promotion of urban life quality. From the holistic point of view, these goals are divided to four main areas:

1 - Environmental goals which are towards the followings: preventing land destroy, preserving the connection between city and nature, developing the resources, preserving the historical and cultural structures, developing green areas, positioning the intervening industries and services, securing against accidents and etc.

2- Economic goals which are towards the following: using land in an optimized manner, preventing land speculation, regulating ownership rights, using land's extra value for the public interest and etc.

3- Social goals which are towards the following: reducing inequality in land use, increasing public facilities and services, extending public spaces, optimizing old contexts, improving the beauty of the urban environment, reinforcing the neighborhood identity, promoting the quality of residential and recreational uses and etc.

4- Spatial-physical goals which are towards the following: distributing the uses in a balanced way, preventing interference of inconsistent uses, preserving balance in the vertical and horizontal development encouraging diversity and intermixture of uses, preserving balance between mass and space, compiling appropriate criteria and standards for uses and etc. (Razavian, 2002, 57).

4.2. Minor or particular goals in urban land use planning

These goals are tools for achieving major and point goals, that planning efforts are made towards achieving them:

1. Efficiency: this goal may be achieved through recognizing the most appropriate type of use for a given piece of land, which leads to the highest benefit through the lowest cost. This way, urban development may be performed in a logic manner and by considering the public welfare which ensures the people's health, and by positioning the pollutant sources out of urban region, different urban pollutions and pollutant centers may be prevented and blocked.

2. Equality: in regard with equality, the goal of land use planning is to provide accessibility to the required facilities for all groups by accurate and planned land use, and also to distribute the benefits resulted from these facilities equally for different groups of urban population.

3. Sustainability: sustainability in land use means to apply the facilities and potential power of any piece of land in a way that these potentials are neither reduced nor destroyed, and their capacity and static status are increased continuously.

4. Public welfare: one of the main and effective factors in determining the goals for urban land use planning is public welfare considerations.

4.3. The determining factors of public welfare are

a) Health
b) Safety
c) Comfort
d) Security (Pourmohammadi, 2008, 5).

4.4. Optimized criteria in urban use position

In determining the local and spatial specifications of any type of land use and any type of urban activity, two leading factors are considered as criteria which are social welfare factor and economic welfare factor. Based on these two main factors, the following six criteria are considered as criteria of urban land use planning in positioning the urban performances:

1. Consistency: the most important effort in urban planning is positioning for different uses throughout the city and separating inconsistent uses from each other. Uses which produce smoke, noise and traffic must be separated from other uses and especially from residential, cultural and social uses (Saeidnia, 2008, 24).

2. Comfort: the two components of distance and time are the most important components in uses positioning. Types of accessibilities are evaluated by distance and time. These two factors are considered as unit for measuring comfort. Quality of accessing the urban services required by the residents, and also being away from annoying and inconsistent uses are considered to be among the main components of comfort (Ziari, 2009, 30).

3. Efficiency: The urban land price pattern is the main factor and basic criterion for determining the land use location. Any use planning, from economic and investment point of view, is evaluation of land price and its status

in regard with preparation and development costs which are determined by cost-benefit analysis method (Saeidnia, 2008,24).

4. Desirability: Desirability and nicety in urban land use planning means effort towards preserving natural sources, creating open and pleasant spaces, and formation quality of roads, buildings and urban spaces (Pourmohammadi, 2009, 94).

4.5. Specifications of different sport lands

Sport lands are remarkably diverse and studying all of them is not feasible. However, it would be useful to mention some main specifications of sport lands, which are mostly constructed in parks and open urban spaces by the municipalities, based on physical hierarchy.

a) Neighbor unit sport center: in neighbor unit sport center, facilities for popular sports such as football, basketball and table tennis are predicted outdoor. The use radius of neighbor unit sport center is 300m, and its capacity is 2000- 4000 persons. The minimum area of these centers is considered to be 500sqm, and they should be able to meet the primary needs of youths and teenagers living near these centers.

b) Neighborhood's sport center: In neighborhood's sport center, in addition to the outdoor spaces for the sports played in the neighbor unit sport center, there are sport saloons designed for gymnastic and chess. In other words, neighborhood's sport center has a n indoor sport space with multipurpose saloons for several sports. The use radius of neighborhood's sport center is 800- 1000m, and its capacity is about 1000- 1400 persons (players and spectators). In this sport center, in addition to sport spaces, some side installations are constructed including office building, installations, buffet, landscape and green area.

c) Region's sport center: in the region's sport center, there are extra spaces for both outdoor and indoor spaces. Lands are designed in standard sizes, and competitions may be held in the sport spaces. The use radius of region's sport center is 1500- 3000m, and it covers a population of about 30000 persons. The average area of these centers is 20,000- 30,000 sqm, and a capacity of 7000 players and spectators is predicted for it.

d) City's sport center: city's sport center almost provides all required sport spaces for the citizens. Although constructing some of these spaces, such as paths for skiing, canoeing and mountain climbing, depends on the climatic and environmental conditions of the city, and constructing such spaces is not feasible in some cities, but spaces for other sport fields may be executed in all cities. Size, use radius, population and capacity of this sport center depend on the city's population and shall be determined depending on the case (Saeidnia, 2008, 40-45).

5. Criteria of sport lands locating in the city

a) Accessibility: easy accessibility is the most important criterion in locating sport spaces. This is true for all sport centers; either small centers or city sport center. However, the regulations for realizing this criterion vary in different levels. In neighbor unit and neighborhood's sport centers, accessibility is correlated with centrality. In other words, if these sport centers are located at the center of neighbor unit and neighborhood, the average radius of accessibility would be reduced, and the easy accessibility criterion would be realized. However, easy accessibility in the region's sport centers, and larger centers, requires enjoying appropriate and high-capacity accessibility network, since, unlike other cultural and recreational spaces (such as libraries, outdoor spaces and etc. which have been studied before), users of these spaces are not only the players and athletes, but also the spectators. Therefore, at the time of competitions, the demand for traveling to these centers is increased, and, if no proper accessibility network exists, there would be extended traffic disorder around the sport center.

b) Comfort: another important criterion for locating these spaces is citizens' comfort. Sport spaces are considered to be among noisy spaces, and thus, if they be located near residential, educational or treatment regions, players' and spectators' tumult and uproar, which are resulted from movement and excitement of sport activities, would divest citizens' comfort. Therefore, these spaces should be located in sites where they do not disturb citizens, comfort. Establishing a buffer zone between sport center and the uses which are sensitive to noise pollution, spacing between these inconsistent uses, applying green spaces, roofing the sport spaces, and applying other methods for reducing noise pollution would contribute to realizing this criterion.

c) Land's low slope: low slope is another criterion for locating spaces for most of sport fields; except from for some fields such as mountain climbing and ski which require high slope, other sport fields require low-slope lands.

d) Adjacency (abuttals): proper abuttals for neighbor unit and neighborhood's sport centers are parks, green spaces, cultural and recreational spaces, residential neighborhood and educational centers. In regard with the

region's sport centers, and larger centers, in addition to the above-mentioned items, highway networks, good climate zones, countryside's and foothills are proper abuttals. Inappropriate abuttals for sport centers are health and treatment uses, industrial and workshop uses, and trash collection or removal sites. Land choice should be done after investigating the use of adjacent lands and determining the rate of consistency or inconsistency with their performances (Saeidnia, 2008, 47- 48).

6. Capitation of sport spaces

The area per capita of the sport installations in different countries, from east to European and American countries, is different. France presents an area of 35sqm per each residential unit, and England and America provides 10sqm and 15sqm per individual respectively.

In average, an international common area of about 25sqm sport and green space is considered per any individual out of which about 18sqm is related to green spaces and the remaining to the sport spaces. However, yet there are no determined regulations in Iran in this regard, and practitioners perform in case manner and based on foreign sources. For instance, in Esfahan comprehensive plan, 10 percent of the city's area has been allocated to sport spaces, which is a remarkable rate comparable with western criteria.

In Iran, it's about a half century that comprehensive plans are being proposed for cities' development; however, yet there is no well-known standard pattern meeting the practitioners' and planners; needs in determining the minimum capitation for land use.

The primary urban designed standards in Iran for supplying the specific capitations were adapted from other countries, since, on one hand, the designers of these standards were graduates of foreign countries, and, on the other hand, unlike today, there were no specified local criteria in this regard. Furthermore, applying the standards of other countries in regard with different urban installations including residential, treatment, educational, sport and etc. is not perfect and fault-free, since conditions of the foreign countries, in regard with climate, cultural and social characteristics, income, households' sizes ad etc., are different with those of our country. Since the urban life conditions in the State's different regions are basically different, urban capitation sizes and criteria of one city of Iran may not be executable in other cities. Considering this fact that our country has various climates, conditions and natures which are effective on the citizens' life style and means of livelihood, the criteria proposed for cities of Iran are just suggestions. In some countries, the sport spaces per capita, in proportion with different types of sport environments and for different age groups, reaches 8sqm per each urban citizen (Ghaderi, 2007). Considering the sport installations, a capitation of 4sqm has been recommended in Iran for children of 7- 14 years old, youths and adults (Shie, 2007, 86).

6.1. Position of the study case area

Kerman province, with 181714 square kilometer, is located at the south of Iran Country, and allocates 11 percent of the State's total area to itself. From the geographical point of view, this province is located between 55 and 25 to 32 of northern latitude, and 25 and 53 to 29 and 59 of eastern longitude from Greenwich meridian. Kerman province is one of the widest provinces of Iran, which is located at the zone of Central Plateau of Iran in form of a closed area. The heights of this province, which are sequence of central mountains of Iran, begin from volcanic mountains of Azarbayejan and continue to Balouchestan.

Fig.1: position of Kerman city (Saleh Gohari, 2011, 85)

6.2. Population changes

In the first public population and housing census, population of Kerman city was estimated to be more than 62 thousand persons in 1956. Population of this city in the years 1956, 1966, 1976 and 1986 were 85404, 140761, 255371 and 384991 persons respectively. Population growth from 1956 to 1966 was 3.9 percent. From 1966 to 1976, this figure reached 4.5 percent, and from 1976 to 1986, a growth equal to 3.3 percent was observed (Abadihaye Keshvar Geographical Dictionary- Kerman, 2003, page: 34). Population of Kerman city was 360862 persons in 2001, 377828 persons in 2002, 393572 in 2003, 512042 persons in 2004, 529738 persons in 2005, and 503011 persons in 2006 (Census Center of Iran).

6.3. Sport capitation status of kerman city

In Kerman city, sport space area (of sport complexes) per any individual is considered to be 4sqm. According to table 1, a dramatic difference may be observed in regard with shortage of sport spaces.

Table 1
capitations of Kerman city in different regions.

Sport complexes Regions	Region 1 Population: 140616	Region 2 Population: 65286	Region 3 Population: 105764	Region 4 Population: 203347
Area				
Salimikia	32000			
Iranmanesh				13125
Adl				13338
Kiani	15333			
Ravari	11200			
Vazin	4160			
Enghelab				11520
Khajoo				11000
Emam Ali		57000		
Volleyball & Basketball	45000			
Shahzadeh Mohammad				8000
Sarasiab				50000
Total area	67193	57000	-	106983
Capita	0.47	0.87	-	0.52

Capitation of sport complexes of Kerman city is generally 1.3sqm per capita.

6.4. Analyzing the uses of kerman city's sport complexes

In this section, which represents the population and its distribution status and also distribution of sport complexes throughout Kerman city, using analyses of geographical information system and index overlap model, two main factors of population and sport centers would be measured based on each other, their distribution would be is evaluated, and finally required number of sport complexes in each region would be recommended.

Region 1

Region 1 embraces 5 sport complexes that are Salimikia, Kiani, Ravari, Vazin and Volleyball & Basketball. This region has a population of 140616 persons and 36097 households. Based on the mentioned standard, this region is able to preset services to its entire population. The sport complexes of this region have been centralized in an area, and possess desired situations from qualitative point of view.

Region 2

Region 2 has 1 sport complex that is Emam Ali. Population of this region is 65286 persons and 17023 households. According to the mentioned standards, this region required 2 sport complexes, while it has only 1 sport complex. However, the condition is almost desired and currently there is no need for constructing another sport complex since the exiting one has the ability of presenting services to the residents of this region.

Region 3

Region 3 has no sport complex. The population of this region is 105764 persons and 26350 households. Based on the mentioned standards, this region requires 4 sport complexes while it lacks any sport complex. Therefore, this region is not able to meet the residents' need and has an undesirable condition.

Region 4

Region 4 embraces 6 sport complexes that are Iranmanesh, Adl, Enghelab, Khajoo, Shahzadeh Mohammad and Sarasiab. Population of this region is 203347 persons and 48518 households. Based on the mentioned standards, this region requires 7 sport complexes. However, having 6 sport complexes, this region has a desirable condition and currently there is no need for constructing another sport complex.

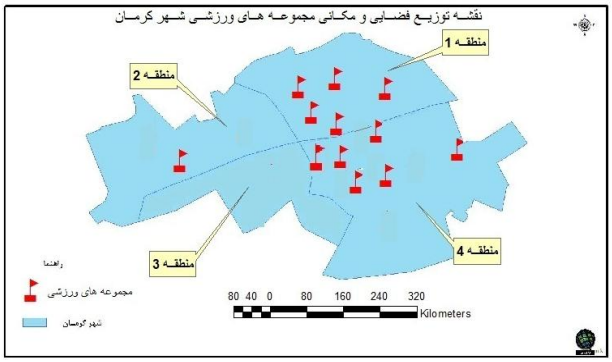
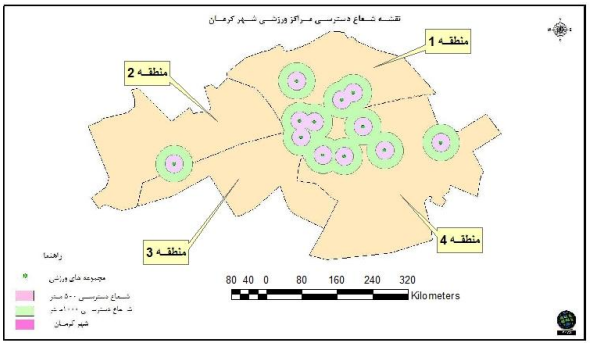


Fig. 2. map of spatial distribution of Kerman city's sport centers.



Fig,.3, a map of accessibility radius of Kerman city's sport centers,

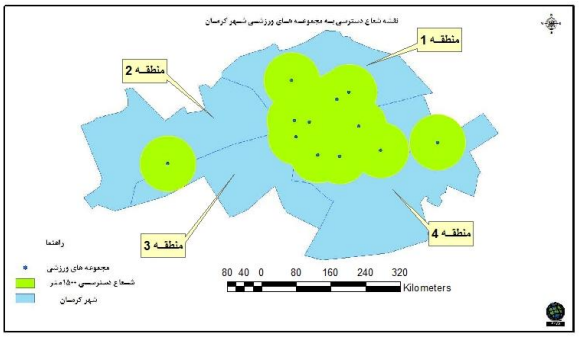


Fig. 4. map of 1500m accessibility radius of Kerman city's sport centers.

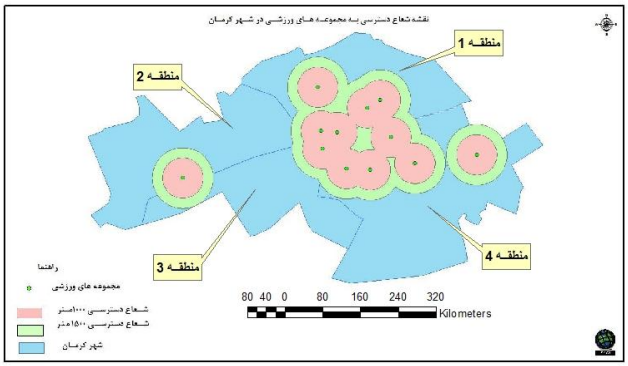


Fig. 5. map of accessibility radius of Kerman city's sport centers.

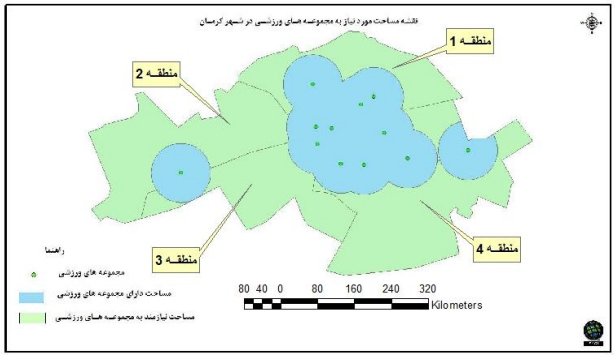


Fig..6. map of required area for Kerman city's sport centers.

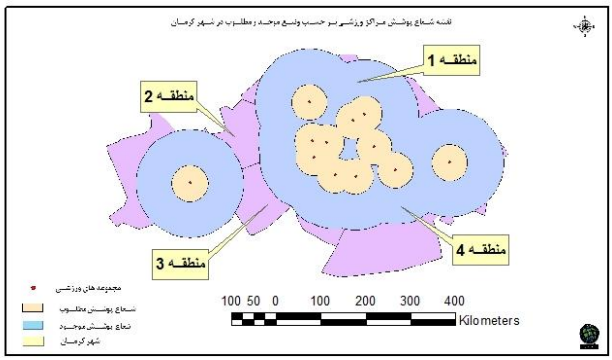


Fig..7. map of cover radius of sport centers according to the exiting and desirable statuses in Kerman City.

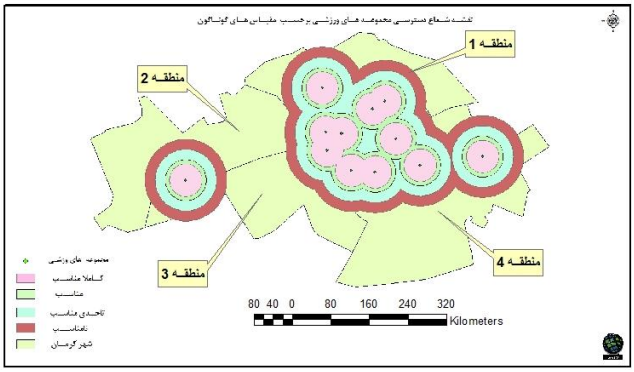


Fig. .8. map of accessibility radius of sport centers according to the different scales.

7. Recommendations

According to the above mentioned issues, and considering all of these cases, this research presents the following strategies approximately:

1- Municipality, as an institute which is responsible for allocating urban land uses in the comprehensive and detailed plans, should present more complete and accurate criteria regulations and standards in regard with sport uses.

2- Construction of 3 sport complexes in 3 regions of Kerman city is necessary since these regions lack enough sport complexes.

3- The Physical Education Organization (Sport & Youths Organization) and Municipality should benefit the experiences of other advanced countries of the world in regard with location allocation manner and distribution quality of sport centers.

4- Sport & Youths Organization and Municipality should have careful supervision on the affair of allocating lands to sport uses, and respect the criteria, regulations and standards in practice.

5- Sport & Youths Organization and Municipality should have careful supervision on distribution of sport centers and, in practice, respect the criteria, regulations and standards in this regard.

8. Conclusion

Reviewing the findings resulted from this research indicate some points which will be discussed in the following. Considering the data gathered from Municipality, Sport & Youths Organization, field surveys and analyses performed using geographical information system software, the following results were obtained:

Region 1, with a population of 140616 persons and 36097 households, which has 5 sport complexes, is in a desirable condition and requires no new sport complex to be constructed.

Region 2, with a population of 65286 persons and 17023 households, requires 2 sport complexes while it has 1 sport complex. However, the condition of this region is almost desirable and currently there is no need for another sport complex to be constructed.

Region 3, with a population of 105764 persons and 26350 households, has no sport complex and it requires 4 sport complexes.

Region 4, with a population of 203347 persons and 48518 households, which has 6 sport complexes, is in an almost desirable condition and requires no new sport complex to be constructed.

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