

Prioritize and Location Finding Land for Housing Development in the Satellite Cities of Using the AHP Model (Case Study: Bahar City in Hamadan Province)

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ABSTRACT

Land as a non-renewable wealth in the city, one of the main topics of interest to managers and urban planners And meantime housing as a basic requirement in many aspects, it is important for citizens, Supply of land, locate and prioritize lands for housing development in a long-term perspective with regard to residential culture of the people of this city, Among the important factors that are known to stabilize the population and increase the weight in small towns And the balance in the settlement system of the metropolis, has a very significant role. In this study, a research scholar in the field, through all the land, Archival information about housing needs in a horizon of 20 years (2032) in Bahar cities, the major satellite cities of Hamadan and Location Finding housing and effective criteria, using the AHP model as a multi-criteria approach to Location Finding and prioritization of lands for housing development in the Bahar cities. The results indicate that the physical development of the city tend to be concentrated on the tissues of the middle And tend to develop in the West and has access to the main road.

KEYWORDS: Bahar cities, Housing development lands, location, Prioritize, AHP model

INTRODUCTION

Land as a nonrenewable wealth in the city, in the most different user, it provides various services to residents and citizens, Under urban land use, according to city population size, has a certain standard, It is learned that as per capita, increasing urbanization and growing demand for housing, according to most officials and planners to address the housing needs of citizens draws, But according to the needs of future generations, while the current needs of the most essential topics that will be great emphasis on the scientific community, But the formation of each residential unit and create a suitable environment for human life must include the various stages of planning, design and construction is over, The lack of attention to their principles or even a failure to perform properly, can cause various problems(Mahmoudi, 2009:p121), The residential user, the most original and largest city is to provide the most basic needs of people, With different dimensions and different that people in urban space, a sense of belonging for more public space, social and economic dimensions of the transfer. Meaning of urban space and time to meet all aspects of their environment, which is becoming the place. Private space to house citizens can be considered (Shirani, 2007:p25), Most land in the occupied territories and in different cultures have their own space is limited to situations in which geographic factors have also played a role unmatched, However, one of the most important principles in this section, the words that go beyond the concept of living and housing and households for the collection of biological activity lies in the social relations (Ahari, 1991:p7), The values of every community in the form of a culture that emanated from the social aspirations of the community, Defines crystallized and their surroundings, so these features shows. Land for housing in the horizontal distance must be selected in place the necessary features for the enjoyment of other services in the appropriate space according to different criteria is, The results confirm that the populations and prevent population displacement, especially in villages towns and satellite cities is, Because today, one of the problems, lack of appropriate links in the network environment and urban systems in the urban settlements, Often a lack of regional balance and weight, the main conditions for the development of rural towns, satellite cities and towns, is very hard. And while the concept of sustainability is an important part of city, village city, lies in the word. Forming units of urban development that will shape the structure of this concept, a strategy for sustainable development approach. This strategy focuses on the development of future activity centers and thus prevent the growth of dispersed and identity(Behzadfar, 2010:p79). This study measures the determinations effectively Location Finding housing, Using the AHP model as a multi-criteria approach to prioritization of housing development land in Bahar cities is studied.

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RESEARCH METHODOLOGY

This study is an applied research that in which the researcher has studied the physical and structural development of the city in different direction by employing field methods, as well as identifying the development capacities, the limitations and barriers. In this walk, the researcher has studied the distribution of uses with suitable location critiera in various dimensions in order to determine suitable direction, place and amount of land needed in a 20-year horizon Using the model AHP to prioritize and Location Finding land for housing development in Bahar cities, As one of the Metropolis towns of Hamadan satellite deals.. In this study, the researcher has been dealing to study and investigate some available documents and information in relevant organizations such as municipality, housing and urban development and statistics centers in order to obtain necessary information to predict the population and housing needs in the scope.

- Research Goals

- To study environmental, natural and human conditions and existing status
- To study the urban growth and development status in the residential system of Hamadan province
- To study housing situation and its needs in the province and satellite cities
- To determine the location, amount and suitable directions of land development And priorities by using AHP model

- Volume of sample

Bahar in the middle zone of the province was selected as a sample from the six cities of Maryanaj, Joreghan, Salehabad, Lalejin and Asadabad cities.

- Research questions

- Are environmental, natural and geographic conditions effective in urban land development location?
- Are social factors effective in finding location of housing lands in satellite cities?
- What criteria could be effective in determining and finding location for housing development lands in the satellite cities?
- Is it different standards, land development, housing choice and prioritized in satellite cities?

- Research variable

Independent variable: Empty lands capable of being used for development inside city.

Dependent variables: Slope, substructures, topography, communication roads, urban services, natural hazards, river limits.

- Research territory

Hamadan with 19491 square kilometers area includes 2.1 percent of total area of Iran. This province is located between 33 degree and 59 minutes to 35 degree and 44 minutes northern latitude and 47 degree and 47 minutes to 49 degrees and 30 minutes eastern longitude from Greenwich meridian(Iranian Statistics Center, 2011). According to the political divisions, Bahar is the central city (Capital) of Bahar city and is located in the central section (south Bahar) of city. Bahar is between 48 degree and 25 minutes to 48 degree and 27 minutes geographic longitude and 34 degree and 52 minutes to 34 degree and 55 minutes geographic latitude. In terms of general situation, the city is located in 15 Klm distance in northwest of Hamadan and the most essential communication road of city with surrounding settlement areas is through Hamadan-Kermanshah Road. Bahar in addition, is connected to Lalejin and other settlement spots in north via the asphalt road in its north zone. The nearest settlement in south around Bahar includes Yekanabad and Mehriabad, in east, Ghorogh Bahar village, in north, Ganj Tappeh village and in west, Salehabad town. The most important natural characteristics of the city is Ghourichai river in north and west and Alvand mountain chains in south of the city(Boom Negar Pars Consulting Engineers, Development Plan of Bahar City, 2007).

- theoretical

Land

In terms of starting point of any urban development, including housing, industry, services...land is of high importance and each plot of urban land is considered valuable as it is exclusive and exceptional than other plots and in general, due to the supply restrictions(Hashemzadeh Homayouni,2000:p414). Land covers a major part of natural resources and holds various characteristics and specifications, recognizing them are greatly important in land use planning. Those specifications make the land especial and distinguished as well as becoming a core and center and in legal and private ownership viewpoint, land is a consumable property; and, in economic view, it is a capital in its essence. Land, particularly in connection with resources market, is a location position(Ghazi, 1991:p11). The urban land polices are affected by laws that controls the method of govern ownership on urban lands.

Housing

In the Second Congress on Mankind Settlement (1996) held in Istanbul, a suitable housing has been defined as follows: "A suitable shelter does not mean having a roof but it means comfort and suitable space, physical access and

safety, ownership safety, structural sustainability, suitable light, ventilation and heating systems, suitable primary substructures, suitable environmental quality and suitable place with accessibility to work and primary facilities and all of those factors should be provided with respect to people's affordability(Pourmohammadi, 2010:p3). In Iran, the housing policies have been planned based on two factors of demand and supply. Different policies have been taken by the ruling governments to housing development since Islamic Revolution until now. Since several factors have affected on housing in Iran during the few past decades, this sector has been facing with different crisises(Motamedi,1995:p413).

Housing development lands

Governmental housing units play very important roles in both quality and quantity terms in the countries that face to housing shortage; however, as the housing problems gradually become less, the private ownership and housing production has flourished by private sector(Shokrgozar, 2006:p63). In this section, using various criteria, the in-bound or peripheral lands are selected by private or governmental sectors to be used for construction; nonetheless, most often, the housing development lands are forecasted in form of development plans and since those estimations often lack spatial and residential analysis in zone level- lack of that information or neglecting it- makes city a polarized place or causes discretion in urban networks in various levels. The housing development land, also called urban development reserve land- is a complex of city lands that is selected based on natural, physical, demographic, economic... nature in a 10-20 year range to fulfill residential demands of the city in a direction free from natural or artificial barriers and have necessary accessibility to services, including essential substructures (Bahreyni et al, 2006:p1).

Model of suitable places to housing function development

Suitable places for developing residential regions should have 1 to 8 percent land slope, maximum 1600 meters height and southern and eastern geographic directions for semi-hot climate and western position for hot climate, observing the limits of known faults in the zone based on the regulations and laws of geology and the faults width in the zone. In addition, legal distance should be taken from dried riverbeds and floods ways and no residential structure should be allowed to be built in 50 to 300 meters distance of flood canals limits. The legal distance should be observed from energy, water, gas and electricity networks, establishment of green landscape in the zone, maximum wind speed of 15 meters per second, study of water reservoirs, conformity of existing pattern of water sources based on the ecological model of Iran, attention to protecting historical and cultural pieces and spots and highly fertile and fertile soils as well as underground water resources must be protected. Furthermore, especial attention should be paid to the damages causing by any probable flood and determining the flood risk regions are among other measures that should be taken in housing functions development activities(Gharegouzlou, 2005:p25). In general state, development takes place in three forms: City-connected development; disconnected development with a distance that would make connection to city possible in a specific time intervals(Hosseinzadeh Dalir, 2006:p25). Of course, one item must be added since there are various and different factors involved in selecting suitable place in developing urban lands; among them, one may discuss access to substructures and urban services, communication roads and economic and social issues that in turn has extensive elements.

- The Analytic Hierarchy Process (AHP)

Analytical Hierarchy Process, short for AHP, is a multi-objective decision making method which combine qualitative analysis with quantitative analysis and put forward by the American operations research expert T. L. Saaty in the 1970s[Zhen Ye, 2010]. During the last decade the AHP has become one of the most used methods for the solution of a wide range of problems in different areas of human needs and interests. For example, the AHP has been used in various industrial applications as operations management decision-making [Partovi, 1990], managing the risk of projects[Dey, 1994], benchmarking logistic operations and project management [Korpela ,1996 & Dey, 2002]. AHP can simplify system analysis and calculation work by structuring, arranging, standardizing and quantifying people thinking process and subjective judgment, so that many uncertain factors are much reduced [Qiankun Wang, 2012]. In other words, the AHP is a flexible, powerful and simple For decision making under conflicting decision criteria

In other words, the AHP is a flexible, powerful and simple For decision making under conflicting decision criteria makes it difficult to choose among alternatives, is used. Different stages of (AHP) is the following:

- 1. Draw diagrams to locate and prioritize the analytic hierarchy process(AHP)
- 2. Important factor determining the criteria and sub-criteria
- 3. Determine the coefficient Options
- 4. Determine the final score (priority) options
- 5. Examine consistency in judgments(AsgharPur, 1998:p297).

- Research findings

Housing status in Hamadan Province

Study housing indexes is one of the recognized tools and methods on housing characteristics and by its help, effective parameters on housing could be identified and any planning and decision making on housing could be

facilitated(Maleki 2003:p6). Indexes are in fact measurement tools on housing position and the process of changes as well as an assessment tool on measuring success and realization of housing policies. For this reason, in addition to assessing the status, they could be also used in developing the quantitative goals of plans. In general, the housing indexes could be divided in three main groups: A: Quantitative indexes of housing, B: Qualitative indexes of housing, C: Economic indexes of housing(Hekmatnia and Mousavi, 2006:p116). In line with this important issue and based on existing information, according to the census of 1986, the number of residential units of province was 235160 and in the census of 1996; that is 10 years later, that number reached to 292327. In another word, during that period, 57167 residential units were added to the number of previous period units and this increase for one decade shows a growth rate of 2.20. Based on the same information, as taken from Iran Statistics Center, listed in table (1), in the last census, the number of residential units of the province had reached to 369472 units and this 77145 units increase somehow shows a growth rate increase from 1996 to2006, showing 2.40 growth rate for that period(Iranian Statistics Center, 2011). Studies of this research on the process of housing needs, with all increases and the growth rate of the last two decades showed that based on studies of Housing and Urban Development Organization, Hamadan is short of 22908 residential units in 2006 and the highest shortage was for city of Hamadan. Immigration and absorbing population of peripheral cities and villages could be one of the most important reasons of increase in that demand in Hamadan city; therefore, one of the ways to remove that shortage, due to the spatial restrictions and closeness of this city to the satellite cities in middle zone, along with ambiguities and disputes which are usually observed in determining the limits and boundaries of this city and other cities, and unfortunately, various barriers in physical development have restricted the residential development. Removing housing problem of satellite towns of Hamadan and directing a part of overflow population to those towns could be achieved thorugh proper location and indentifying needs in a long-term horizon. The importance of establishing suitable grounds for establishing housing in cities, aims at preventing migration to capital cities of the province and preventing negative growth of those cities. The table and diagram number 1 list the 41 percent share of Hamadan city of housing demands of province. This shows the centralization of population and services and appearance of a city that in the absence of proper planning for the settlement system of satellite cities; its urban network will face a serious in balance, loss of weight and polarization of the central zone versus weakness of other zones, especially northern and southern zones(Boom Negar Pars Consulting Engineers, Development Plan of Bahar City, 2007).

Rural	Urban	Province	Year
140,252	94,908	235,160	1986
126,109	166,218	292,327	1996
139,844	229,628	369,472	2006
-1.10%	5.80%	2.20%	Increase Rate 1986-1996
1.00%	3.30%	2.40%	Increase Rate 1996-2006

Table number 1: Housing status in population and housing census of 1986-2006

(Source: Iranian Statistics Center, 2011)

Housing status in Bahar

In order to have a better understanding of residential spaces, this city is divided into 2 zones and 6 blocks. According to the calculations made from the map, the existing status of the city showed that total land use area of the city is 160.25 hectares. The share of this land use from total gross areas of the city was 20.37 percent and the proportion to the net surfaces (built) was 41.2 percent. The per capita of the land use in existing status is 44.57 square meters per individual. In addition, the net housing density in this city is calculated to be 224 persons per hectare(Boom Negar Pars Consulting Engineers, Development Plan of Bahar City, 2007).

1	lable number	· 2: Average	distribution o	f area o	f residential	plots in	Bahr city blocks	

Dla ala		Residential										
BIOCK	Surface (Square Meter)	Number (Plot)	Plot Space Average									
Block 1-1	247909	834	297									
Block 1-2	293375	1147	256									
Block 1-3	135723	515	264									
Block 1-4	115750	387	299									
Block 1-5	124643	491	254									
Block 1-6	64982	287	226									
Block 1-7	168677	806	209									
Block 1-8	154131	556	277									
Block 1-9	91990	401	229									
Block 1-10	5353	3	1784									
Total	1602535	5427	258									

(Source: Boom Negar Pars Consulting Engineers, Development Plan of Bahar City, 2007)

During past years, the residential units of Bahar have been affected by cultural and economic actors including various materials and construction techniques.

During the last 15 years, using local and traditional materials has been significantly reduced due to homogeneity in producing construction materials in the country. The techniques and materials of residential units in Bahar shows that iron and bricks have been the main construction materials in the units. In such buildings, after foundation, the platform is made; the floor and walls are thus immune from ruins caused by humidity. The load bearing walls are made of bricks and cement mortar and the ceiling is made of iron beams and cross beams. The final coat is bitumen and asphalt or Isograms (insulation brand) to prevent moisture penetration. According to the last studies, in 2006, more than 452 residential units were built with metal or concrete structure, and those materials account 8.33 percent of total residential units of the citv(Boom Negar Pars Consulting Engineers. Development Plan of Bahar City, 2007). Distribution of residential buildings as per construction materials and blocks of the city shows that blocks 1-7, one of the newly constructed parts of the city- with 34.24 percent metal and concrete frame (structure) had highest ratio among blocks in terms of this type of construction materials. Studies show that in central blocks of the city, including blocks 1-2 and 1-4, low durability and poor materials such as cement block, mud, mud and bricks...were used in many buildings. Those blocks are considered as worn out and low blocks of the city(Boom Negar Pars Consulting Engineers, Development Plan of Bahar City, 2007).



Map number 1: Zoning and blocks of the city

(Source: Researcher's studies)

Study of population structure in Bahar Population of city and its change process

According to the results of general census of population and housing of 1996, the resident population of Bahar was 25865. The existing studies show that the population was steadily increasing in 30-years period of 1966-1996; although the relative intensity of growth differed in time intervals. Based on the results of general census of population and housing, the population of 1956 was 9615, of 1966 was 11843, while the population reached to 14489in 1976, and has increased to 21678 in 1986.

Therefore, it could be observed that the city population in this time has increased for 2.2 times taking the breakeven of the total increase coefficient of population for three subsequent decades. In each subsequent decade, the population respectively has grown 1.2 times, 1.5 times and 1.2 times per decade.

In another word, in the first two decades of this time, the acceleration of grow population has been increasing. While in the last decade, there has been a considerable reduction in the population grow acceleration, as if the relative intensity of population grow is almost equal in the first and third decades of this time period.

The number of city dwellers in 2006 was approximately 27481 that show its grown1.1 times in that decade. It thus could be observed: First, Bahar is a small and low population town, second: the net breakeven of impacts of attraction and rejection forces of the population was not significant and the population has increased in a relatively low rate and third: the population increase rate was higher to 1986 and after that, it has been gradually reduced and is becoming lower and lower. Bahar City's population in 2011 to 30490 people (Iranian Statistics Center, 2011).

Average annual growth of city population

Based on accessible information, the average annual growth of population of Bahar has been 2.28 percent during 1966-2006 and the breakeven of similar size of this growth rate in three subsequent decades 1966-1996 is (2.04%, 4.11% and 1.78% respectively) and average size of growth rate per years of this time period 1996-2006 has been almost 1.08 percent. Therefore, spite of its small size and low population, Bahar is one of the main cities of Hamadan Province and its population is only less than the population of the five cities of province (Hamadan, Malayer, Nahavand,

Touyserkan and Asadabad) and is more than population of other 11 cities of the province. In this distribution model, the relative share of city of Hamadan is 49.5 percent, Malyer, 17.8 percent, Nahavand, 8.0 percent, Asadabad 6.0 percent and Touyserkan is 4.7 percent, having more than 86 percent of urban population of the province. In any way, based on existing information, due to less acceleration in population growth of Bahar, in compared to the average size for total urban population of province (with respect to the increase in number of cities), the size of relative share of its population is diminishing gradually as far as this size reduced from 5.1 percent in 1966 to 3.2 percent in 1996 and its similar size in 1976 and 1986 was 4.5 percent and 3.8 percent; respectively. According to similar implications, that process has been continuing in recent years as well and the relative size of population of Bahar from total urban population of Hamadan is approximately 2.9 percent(Boom Negar Pars Consulting Engineers, Development Plan of Bahar City, 2007).

Prediction of future changes in population

In general, the noteworthy point in the urban plans in various levels is the close relationship between population and land. Both categories affects to each other and the change in one of them would cause change in the other category. Therefore, the study requires careful population analysis and studies in order to be able to calculate the needed land carefully in plan horizon. On the other existing situation and population elements could be always obtained through census of people and housing as well. In this part, by using two methods of linear growth and exponential growth model, we will investigate the population of bahar in the plan horizon by using special analytical relations and prediction methods, (2032) are studied.

- Exponential growth model

This model is obtained based on the proportion between desirable populations to base population by exponential ratio of growth rate.

$$r = (\sqrt[n]{\frac{P_n}{P_0} - 1}) \times 100$$
 $P_n = P_0 (1 + r)^n$

In this relation, r is equal to growth rate between the origin years (P0=1956) and horizon year (Pn=2006).

$$r = (\sqrt[50]{\frac{27481}{9615}} - 1) \times 100 = 2.1$$

Since The growth rate between 1956 to 2006 was positive and predicting population of horizon 2032, according to 2012 population and that growth rate, is as follows:

$$P_n = 30.490(1 + \frac{2.1}{100})^{20} = 46203$$

As it could be seen, the population of the city will be 46203 by accounting the growth rate of the previous 50-years period to the horizon of year 2032. After making population studies and suggesting population for the plan horizon, the amount of land should be calculated that are needed for residential units horizon that are going to build in plan. We have predicted to needed land the by making structural, population, economic...studies and by considering all aspects and various analysis from the two methods that has mentioned above. The method is explained in details as follows.

In first method, we started with taking the three items of suggested population and estimate the number of housing units per family coefficient in the residential unit and average of family size.

H= P/KS

In above-relations, H is number of houses needed, P is the population as predicted in plan horizon, K is the coefficient of number of families per residential units and S is the average of size of family.

By placing the numbers of above-mentioned items in the formula for Bahar city, the number is obtained to be 9714 residential units. After obtaining the number of necessary units, divide it into the net residential destiny to obtain area of land needed for housing building.

H =
$$\frac{46203}{4.1 \times 1.16}$$
 = 9714 .A = $\frac{H}{D}$ A = $\frac{9714}{224}$ = 29.97

With respect to the above calculations, it could be seen that 30 hectares land is needed for this plan with 46203 populations.

In second method, which is a simple method, the population of horizon year of plan is multiplied in the residential per capita to obtain the size of residential land for the year 2032. The number is then subtracted from the current residential land use of city to calculate the size of land needed.

According to the above calculation, 45 hectares of land is needed.

With respect to the methods used and considering the two population growth as suggested for 2032 and the two methods of calculating land and considering all aspects, in average, 38 hectares land is needed.

By considering the existing conditions of the lands as located in the city boundaries and connected development form, is considered as first priority and development outside city boundaries- but inside city limits is the second priority.

In this research, by considering the following factor, the AHP multi-criteria model has been used. According to the calculations of previous parts in average, 38 hectares land is needed; therefore, since there are already 54 hectares of uncultivated, deserted and under construction land is available in the city, which are not included in fertilized agricultural lands, gardens, green landscapes and environmental protection and preserved zones, we will face no shortage of land and the priority is to use existing lands.



Map number 2: Options of locations found for Bahar City

(Source: Researcher's studies)

- Research Analysis

- Analytical Hierarchy Process (AHP) steps in bahar cities:

1- charting Analytical Hierarchy Process for prioritizing the desired location:

At this stage of the hierarchy consists of four levels: goal, criteria, sub-criteria and alternatives are outlined, The Analytical Hierarchy Process is the most important part, Because these issues are difficult and complex analysis, analytic hierarchy process, they Turns simply match with the mind and human nature.



Diagram Analytical Hierarchy Process to prioritize and Locating the desired

2- Determination of coefficient of criteria importance and sub-criteria

For determine the importance coefficient (weight) criteria and sub criteria, we compare them two to two.. In this comparison, the judgment base is the following table with 9 quantities that based on it and with respect to the goal to study, the criteria i to criteria j is determined to be aij.

Privilege	Explanation	Description
1	Equal Importance	2 criteria have equal importance in achieving goals
3	Little more Importance	Experiences show that importance of I is little more than j in achieving goals
5	Importance of More	Experiences show that importance of I is more than j in achieving goals
7	Importance of Very more	Experiences show that importance of I is very more than j in achieving goals
9	Total Importance	Importance of very more of I in accordance with 1 has been proved certainly
8,6,4,2		When there is average status

Table number 3: saaty, T.L. 9 compared quantitative criteria for comparing binary

(Source: Tofigh 1994, page 24, quoted from Thomas L. Saaty)

All of the criteria and attributes are compared two by two and are registered in an n x n matrix so all the elements of that matrix are positive and in attention to the principle of diverse condition in the hierarchal analytical process in each twoby- two comparisons, we will have two amounts of aij and 1/aij numbers. To calculate the criteria importance coefficient, this study has used geometric average method, due to its more precision. The geometric averages of matrix rows are obtained first and then are normalized.

The importance coefficient of criteria is obtained from normalizing of those numbers; that is, from dividing each number to the sum of it. In order to obtain the coefficients importance of sub-criteria, the same stages are taken again, which were taken to obtain the importance coefficient of criteria.

1-2- Determining the coefficient of criteria importance in Bahar cities

ormalized Metris	Topography	dip	Achieving to infrastructure	Achieving to Urban Facilities	Earthquake width making	Achieving to Communicat ion Network	Distance from river sanctum	Total	Wight
Topography	0.05	0.03	0.07	0.05	0.04	0.04	0.17	0.44	0.06
dip	0.21	0.12	0.11	0.31	0.16	0.05	0.17	1.12	0.16
Achieving to infrastructure	0.26	0.26	0.34	0.31	0.31	0.31	0.21	2.09	0.30
Achieving to Urban Facilities	0.16	0.16	0.17	0.15	0.24	0.31	0.13	1.21	0.17
Earthquake width making	0.10	0.10	0.08	0.05	0.08	0.08	0.17	0.62	0.09
Achieving to Communication Network	0.21	0.21	0.17	0.08	0.16	0.16	0.13	1.24	0.18
Distance from river sanctum	0.01	0.01	0.07	0.05	0.02	0.05	0.04	0.27	0.04
Total	1	1	1	1	1	1	1	7	1

Table number 4: Standardized matrix from two- to – two comparisons of criteria

(Source: Researcher's calculation)

With respect to the stages that are performed and comparing the criteria, accessibility to the substructure is the most important and distance from river borders is the least important in criteria subject of study, taking 0.30 and 0.04 weight; respectively.

2-2- Determining the importance coefficients of sub-criteria in Bahar cities

In order to obtain the coefficients of sub-criteria importance, the same procedures as taken above will be followed.

Tuble number 5. Standardized maint from two to two companisons of sub entiend	Table number 5:	Standardized	matrix from t	two- to – two d	comparisons of	^c sub-criteria
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criteria	Topogr	aphy		dip			Achieving to Urban Facilities					
sub- criteria	Low Land & Height	weight	Percentage 2-4	Percentage 4-6	Percentage 6-8	Achieving to Water	Achieving to Electricity	Achieving to Telephone	Achieving to Gas	Achieving to Training	Achieving to Health Care & Treatment	Achieving to Administrative & disciplinary
Wight	0.75	0.25	0.72	0.20	0.08	0.57	0.27	0.05	0.10	0.29	0.63	0.08

(Source: Researcher's calculation)

criteria		Earthqua	ke width ma	king	Achieving to	o Communicatio	on Network	Distance from river sanctum		
sub-criteria	Low Risk	Mediu m Risk	Relative High Risk	High Risk	Grade One Main Road	Grade Two Main Road	Sideway Open & Dead end	Distance 0-10 meters	Distance 10-20 meters	
Wight	0.59	0.59 0.26 0.10		0.05	0.63	0.29	0.08	0.75	0.25	

(Source: Researcher's calculation)

3. Determining the importance coefficient of choices

In this stage, the priority of each choice will be judged in connection with each of the sub-criteria and if criteria have no sub-criteria, the judgment will be made by the same criteria with itself.

The basis of that judgment is that very 9-quantitative Saati comparison with the difference that in comparing choices in connection with each sub-criteria (or criteria as per the case), the discussion is not "which choice is more important" and it is rather, "What choice has superiority and how much?" The process of obtaining weight (coefficient importance) of the choices to each one of the sub-criteria is very similar to the process of determining the coefficient of criteria importance to target. Importance coefficient in Bahar cities options are summarized in the following table:

Criteria	Topo h	ograp Iy		Dip		Achieving to Infrastructure			A	Achieving to Services			Width Making of Earthquake Risk			Communicational Network			Distance from river sanctum		
Weight	0.	06		0.160			().30	-		0.17		0.09			0.18			0.04		
Sub-Criteria Options	Low Land & Height	Height	2-4 %	4-6 %	% 8-9	Achieving to Water	Achieving to Electricity	Achieving to Telephone	Achieving to Gas	Achieving to Training	Achieving to Health Care & Treatment	Achieving to Administrative & Disciplinary	Relatively Low Risk	Average Risk	Relatively High Risk	High Risk	Grade One Main Road	Grade Two Main Road	Sideway Open & Dead end	Distance 0-10 meters from river sanctum	Distance 10-20 meters from river sanctum
Weight	0.75	0.25	0.72	0.20	0.08	0.57	0.27	0.05	0.10	0.29	0.63	0.08	0.59	0.26	0.10	0.05	0.63	0.29	0.08	0.75	0.25
A	Good	Good	Good	appropriate	appropriate	Good	Good	appropriate	Relatively Appropriate	appropriate	Relatively Appropriate	Relatively Appropriate	appropriate	Good	Relatively Appropriate	appropriate	Good	appropriate	appropriate	Good	Good
Weight A	0.75	0.75	0.67	0.75	0.59	0.75	0.75	0.25	0.75	0.75	0.25	0.25	0.59	0.79	0.25	0.25	0.79	0.59	0.59	0.75	0.75
В	appropriate	appropriate	Relatively Appropriate	Relatively Appropriate	appropriate	appropriate	appropriate	Good	appropriate	Relatively Appropriate	appropriate	appropriate	appropriate	Relatively Appropriate	appropriate	Good	Relatively Appropriate	appropriate	appropriate	appropriate	appropriate
Weight B	0.25	0.25	0.33	0.25	0.41	0.25	0.25	0.75	0.25	0.25	0.75	0.75	0.41	0.21	0.75	0.75	0.21	0.41	0.41	0.25	0.25

(Source: Researcher's calculation)

4. Determining final score (priority) of choices

Up to this stage, the coefficients of criteria and sub-criteria importance in relation with the goal of study and the importance coefficient (score) of choices in connection with each one of the substructures and criteria with no subcriteria have been determined. In this stage, the importance coefficients are combined to determine the final score of each option.

To do so, the principle of hierarchical Saati combination principle is used that leads to a vector of priorities by considering all judgments which are ordered on hierarchy and order in all levels.

$\sum_{k=1}^{n} \sum_{i=1}^{m} wkwi(gij)$

WK: Coefficient of criteria importance K: Final score (priority) of the choice Wi: Coefficient of importance of the sub-criteria i Gij: Score of choice K in connection with sub-criteria i



5. Study compatibilities in judgments

One of the advantages of hierarchical analysis process is the possibility of studying compatibility in judgments made in determining the coefficient of criteria and sub-criteria importance. In another word, how much compatibility has been observed in judgments in informing the matrix of two-to-two comparisons (matrix A)? When the importance of criteria is assessed to each other, there will be a probability of incompatibility in judgments; that is, if Ai is more important than Aj, and Aj is more important than Ak, but spite of all efforts, the priorities and feelings of people are

most often uncoordinated and non-homogenous. Therefore, a range should be found to reveal the amount of incompatibility in judgments (Tofigh, 1994:p42). The mechanism considered by Saaty (1988) in studying incompatibilities in judgment is to calculate a coefficient, named incompatibility coefficients (I.R.) that is obtained by dividing the incompatibility index (I.I.) to the random index (R.I.). If that coefficient is less than or equal to 0.1, compatibility in judgments is acceptable; otherwise, the judgments need to be revised. In another word, the matrix of two - to - two comparisons of criteria should be re-formed.

Incompatibility (I.I.) =
$$\frac{\lambda_{max} - \mathbf{n}}{\mathbf{n} - \mathbf{y}}$$

The random index could be extracted from following table with respect to *n* number of criteria.

Table number 7: Random index

15	14	13	12	11	10	9	8	7	6	5	4	3	2	n
1/59	1/59 1/57 1/56 1/48 1/51 1/49 1/45 1/41 1/32 1/24 1/12 0/9 0/58 0 R.I.													
(Source: Tofigh 1994, page 30, quoted from Thomas L. Saaty)														

In the geometric average method which is an approximate method, instead of calculating the special maximum value:

$$L = \frac{\gamma}{n} \left[\sum_{i=1}^{n} (AW_i / W_i) \right]$$

L is used with following description in which,

AWi is a vector that is obtained by multiplying the matrix of two-to-two comparisons of criteria (matrix A) on Wi vector.

The stages of calculating compatibility rate have been as follows: A) Calculating vector L, AW

Normalized Metris	Topog raphy	dip	Achieving to infrastructure	Achieving to Urban Facilities	Earthquake width making	Achieving to Communicati on Network	Distance from river sanctum		W		AW		L
Topography	1	0.25	0.2	0.33	0.5	0.25	4		0.06		0.46		7.33
Dip	4	1	0.33	2	2	0.33	4		0.16		1.25	L	7.81
Achieving to infrastructure	5	3	1	2	4	2	5		0.30		2.35	= M -	7.86
Achieving to Urban Facilities	3	0.5	0.5	1	3	2	3	*	0.17	=	1.33	AW⊦	7.71
Earthquake width making	2	0.5	0.25	0.33	1	0.5	4		0.09		0.67		7.58
Achieving to Communication Network	4	3	0.5	0.5	2	1	3		0.18		1.44		8.11
Distance from river sanctum	0.25	0.25	0.2	0.33	0.25	0.33	1		0.04		0.29		7.49
Total	19.25	8.5	2.98	6.49	12.75	6.41	24		1.00		7.80	Average	7.70

Table number 8 : Calculating vector L, AW

(Source: Researcher's calculation)

B) Calculation of compatibility index (CI)

CI =
$$\frac{L - n}{n - 1}$$
 $CI = \frac{7.70 - 7}{7 - 1} = 0.1143$

C) Calculation of compatibility coefficient (CR)

$$CR = \frac{CI}{RI}$$
 $CR = \frac{0.1143}{1.32} = 0.0866$ $CR = 0.0866 \le 0.1$

With respect to the sustainability coefficient (CR) as obtained in this research; that is CR=0.0866; the priority in weight of indexes is sustained and could be trusted.

Conclusion

One of the fund a mental problems that happened in the cities, lack of proper orientation and the development of their physical, Different effects in different sectors have been followed. Failure or inability to observance the principles of urbanism principles apply to all lack of profit counselors powerful tools for environmental analysis And social, economic and legal factors in this field is important.

What the results of this analysis show that, in the selection and prioritization of areas where housing development in the town is a very impressive important point, One to maintain the social fabric of rural - urban ethnic neighborhood and family in the neighborhood And other single-unit homes often connected with the growth and development of the city according to the traditional conditions relying on ethnic affiliation. However, environmental factors and natural and non-natural elements particularly the access and communicative situation the city. As the focal point Iran connecting to West gate of Hamadan the provincial capital, which is the capital and the center connection point of the area is, Has very important and crucial. Accordingly suggestion for year 2032 taking into account two growth rates and land calculation two methods And consideration all aspects of an average 38 hectares land in the form of the town housing development is required, Considering present situation, the Locating of lands the form of developed primarily within the town and connects the second expansion outside town boundary but is intended. Since the range town about 54 acres of lands in arid, desolate and abandoned of lands under construction and there is a fertile agricultural lands, gardens, green areas and environmentally protected areas is not, Priority and thus will not face a shortage of lands, the of lands is available.

The required In this regard of lands, according to the indicators of social, economic. environmental and physical environment, in the form of objective criteria and sub-criteria associated with the research. connected with two different choices (A,B), assessed and analyzed using a multi-criteria model of AHP, In order to develop housing of lands meet the in bahar cities (deficiency of status quo and coming needs Original research town the horizon), Parallel to urban sustainable development and protection of forest and farms, fruitful and gardens town privacy, inevitably low the value and irrigated agricultural lands been located, So that ultimately analysis results indicate that located in land Options A with a score of 0.66 has more priority than other options, In other words, land located in the western part of town was affected by all the factors, criteria and sub-criteria considered and effective in the process of prioritizes and housing development land located in bahar cities, was determined as the ideal and proper Options. Map number 3: Choices in future development of city and choice A as the priority of future

lands in housing development

(Source: Researcher's studies)



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