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# Measuring the Spatial Distribution of Cities in West Azarbaijan Province

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**Abstract:**
The aim of this paper is to analyze the hierarchical network of urban areas of West Azarbaijan for examining the rate of balance in variance and spatial distribution of population of urban areas in the province of West Azarbaijan.
The methodology in use is a pragmatic-developing one. The quantitative models, such as bulk modulus, urban centralization index, anthropy model and gini coefficient index, are used in order to analyze the urban hierarchy of West Azarbaijan. Findings of this study shows that Urban centralization index in all the studied periods was higher that one. Population bulk modulus of all cities of the province in the years of 1956, 1966 and 1976 had augmented but in the years of 1986, 1996 and 2006 has reduced. Anthropy index in all the studied periods was less than one, which shows the unbalance in population in urban areas of the province. Calculation of spatial coefficient LQ shows that small cities of the province are exporter of services and their basic economy is based of services sector. The communicative network of the province, specially the roads, is in a condition that economically targets the capital of the province and like a radius ends to Urumieh.
The final conclusion of this research is that the unbalance in variance and the spatial distribution of population in urban areas of the province is the characteristic of network of urban hierarchy of the province of West Azarbaijan; in a manner that transactions between the cities of the province are also affected by the political-administrative structure of the country as well.

**Key Words:** Urban centralization index, bulk modulus, Anthropy model, space index, urban communication, West Azarbaijan, Iran

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**Introduction**

In 1800, about 29 million people were living in the cities. It means that only three people out of 100 were citizens. (Short, 2006) In 1950, 29% of world populations were living in the cities. (UNCHS, 1999; UNCHS, 1978) But in 2006 more than one half of world population was citizens. (Goottiener and Budd, 2005). One can conclude that population of world's cities has been increased from 30 million to 3 billion in the last two centuries. (Atash, 2007: 399). It is also predicted that in 2050 more than 6.4 billion people will live in the cities. This increasing city living has happened mostly in the developing countries; city population of these countries were less than 200 million in 1950, and more than 105 billion in 2000. (UNCHS, 2001) Such a progress can also be seen in th city living of Iran; in 2005 more than 70% of the country population was living in the cities. (Modarres, 2006: 405) In addition, the high rate of population growth in the developing countries has caused problems, such as population density, pollution, lack of habitation, inefficient urban services and finally the interruption of balanced urban network and the emerge of the urban primary phenomena. The problems such as: urban-rural immigrations (Ray, 1998), poverty and injustice (Ley and Smith, 2000), costs and access to inhabitation (Economist,2003), urban accumulation, general services (Otiso,2003), costs of commerce (Economist, 2004), city commands, quality of urban living (Mercer HRC,2004), informal Settlement, urban distribution, urban networks and urban hierarchy (Taylor,2005; Taylor,2004). In Iran, the incomes of oil and injunction of this money to the body of cities caused the urban primary phenomena. Urban network of Iran, since 1950s, after the changes of economic and social situations of Iran, followed the exogenous model of sovereignty, and caused many principal changes, which emerged metropolises, caused the interruptions or disjunctions in urban network, and more generally in the country scale. In general, the distribution of urban system of the country from 1957 to 1977 was companied by over-centralization or urban primary and after 1977 until 1997 gravelly decentralized and moved towards a more plausible distribution. Metropolises in relation to the whole population of related provinces have faced the emergence and dominance of urban primary phenomena and centralized in different sectors. Based on this fact, the urban network system of Iran does not have any hierarchical function and following the spatial distribution and population mass of cities does not frame in a pragmatic and hierarchical system. The urban network of the country is on his way of centralization; the distance of Tehran and other big cities from medium and small cities is getting more and more, which had a great reflection the unbalanced distribution of population in rural scale (Nazarian, 2000) and caused unbalance of population and deliverance of active manpower, and had an obvious effect on unbalanced model of distribution in the economic and social fields of employment and unemployment.

The profile of spatial structure of West Azarbaijan shows the unbalances in regional scale. Adopting the strategy of establishing centers of growth and priority of allocating resources to some of them caused polarization of development in the province in a manner that certains cities allocated a great mass of population and economic activities to themselves and made a great unbalance in system of center of populations and in one of urban population distribution. For example, in West Azarbaijan in 2007 almost 33.8% of population lived in Urumieh and 66.2% in the other 36 cities. One can also observe that population of Urumieh is almost 3.2 times bigger than the second big city of the province, Khoy. Studying the statics reveals that unbalances in population distribution in West Azarbaijan is much larger. In 2007 population of

Urumieh was almost 591 times in relation to the smallest city of the province, Simineh; while this city posited in the 36th rank in hierarchy of urban inhabitation of West Azarbaijan. The great unbalance in urban system of West Azarbaijan leads to functional gap in the medium level in such situations, the regulation of polarization in urban development and decentralization of urban primary is a plausible act for spatial development of the province.

**Methodology**

Different methods and models have been used in this paper to analyze the urban hierarchy network of the province of West Azarbaijan. They are listed below:

1. Urban centralization index: this index represents the situation of urban population centralization or the trend of population to city living which shows the priority or dominance of a unique city in urban system. The index is made by dividing the population of the main city to the sum of population od second, third and forth cities.
2. Bulk modulus is an index by which one can calculate percentage of city population relative to the whole population; therefore calculating rate of increasing or decreasing of city population in a specific period of time relative to every percentage increasing of whole (country, province or area) population. The complete formulation is as below:

$E(t, T_{T+10}) = ru(t, t+10)/ r(t, t+10)$

E: bulk modulus between the time "t" and "t+10"

ru: annual ration of city population increase

r: annual ration of whole population increase

3. Anthropy model: anthropy or disorderness index is a mathematical method used in information theory and its relative methods are used in exploring and describing of inhabitation areas and the ways of population distribution in geographical space. This model is a criterion for evaluating the monotony of a variant in study, for example population distribution in cities of an area. By using this model, spatial balance of population position all around an urban, a real or nationwide network can be found. According to the theorical principle, when anthropy trends to one or higher than one, it is a situation of spatial balance and symmetry of population in centers of urban network; but less than one shows the reversed situation. The mathematical formulation is as below:

$G = \Sigma^{INPi} Ln^{k}$

Ln: natural logarithm

k: number of classes

pi: frequency percent of population

G: relative anthropy

4. Spatial coefficient model is used to study role of cities in the economic progress of an area. This model is used to identify the base section of different areas, for identifying and studying base and non-base sections in different areas. The formulation is as below:

LQ= SI/NI /S/N

LQ: spatial coefficient of an action

SI: employment of action i in the city

NI: whole employment of the city

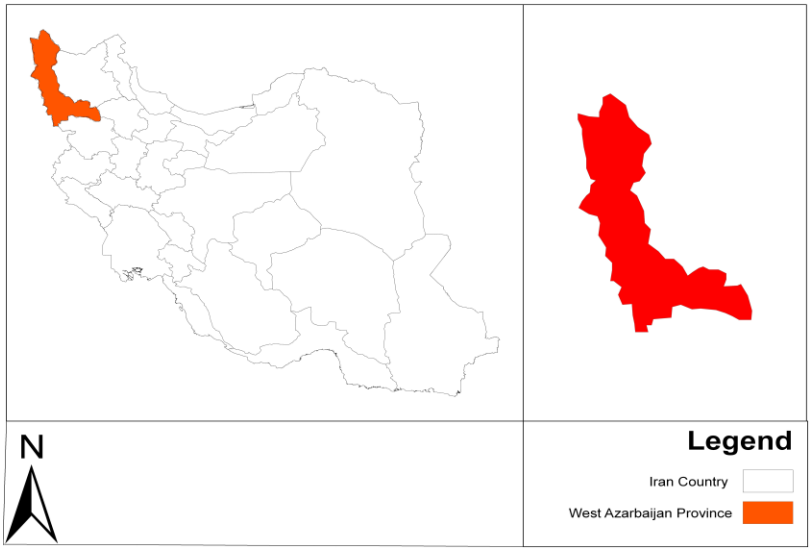
S: employment of action i in the area or country

N: whole employment of the area or country

**Situation of West Azarbaijan Province**

The West Azarbaijan province is located on the north-west of Iran. Republic of Azarbaijan and Turkey on the north, Iraq and Turkey on the west, East Azarbaijan province and Zanjan province on the east, Kurdistan province on the south are the neighbors of West Azarbaijan. The area of the province is 37,059 $km^2$ which makes it the $13^{th}$ big province of Iran. It occupies 2.25% of the country area. According to the census of 2006, the population of West Azarbaijan is 2,873,459 it means 4.08% of the country population which puts the province in the $8^{th}$ place in Iran. West Azarbaijan is one of the mountainous provinces of Iran and has a various and spread topography. West Azarbaijan had in20 cities in 1986, 22 cities in 1996 and 36 cities in 2006. One of the reasons of increasing the number of cities of the province is the augmentation of population of big rural areas which made them able to establish municipality. According to the census in 2006, the 36 cities of the province have 1,724,954 population which is 60% of the whole province population (Statistical Centre of Iran, 2006).

**Figure 1. Political Situation of Azarbaijan province**




1. **Research findings:**

**Urban Development Indexes in WSest Azarbaijan:**

One of the ways to identify and analyze development and abilities of cities in the field of presenting the goals of development is the calculating and determining every development indexes. By determining and analyzing the set of development indexes, one can find the lacks of development and prepare the possibilities of decision making and organizing for local and provincial planning. To do so, the indexes of urban development represented by the Ministry of Housing and Urban Development about the development situation of cities and their rate of national average deviation have been used. By comparison these indexes of urban development of West Azarbaijan to the indexes of the country, some results have been gained. They are summarized in table

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**Table1: urban development indexes in West Azarbaijan (2002)**

| Levels | average of the country | average of the province | difference of the province to country | rank of the province in country |
|---|---|---|---|---|
| **percentage of literate** | 85.11 | 74.75 | -10.36 | 22 |
| **percentage of employment out of all population** | 27.35 | 24.25 | -3.1 | 9 |
| **percentage of employment out of active population** | 89.36 | 87.81 | -1.55 | 12 |
| **percentage of unemployment out of active population** | 13.42 | 15.68 | 2.26 | 18 |
| **percentage of divorce to marriage** | 7.39 | 6.91 | -0.48 | 14 |
| **percentage of families having housing** | 81.42 | 83.51 | 1.09 | 11 |
| **percentage of keeping housing** | 52.47 | 46.45 | -6.02 | 15 |
| **percentage of families having pipeline water** | 88.14 | 82.28 | -5.86 | 20 |
| **percentage of families having electricity** | 96.93 | 91.02 | -5.91 | 24 |
| **percentage of families having telephone** | 40.84 | 37.07 | -3.77 | 8 |
| **percentage of municipality's cost for urbanism** | 53.14 | 54.89 | 1.75 | 17 |
| **relation of disorder people** | 135 | 101 | -2.4 | 8 |
| **academic value of employment** | 973 | 892 | -8.10 | 18 |
| **value of family's benefits** | 969 | 798 | -1.71 | 24 |
| **average of electricity** | 1810 | 787 | -10.23 | 20 |
| **relation of telephone** | 89 | 72 | -1.7 | 24 |
| **relation of book** | 195 | 165 | 0.03 | 15 |
| **relation of cinema chairs** | 76 | 95 | 0.91 | 22 |
| **relation of hospital beds** | 47 | 40 | -0.07 | 10 |
| **relation of health centers** | 34 | 37 | 0.3 | 18 |
| **relation of health units** | 39 | 37 | -.02 | 3 |
| **relation of physicians** | 71 | 43 | -2.8 | 20 |
| **urban development of municipality** | 6.32 | 6.56 | 0.24 | 15 |
| **relation of employment to all population** | 7.5 | 7.46 | -0.04 | 15 |
| **relation of family growth to housing growth** | 1.7 | 2.45 | 0.75 | 15 |
| **density of families in housings** | 3.18 | 3.17 | -0.01 | 15 |
| **density of people in room** | 2.49 | 2.58 | 2.09 | 13 |

**Urban Centralization Index**

According to this model, the population centralization of West Azarbaijan is 1.08 in 1956, 1.13 in 1966, 1.16 in 1976 and 1986, 1.15 in 1996 and 1.25 in 2006 (table 2); that is in all the studied periods of time the index of centralization is higher than 1 which shows the strong trend of population to city living and unbalance in population distribution.

**Table2: urban centralization coefficient for population of cities of West Azarbaijan in a 50 years period**.

| year | Population of first city | Sum of 2nd, 3rd and 4th cities | ratio of centralization |
|---|---|---|---|
| 1956 | 67605 | 62448 | 1.08 |
| 1966 | 110749 | 97961 | 1.13 |
| 1976 | 164419 | 142163 | 1.16 |
| 1986 | 300746 | 258519 | 1.16 |
| 1996 | 435200 | 376803 | 1.15 |
| 2006 | 583255 | 467948 | 1.25 |

Source: Statistical Center of Iran

**Bulk modulus in the province:**

According to tables 3 and 4, the bulk modulus coefficient of population of all the cities of the province had increased from the first period to the third one and had decreased from the forth to the fifth one. The reason is the immigrations from outer of the province into the province and slowdown of rural-urban immigrations.

**Table3: characteristics of urban population of West Azarbaijan during 1956 - 2006**

| explanation | Population | | | | | | Growth ratio | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1966 | 1976 | 1986 | 1996 | 2006 | 1966-1956 | 1976-1966 | 1986-1976 | 1996-1986 | 2006-1996 |
| All cities of the province | 160998 | 277648 | 446714 | 902999 | 1315201 | 1724954 | 5.6 | 4.87 | 7.29 | 3.8 | 2.74 |
| All province | 721136 | 277648 | 1407604 | 1971677 | 2496360 | 2873800 | 4.19 | 3.62 | 3.43 | 2.4 | 1.41 |

Source: Statistical Center of Iran

**Table4: bulk modulus coefficient of cities of West Azarbaijan during 1956 – 2006**

| 1956-1966 | 1966-1976 | 1976-1986 | 1986-1996 | 1996-2006 |
|---|---|---|---|---|
| **1.33** | **1.86** | **2.13** | **1.60** | **1.94** |

**Entropy Coefficient**

Table 5 shows the calculation of changes in anthropology coefficient in the cities with population over 50,000 in West Azarbaijan during 1956 to 2006. In the basis of the results, the anthropy coefficient was in all periods of time less than 1 which shows the balance and

asymmetry in population in the cities. Because of living of some 67% population of the province in the 8 cities, even the increasing in number of small cities in recent years cannot affect the balance of population distribution. The results show that in 1976 there was only a medium city (100,000 to 250,000 populations) and that was Urumieh. The entropy coefficient, with regarding all the cities, was 0.764 in that year and 0.647 without regarding the medium city. This shows that in that year there was a kind of balance in spatial population distribution; also, entropy coefficient will trend to unbalance without regarding the medium city. On the other hand, although Urumieh is the first city of the province, but in the urban network the dominance of a unique city is not obvious. In 1976, without regarding Khoy, the second big city, in urban network system, the G index is 0.678 that shows unbalance. In 1986, there was only one medium city which was Khoy. The entropy coefficient in this year, without regarding all cities, was 0.782 and it was nearer to be balanced; but without regarding Khoy this index was 0.708 that shows Khoy is somehow efficient in balancing the urban system. In this year, without regarding the first city, Urumieh, the entropy coefficient is 0.672. Therefore in this year the urban primary phenomenon is not so obvious.

In 1996 there were 3 medium cities. Entropy coefficient for all cities 0.771 and, without regarding the medium cities it is 0.581 which shows the efficient role of these cities in spatial balancing of population. The G index, without regarding the metropolis, was 0.661 that is a symptom of urban primary phenomenon; the index is not so strong in this year. According to the evaluations of Statistical Center of Iran in 2005, the number of cities in the province is 30. In this year, G index in 0.679 for the cities of the province. The index is 0.507 without regarding the medium cities (with population of 100 to 250 thousands); this shows the unbalance in the urban network. Also, anthropy coefficient is 0.654 without regarding Khoy, which shows the unbalance. In this year relative entropy, without regarding the metropolis Urumieh, is 0.577. the increase in the number of small cities in the urban network and nonexistence of a proper definition of the meaning of “city” (count every place which has municipality a city) is the reason of population trend of urban network in 2005 to be unbalance. For example, the smallest city of the province was Silvaneh in that year with 1041 population (Table5).

**Table5: changes in entropy coefficient in cities over 50,000 populations In West Azarbaijan (1956 - 2006)**

| Name City | P 1956 | pi | Lnpi | Pi. lnpi | P 1966 | pi | Lnpi | Pi. lnpi | P 1976 | pi | Lnpi | Pi. lnpi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Urumieh | 67605 | 0.45 | -0.8 | -0.36 | 110749 | 0.44 | -0.82 | -0.36 | 164419 | 0.42 | -0.87 | -0.37 |
| Bokan | 5307 | 0.04 | -.3.22 | -0.13 | 9357 | 0.04 | -3.22 | -0.13 | 20579 | 0.05 | -3 | -0.15 |
| Khoy | 34491 | 0.23 | -1.47 | -0.34 | 47648 | 0.19 | -1.66 | -0.23 | 70357 | 0.18 | -1.71 | -0.31 |
| Mahabad | 10575 | 0.07 | -2.66 | -0.19 | 28610 | 0.11 | -2.21 | -0.24 | 44067 | 0.11 | -2.21 | -0.24 |
| Miandoab | 14796 | 0.1 | -2.3 | -0.23 | 18767 | 0.07 | -2.66 | -0.19 | 27739 | 0.07 | -2.66 | -0.19 |
| Salmas | 13161 | 0.09 | -2.41 | -0.22 | 21703 | 0.09 | -2.41 | -0.22 | 27638 | 0.07 | -2.66 | -0.19 |
| Naqadeh | 4453 | 0.03 | -3.51 | -0.11 | 10801 | 0.04 | -3.22 | -0.13 | 23836 | 0.06 | -2.81 | -0.17 |
| Piranshahr | 965 | 0.01 | -4.61 | -0.05 | 4848 | 0.02 | -3.91 | -008 | 10572 | 0.03 | -3.51 | -0.11 |
| Total | 151353 | 1 | -20.98 | -1.61 | 252483 | 1 | -20.80 | -1.67 | 389207 | 1 | -19.43 | -0.73 |
| Anthropy index | 0.77 | | | | 0.80 | | | | 0.83 | | | |

| Name City | P 1986 | pi | Lnpi | Pi. lnpi | P 1996 | pi | Lnpi | Pi. lnpi | P 2006 | pi | Lnpi | Pi. lnpi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Urumieh | 300746 | 0.41 | -0.089 | -0.36 | 435200 | 0.41 | -0.89 | -0.36 | 583255 | 0.43 | -0.84 | -0.36 |
| Bokan | 67938 | 0.09 | -2.41 | -0.22 | 120032 | 0.11 | -2.21 | -0.25 | 150703 | 0.12 | -2.08 | -0.25 |
| Khoy | 115343 | 0.16 | -1.83 | -0.29 | 148944 | 0.14 | -1.97 | -0.28 | 181465 | 0.12 | -2.12 | -0.25 |
| Mahabad | 75238 | 0.10 | -2.3 | -0.23 | 107827 | 0.10 | -2.3 | -0.24 | 135780 | 0.1 | -2.13 | -0.23 |
| Miandoab | 59551 | 0.08 | -2.53 | -0.2 | 90141 | 0.08 | -2.53 | -0.21 | 114153 | 0.07 | -2.6 | -0.18 |
| Salmas | 50573 | 0.07 | -2.66 | -0.19 | 65416 | 0.06 | -2.81 | -0.17 | 81342 | 0.06 | -2.84 | -0.7 |
| Naqadeh | 52275 | 0.07 | -2.66 | -0.19 | 64807 | 0.06 | -2.81 | -0.17 | 73438 | 0.05 | -2.99 | -0.15 |
| Piranshahr | 13465 | 0.02 | -3.91 | -0.08 | 33805 | 0.03 | -3.51 | -0.9 | 58178 | 0.04 | -3.23 | -0.13 |
| Total | 721664 | 1 | -19.19 | -1.76 | 1066172 | 1 | -19.03 | -1.76 | 1378313 | 1 | -19.01 | -1.72 |
| Anthropy index | 0.85 | | | | 0.84 | | | | 0.83 | | | |

**Source: Statistical Center of Iran, 1956- 2006**

**Space index**

In 2006, in small cities (population of 25,000 – 50,000) of West Azarbaijan the agriculture sector was not the basic economy and in all of them space coefficient index was less than 1 which shows these cities were importer of agricultural products. In industry sector only Macku had the space coefficient of 0.9 and was an importer of industrial products. Shahin-dejh had 1 and was self-sufficient. The other cities had a coefficient higher than 1 and were exporter of industrial products. In services section in all small cities of the province, LQ was higher than 1 that shows these cities were exporter of services and their basic economy was based on services sector.

In conclusion, urban system of West Azarbaijan during last 50 years has forced fluctuations so that the number of cities increased from 8 in 1957 to 22 in 1997 and 36 in 2007. From a functional point of view most of the cities have a function of service and acted as a center for presenting different services. There is an unbalance in urban network and hierarchical system of the province which is an indication of dominance of Urumieh as the first city of the province. Therefore West Azarbaijan, because of special conditions of establishment and special geographical situations and having lots of capacities, should be regarded in relation to the neighbor provinces. Every decision about balancing the urban system should start from below so that the regional unbalance evoked by emerging of secondary kernels and finally emerging

of a regional urban network, diminishes and in a natural atmosphere some kind of natural balance been gained as a complete system in which every peripheral space, with different functions and roles, assist to diminish the unbalance of the province.

**Hierarchical network of Urban Communication**

According to the studies and map of population and communications situation of the province, it can be concluded that communicative hierarchy of the cities is by the means of primary and secondary roads. Communicative hierarchy forms through Urumieh to north areas of the province and through roads of Urumieh to Nushin-shahr, Qush-chi, Salmas, Tazeh-shahr, Khoy, Feururq, Iv-oqli, Qareh Zaiel-din, Shut, Macku and Bazargan. Bazargan is the border city to Turkey. In the southern area of the province communicative hierarchy forms through the roads of Urumieh to Mohammadyar, Mahabad, Mian-do-ab, Simineh and Bokan. Some cities have communicative hierarchy to Urumieh and to each other through secondary roads. some cities like Takab, Shahin-dejh, Mahmoud-abad, Keshavarz, Chehar-borj, Rabt, Sardasht, Amir-abad, Piranshahr, Gardak-shaneh, Naqadeh, Talus, Oshnuyeh, Silvaneh and Srav in southern area and Siah-cheshmeh and Avachiq in northern area of the province.

Western cities of the province have communications to Turkey and Iraq. There are 3 airports in the province: Urumieh, Khoy and Macku. They are not all under the communicative hierarchy of the province. Only Urumieh's airport is active and has nationwide ties. According to the data of Statistical Center of Iran, in 2006, there were 1079 flight in Urumieh airport which contained altogether 121,531 input passengers, 123,357 output passengers, 823,472 input cargos and 800,101 output cargos. In fact, aerial communication is through Tehran-Urumieh, but there are some tips from Urumieh airport to abroad.

It is necessary for the southern and northern parts of the province to have aerial communication (Macku and Boukan). The railroad network is only restricted to west-east axis in northern part of the province. It is necessary to install a north-south railroad network through Bazargan, Macku, Shut, Qareh Ziael-din, Khoy, Salmas, Mian-do-ab and Boukan.

It can be concluded that pattern of communication between cities is, affected by bureaucratic and political pattern of the country, centralized. In this pattern, Urumieh, political and bureaucratic capital of the province, is the center of services, communication, culture and so on. Urumieh has a high power in absorption in urban hierarchy (because of communicative, economic and other infrastructures). It should be noted that although West Azarbaijan, and especially Urumieh, could not play a role in national hierarchy structure as it should be and even the position of Urumieh is not highlighted on the country scale; but the internal structure of West Azarbaijan is, following nationwide structure, centralized and Urumieh has bureaucratic, political, economic and other dominances. Communicative networks of the province, especially in road sector, are in a situation that economically target Urumieh.

These situations made a condition in which the areas nearby primary roads have a better position in servicing sectors. In this system hierarchical network of the province (because of planning from above and focusing of bureaucratic assignation) is from above to bottom and is suppressed to political and bureaucratic centers. The role and function of cities in this system is impressed by bureaucratic and political role which is assigned to them. The point is about out-of-system function of urban communication in hierarchy system. Despite of hierarchal system in bureaucratic sector, medium cities of the province could never act as a link between the

capital of the province and small cities. This is because of the relation is, from different aspects, directly established to the capital of the province or even in some cases to the capital of the country or even to some more important capitals of other provinces (like Tabriz). Therefore, role and function of medium cities is inoperable. Small cities and villages try to prepare their needs from the capital of the province. This problem made a discontinuity in hierarchical communications and a functional gap in medium cities. Every planning about communicative hierarchy of cities should consider these conditions and try to move toward giving stronger functional roles to medium cities; because only in this condition one can expect a network based on communicative hierarchy.

**Conclusion**

Urban system in West Azarbaijan has a chain network in which small and medium cities are linked chainly to the main metropolis, Urumieh. In general, spatial structure of West Azarbaijan shows unbalance on the scale of the province. Adopting a strategy of establishing centers of city living in recent last years has followed by polarization of development in the province. The consequence is centralization of a great mass of population and economic activities in certain cities; which in consequence the system of population centers faced a vast unbalance situation and caused unbalance distribution of city population. A marker to this fact is the establishment of 33.8% of city population in Urumieh and inhabitation of 66.2% in other cities. The study of process of changing in number and size of the cities shows that the policy of expanding villages to cities in the whole country has increased number of small cities in the province, so that number of cities with population less than 5,000 was one in 1986, that is 5% of all cities; and it was 11 in 2006, that is 30.5% of all cities. On the other hand, after different reasons population of some cities have increased and the position in population classification have changed.

Calculation of anthropy coefficient index in cities and population shows that the index was in all studied periods under 1 and therefore there is an unbalance in population distribution and establishment in cities. Also, in studying urban network of the province it is observed that the existence of small cities in relation to the role and function defined to them could not have any role in balancing and equation of population establishment. Related to this topic, it is observed that some 67% of province population inhabit in 8 cities: Urumieh, Khoy, Mahabad, Salmas, Naqadeh and Piranshahr. It can be said that in the last 50 years, the urban system of West Azarbaijan has faced many fluctuations. The number of cities from 8 in 1956 increased to 22 in 1996 and to 36 in 2006. It means that by average, between 1956 to 2006 every year 0.6 city has added to the urban network.

Calculation of urban centralization index shows that the index is higher than 1 and is a marker to the strong trend of population to centralize in cities; which is itself a reason of unbalance in population distribution. Also, bulk modulus index of all the cities of the province is decreasing during 1986-1996 and 1996-2006; the reason is immigrations from out of the province and decrease in rural-urban immigrations. This index in periods of 1956-1966 and 1966-1976 and 1976-1986 increased. . Calculation of spatial coefficient LQ shows that small cities of the province are exporter of services and their basic economy is based of services sector. A kind of asymmetry and unbalance is observable in the urban hierarchy of the province. The increase of number of small cities during 1987 to 2007 caused some kind of unbalance in hierarchical system of cities of the province.

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