

Assessing usage of urban lands using GIS system (Case study: Jouybar City)

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Abstract: Today according to increasing development of cities and lack of balance in distribution of usages, organizing usage of urban lands is so significant. In this research we dealt with usages in Jouybar City. The aim of the research is that by studying current condition of land usage of Jouybar City and recognizing different urban usages such as residential, trading medical and by comparing these usages with standard per capita, we can specify level of shortage in every usage. In this research using analytical-descriptive approaches we dealt with usages. By applying geographical information we analyzed usages. Likewise, the results achieved from assessment indicate quantitative per capita of most usages present is not compatible with scientific criteria and urbanization standards. There is shortage in most usages and some of usages do have good condition which indicates lack of balance in condition of usages and should be guided towards balance through an accurate planning.

Key words: Assessment; Urban lands use; GIS System; Jouybar

1. Introduction

1.1. Issue

The world where we live is a city whose result is being far from natural environment and unwanted acceptance of lack of balances which originate from imbalance relationships of men and urban space (Yadollah, 1996). From half of the twentieth century disorganizations have been made in usage features of lands in cities which are due to effect of unplanned urbanization in developing countries. Hence, in order to expand urbanization, organizing land use is significant (Seyfoldiny and Zangane, 2006). Assessment process demonstrates reciprocating nature of urban design process; assessment results need returning to previous steps so that statistics and information and criteria which are gained can be investigated again and in spite of necessity needs and solutions will be defined again (Ziary, 2002).

Development of Jouybar City in recent years is influenced by population growth and villager's immigration to this city which caused city development in agricultural fields and non-normative usage of agricultural lands around city. Texture of most neighborhoods in this city still has rural characteristics because of their urban backgrounds. The residents are mostly farmers and gardeners. This made some difficulties such as unsuitable locating, imbalance distribution of facilities and so on. Some plans are needed for preventing from above problems; the ones which are presented in this research are as follows.

Necessity of urban lands usage plan, optimum allocation of urban space to usages by considering standards on one hand and imposing compatibility, desirability, dependency and capacity of usages with each other in urban scale. By using criteria and standards available in this research we tried to assess urban usages by geographical information system in a good way. Meantime we assessed current condition of usages across Jouybar City. After that per capita and density of each of them were dealt with and they were compared with standards of Iran.

Background of land usage studies in the world is not that long. For the first time in 1826 in a book called isolated government which was related to agriculture and national economy Foon Tonen emphasized land usage models according to prices of agricultural products. After his studies, studies of land usage started (Ziary, 2010). Many years after Tonen Technique sporadic efforts were made in relation with urban land usage studies. They were done by Robert Park, Ebenezer Howard, Kamilo Ziteh, Vagner and so on. But from the beginning of twentieth century on in America the first comprehensive efforts were made in explaining land usage theory by Homer Hoyt, Ernest Berges, Rodrik Maknezi, Edward Olmen and Firy. In Iran some homes were built in a planned (organized) way. If we try to investigate usage background of urban lands with the same title and based on scientific principles, we should argue that background of these studies is so limited and is mostly related to the time of preparing the first urban comprehensive plan (Entezari and Rashtiany, 2012).

1.2. Previous research

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Too many books and article were printed and published regarding usage background of urban lands in Iran and the world. At the same time there have been some researches within framework of urban planning M.A. and PhD dissertation some of which are as follows.

Sandy Pen Das et al. (2013) in an article named "studies of assessing urban lands proportion using GIS measurement, case study", dealt with quick urbanization and growth of urban lands in a county in India To do so, investigation for responding demand for population increase up to 2021 and suitable and locations for future construction were shown and also some areas were considered as green belt which should be maintained (Das et al., 2013).

In an article called "land use planning process in Singapore", Lee Koanio (2013) pointed out that in recent years Singapore had had significant population growth. Population growth in Singapore results from city-village and city-city migration phenomenon. Effects of population quick growth in this country led to some changes in infrastructures and usages in urban spaces. Singapore Government started policy of establishing new cities in line with solving this problem (Kuan Yew, 2013).

1.3. Theoretical perspectives land use

There are various views on urban land usage, but in a general aggregation we can mention them with five main views which are as follows (Zerabi et al., 2012):

- 1-Theory of social role of the earth
- 2-Theory of economic role of the earth
- 3-Theory of organizing earth
- 4-Theory of modernism and land use
- 5-Theory of urban constant development and land use

The view which we consider in this research is urban constant development. From this aspect, city development always needs planning. This planning should be able to provide good spaces for establishing different urban elements by appropriate guidance of capacities and resources available. This way moreover exploiting space, satisfaction feeling of citizens will be proved.

2. Definitions of concepts

2.1. Land use

Urban land use and the way of their spatial-space distribution are key functions in order to use urban space in an optimum way. (Ebrahimzadeh and Majir Ardakani, 2006) Definition of land usage means applying land for special goals by men (Turner and Meyer, 1994).

2.2. Planning urban land use

urban land use planning spatial and space organizing of activities and urban performances are based on needs and desires of urban society and form main core of urban planning. In other words, land planning is the science of dividing land and location for applications and different life usages which is applied for effective usage of land and fine space discipline. In this planning urban land models are specified scientifically and locating of different activities in city is done in coordination with each other and urban systems (Pour mohammdy, 2013).

2.3. Assessment

Assessment is a tool for measuring plans` efficiency and for providing logical steps for future planning in advanced planning system (Habiby, 2011).

3. Geographical position of Jouybar city

Jouybar City is one of central cities in Mazandaran City with area of about 285/5 square kilometers which includes 1/20 percent of the province's area. This city has humid and wet climate Average annual rainfall of the city is 78/44 millimeters and average temperature is -1/6 to 37 degrees centigrade which is changeable. (Housing and city planning organization of Mazandaran, 2003). According to public population and housing census in 2006, population of the city announced 27138 people and based on growth rate of 2006-9(1/03 percent) the population was estimated 28189 for 2009.



Fig. 1: Geographical position of Jouybar City (Source: Housing and Urban Development- Drawing: Aghapour)

4. Quantitative assessment of land use

In this research analyses are based on identification and matching urban usage per capita with current condition and the way of allocating urban space to each of different usages. In this process per capita and standards for optimum allocation of urban space to different urban usages are considered. Ratio of these usages is varied depending on environmental condition and human and district functions in different countries. However in national level they are different according to

geographical condition (Ebrahim zadeh et al, 2010). Usually after determining total area of city in current condition and in the suggested horizon, we need to determine urban per capita including residential,

trading, business, industrial and entertaining per capita (Ziary, 2002).

Table 1: Shows some standard per capita and spaces needed in different urban level by introducing top performance in each level

Top usage	Physical ratio of city	Per capita and space needed in different urban levels
Kodak Park	Alley	Per capita between 1 to 3 square meters, minimum breakdown piece 650 square meters
Kindergarten	Alley	Per capita 8 square meters (4/5 square meters of open space and 3/5 square meters of covered space)
Daily trading	Alley	Fine number of units, one unit for each 255 people Max breakdown piece, 500 square meters
Primary training	Neighborhood	Min 9 square meters (open space of 5 meters and covered space of 4 meters) (min area of 2500 square meters)
Weekly trading	Neighborhood	Number in neighborhood centers 1 unit for each 335 people, max breakdown piece of 85 square meters
Neighborhood Park	Neighborhood	Per capita between 2 to 4 square meters, min breakdown piece of 1 hectare
Primary training	Quarter	Min 11 meters for each student, min area of 7000 square meters for each 600 people
Monthly trading	Quarter	Number in center of quarter, 1 unit for each 535 people, Max breakdown piece 100 square meters
High school education	District	Square meter for each student, Min area of 1 hectare for 800 people
Wholesale trading	District	1 unit for each 800 people In breakdowns piece in each district 120 square meters
Clinic	District	Per capita for each 100 people 25 square meters Min breakdown piece 2500 square meters
Nahie Park	District	Per capita of 3 to 6 square meters for each person Breakdown piece of park between 6 to 8 hectare
Hospital	District	For each 1000 people 370 square meters, Min breakdown piece 2/5 hectare
Trading unit	District	Min total level of breakdown piece in district center 500 square meters

A combination of summary in tables of 3-19 for urban usages per capita (Habiby and Masayeli, 2008)

According to studies conducted and field researches from total usages present in 14 the city, 14 usages which are the most important ones were selected and ratio of per capita and space allocated to each case were investigated and analyzed.

4.1. Residential function

Residential usage is the widest one across the city. Main residential pieces in neighborhoods of the city are placed next to each other in an organic and disorganized way so that no block has an organized structure. Residential houses in Jouybar City are villa-based and have yards. According to field impression during spring of 2014 among 1370 pieces, 7899 residential pieces were in Jouybar City. Density of these pieces owns maximum volume of residential density which is adjacent to Emam Street and it is main road. Residential usage devoted

maximum area of the city to itself which is equal to 3000971/30 square meters.

4.2. Training usage and researches and technology training

Training usage distribution across the city should have neighborhood operation. Noticing access factor in locating them is so important especially in lower levels such as elementary and junior high school. In higher levels such high schools and technical and professional centers whose performance level becomes transnational in small cities, it is better to choose points which are available for majorities. From among 52 training pieces, there exist 2 higher education centers, 16 elementary schools, 6 junior high schools, 9 centers of pre-elementary school, 13 high schools and 6 other training pieces. These usages were distributed across the city.

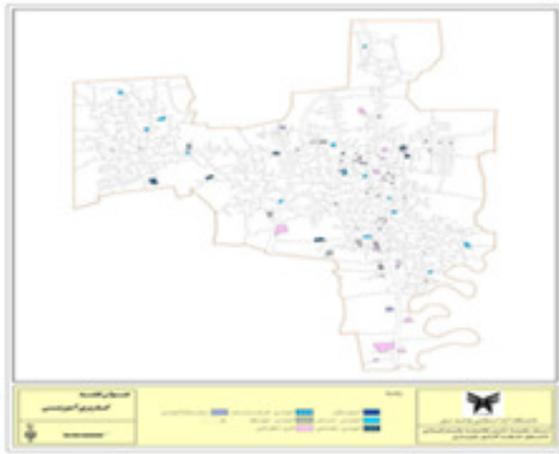


Fig. 2: Training usage map

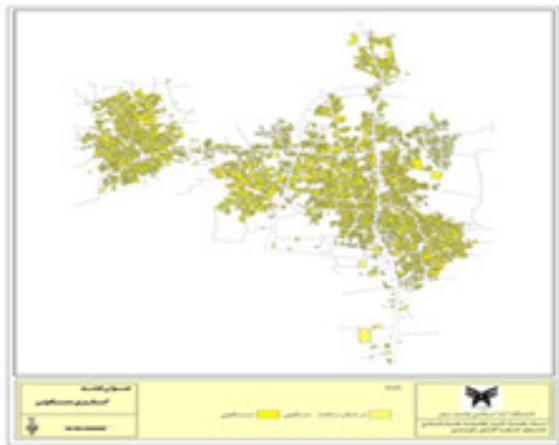


Fig. 3: Residential usage map (Source: Housing and Urban Development- Drawing: Aghapour)

4-3-Business and law usage:

This usage is among public welfare services usage whose nature is providing welfare for public citizens of cities. So in distribution model of these usages we need to care about two factors of population density and access. But in Jouybar City this usage is not

distributed in the whole city and was located only on Emam Street to Sepah Square

4.4. Trading-servicing usage distribution

This usage across Jouybar has been linear and around main center of Emam Street. Few usages are located in distribution form. Performance of this section is mainly neighborhood-based across the city. Inside city's neighborhood, trading usage distribution is significantly reduced. Trading centers of the city are mostly formed in tiny pieces with high price including 2304 pieces and 241501 square meters

4.5. Medical and sport usage

Because of little population there is only one hospital in Jouybar City which currently meets needs of citizens and also there is health care in some neighborhoods and about Sport usage This usage is among public welfare services and its locating must be in a way that makes access easy and it should be a hobby during citizen's free time, since Jouybar is famous for its wrestling this usage is nearly sporadic across the city.

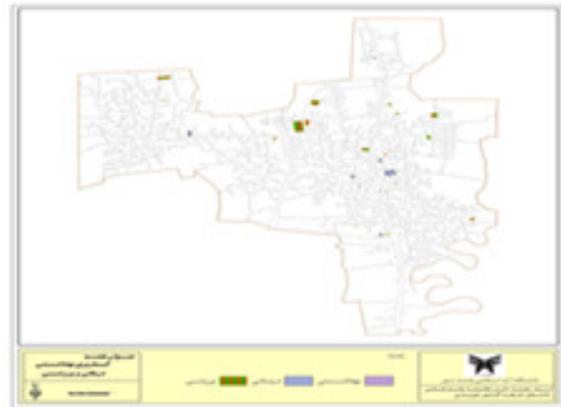


Fig. 4: Health and sports User map



Fig. 5: Business and landscaping map (Source: Housing and Urban Development- Drawing Aghapour)

4.6. Industrial usage

According to rules and regulations and environmental problems of big and non-organic industries, livestock and aviaries need to be placed out of the city. Despite this principle, there are various factories and workshop units some of which are placed in neighborhood tissue whose area is 80036 square meters. This usage was distributed in all parts of the city.

4.7. Cultural-artistic and religious usage

Another usage which is necessary for citizens is the need to library and cultural-artistic centers which are so few. And about Another key usage of city is religious one where in each city there must be one mosque. Moreover Masjidjame Mosque, this city has lots of other masques in all the neighborhoods.

4.8. Usage distribution of park

There are only two small parks across Jouybar which don't meet needs of citizens and also they are a long walk.

4.9. Entertainment-tourism usage

The city has got only on Entertainment-tourism center which is so minor compared to the city population.



Fig. 6: Cultural and religious User



Fig 7: industrialusers' map (Source: Housingand Urban Development- Drawing: Aghapour)

4.10. Usage distribution of transportation and storage

This type includes access network and stores, terminals and parking garages. This usage is 76 and 47181 square meters in area, respectively where 4 terminals are located in the north and south and western south of Jouybar. 70 waste storages are located around north, west and eastern south of the city, and the reason behind this locating is being away from city centers due to pollution.

4.11. Agricultural land distribution

This type includes gardens, dry lands, farms, route of rivers and usages which are being built. There are 535 gardens with area of 1978357 square meters in the suburb of the city. There exists 1589 pieces of land with area of 1106803 square meters between buildings. Also there are 399 farming lands with area of 3950410 square meters around the city and 511 pieces are being built with area of 196500 square meters across the city in distributed form.

4.12. Equipment usage distribution and city installations

Equipment usage distribution and city installations include equipment and graveyards in the city. Equipment available in this city allocated 8939 square meters of the city to them

4.13. Comparing with standard per capita

To assess usage of the city, current condition of usages was compared with standard of per capita. Due to spatial position of Jouybar City and because of being located in plain section of the country and horizontal construction in this city, residential usage has surplus residential per capita to standard per capita. Other usages do have annual surplus, except in cultural sectors, park and green space, tourism sector and urban, production, industrial and workshop instalations.



Fig. 8: Comparing with standard per capita map (Source: Housing and Urban Development- Drawing: Aghapour)

4.1.4. Quantitative assessment of land usage

Table 2: Comparing standard per capita and per capita of current condition

Difference with standard per area		Standard per area		Current condition per area		Type of usage		Urban usage	Established surfaces
11.2	349029	83.75	3350000	97.7	3000971	Residential	Residency		
7.5	162498.4	10.1	404000	5.6	241501.6	Trading	Working centers and activity		
0.2	9948.77	2.45	98000	3	88051.23	Training	public welfare services	Urban usage	Established surfaces
1	30651	1.1	44000	0.4	13349	Health and medical			
0.7	20841	0.62	24800	0.1	3959	Cultural			
-0.6	-18109	0.75	30000	1.6	48109	Religious			
10.1	310219	8	320000	0.3	9781	Park and green space			
3.3	101908	3.75	150000	1.6	48092	Sport			
-1.5	-41546.5323	1	40000	2.8	81546.5323	Business and law			
1.5	47222	1.25	50000	0.1	2778	Tourism			
14.7	452866	18.92	756800	9.9	303934	Total public welfare services			
8.6	265868	50	2000000	56.4	1734132	Transportation and storing			
1.1	75060.71	2.1	84000	1.6	8939.29	Installations and urban equipment	Urban usage	Established surfaces	
-2.4	-72036.16	0.2	8000	2.6	80036.16	Productive-industrial-workshop			
59.9	1712529.188	183.99	7359600	183.7	5665179.81	Total levels made			

Source: studies of writer

5. Conclusion

Urban land usage planning way of using distribution, protection, spatial and space organizing of activities and urban performance are all investigated equal to standards, current condition and future condition; a certain timing period. Analyzing land usage of Jouybar City shows that this city has had too much population and physical growth due to its servicing role and because of not caring about urban points of the county during several decades. So that most lands and gardens around the city turned to different usages especially residential ones. So in order to balance usages and urban civil construction, it's necessary to plan and balance cultural, sport, green space, health, workshop and transportation usages. The studies done indicate Jouybar city is like other cities with population of about 27138 people with area around 727/2 hectare in residential, religious, trading, sport, and religious usages from quantitative aspect. But the point here is that all the usages mentioned do need good distribution and right locating in different area of city. On the other hand some usages such was training, business, green space and health are not in a good condition from quantitative aspect. The highest level allocated to usages is as follows, respectively.

Residential, roads and streets, farming, gardening, dry land, residential garden and trading and the lowest level is for cultural and health usages.

Generally we can argue that condition of Jouybar City land usage is not fine at the moment. There are too many shortages from usage aspect and usages mentioned did not follow urban common standards in Iran. So with right planning and management we can raise levels of these usages to other ones and this way we can establish organized and coordinated communication among urban usages of Jouybar City.

6. Suggestions

An outlook of this city is providing good spaces for attracting tourists and athletes (the city is regarded wrestling capital of Iran). Providing park per capita and green space and also providing space per capita and cultural environments is that important. There could be good replacement for these usages due to presence of empty lands, farmlands and gardens in city.

Regarding physical development of the city, with an attitude towards theoretical basis especially urban construction development it is advised to keep developing city in suburb lands and after saturation of the area lands around it should be developed with following objectives:

Developing future of the city based on land skills, city face, facilities, limitations and physical growth. Developing and establishing cultural spaces such as movie theaters, playhouses and art galleries. Making spaces and cultural environments can have a key role in strengthening cultural level of city. Developing and making parks and urban green spaces and making neighborhood parks and playgrounds for children. In most neighborhoods of the city we have sites and places which are not used which by turning them to playground for children we can reduce shortages of playgrounds.

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