The role of small towns in the spatial distribution of population (Case study: Kerman province)

Ali Peyvand[1], Ma'soumeh Hafez Reza Zadeh[2]* and Mortaza Esmaeel Nejad[3]

[1]Master student, Department of Geography, Zahedan Branch, Islamic Azad University, Zahedan, Iran
[2]Assistant Professor of Geography and Urban Planning Department, Zahedan Branch, Azad Islamic University
[3]Assistant Professor of Geography Department, Birjand University, Birjand Branch
*Corresponding author

KEYWORDS	A B S T R A C T
Small towns, Attractive Coefficient, Entropy Coefficient, Kerman province	In developing countries including Iran, uncontrolled growth of cities, unfair distribution of funds and allocation of all resources to these places, has caused to unbalanced and uneven distribution of the population so that, this imbalance, resulted to a lot of problems and an interruption in the hierarchy system of the country. Therefore, the present case study considers the role of small towns in the spatial distribution of population of Kerman based on the strategy for the development of small towns. The research method used two models of attractive and entropy coefficient in the present library research thesis and data analysis. The research findings show that the attractive coefficient results have high ability of having population in some small cities when certain investing is done, and at end comes the entropy model in consecutive years of 1986, 1996, 2006, and 2011, including the small towns of 0/724, 0/701, 0/671, 0/674 and not including those of 0/572, 0/607, 0/588, and 0/588 which shows that the small cities should have an effective role in balancing and optimal distribution of population in Kerman . Thus, urban planners and professionals should pay a special attention to this group of cities.

Introduction

Population is one of the key elements in economical, social and cultural plans, so the recognition of quality and quantity of population and understanding the structure, size and spatial extent of it is considered as an important tool in decision making and planning. (Mola'i Hashtjin, 2007, 1) Experts believe that one of the major obstacles to the overall socio-economic development is unbalanced spatial distribution of the population rather than the population overgrowth. More balanced distribution of

population will facilitate the way to reach national and regional development goals. According to this theory, unbalanced focuses of population in a few large centers leads to a dichotomy and dependent condition and also disruption of the national unity and territorial integrity. (Rezaee and Taghavai, 2008, 6). The urban size and hierarchy has long been a topic of interest for researchers and the geographers' mind has so long been focused on this subject. In developing countries, large cities with complete discontinuity with the intermediate and small cities, accounted the majority of high-level services, social and economic. The small and intermediate cities with poor communication with lower communities have been treated as peripheral, marginalized and dependent spaces. The result of elimination of the intermediate role of small and medium towns is the creation of chain urban network in which a small or medium town or even a village are directly in connection with the main metropolis.

To decentralize and create a more balanced urban system, the strengthening policy of intermediate cities was raised for the first time in the sixth French Economic and Social Development Program (1975-1971). In Iran, the urban network doesn't have a hierarchical function, so their centers of biodiversity, spatial distribution and population size don't follow a functional hierarchical system and the urban network is evolving towards centralization. (Ziyarti & Teghi Aghdam, 2007,16). According to the 2011 census, Kerman has 65 urban centers, therefore, this case study is very important due to the large number of urban centers. This paper seeks to examine the balance or imbalance of the urban system and the role of small towns in the urban system of Kerman Province. Accordingly, using the attractive and entropy coefficient

models, it analyzes the housing system and the urban hierarchy of Kerman in the four periods of 1986, 1996, 2006 and 2011.

Small town

The concept of small town is a relative one, because it depends on such factors as the degree of urbanization, level of development and the country's economic structure. Consequently, within a country, it differs from one region to another. There are several criteria for the recognition of town size which often have a quantity load. The most common criterion for the classification of cities is the population factor. Although the size of the city population doesn't have anything to do with the role it plays in the region, it can indicate its role and function in the urban network and the surrounding area. The size provided by the United Nations to identify the small towns among others, is a population of one hundred thousand or less. But depending on social, economic, and population conditions and requirements, this number varies from one country to another. For example, it is possible that in a country like India, due to the specific demographic and economic conditions, the city centers with a population of less than one hundred and fifty thousand be regarded as small towns and those of more than ten thousand as towns (Fani, 2009, 11).

In 1982, a conference named "The Role of Small and Intermediate Towns in National Development" was held in the United Nations Regional Development Center in Japan and it was suggested that cities with a population between 20 to 100 thousand be named small and intermediate towns. (Joukar, 1386: 29, quoted by Mathur, 1983). Before the Iranian revolution, based on the population criterion in the fifth construction plan, the cities with a population of 25000

to 100000 were considered as small towns. In the land plot of Islamic Republic of Iran, the cities with a population of 5,000 to 25,000 were selected as small towns and in the National Physical Plan complied with the UN standards, cities under 50,000 people have been introduced as small towns. (Ezadi Kharameh, 2001,138).

Based on the studies of land-preparation plan (first phase 1985) the classification of small, medium, and large cities are presented as follows:

- small towns (less than 50,000 people)
- medium small cities (50,000 to 100,000 people)
- medium big cities (100,000 to 250,000 people)
- big medium cities (250,000 to 500,000 people)
- big and very large cities (500 thousand to 2 million)

(the studies of the Islamic Republic of Iran's land-preparation plan, 36-37).

Small towns are those that the majority of their population are working related to their surroundings and cannot work independently and without relation to their surroundings. Consequently, the most important conditions for the survival of these towns are the exchange of necessary physical, natural, social, cultural needs and, in short, all the requirements existing between a town and its surrounding biological units. Based on the statistical point view, the criterion of 50,000 or less population seems to be a useful one for the recognition of small towns, as well (Peshah Abadi, 2005, 10).

Small town has a variety of definitions, but generally any town with a population of more 10000 is considered small (Saifaldini, 1999, 422).

According to Shokooyi (2004,44), small towns are those that have a population of more than 10000 to 50000 along with functions like marketing, retail sail, local official section and transportation centers.

Since there is no a constant criteria for the recognition of small towns and it is variable in different areas, the criteria used to identify the small towns in the present research is the population of 10000 to 50000.

Small towns and balancing the population housing system

Many researchers believe that one of important obstacles against social, economical development is unbalanced housing distribution rather than the population overgrowth. So the theory of unbalanced centralization of population in some large centers results to dichotomy and dependence and makes problem for national development and regional unity. In developing countries, the pattern of population settlement and biological centers does not obey from appropriate utilization system of capacities and existing talents and to appearance of population settlement is gives a imbalance image. The model of unbalanced distribution of city centers had bad effects on the city developments, so that the job-providing and poerful zones (centralized poles) face work force attraction while the0 stagnant and weak zones face work force recession. An important strategy in developing small towns is directing the emigration flows of the country. Since, as mentioned before, most of developing countries believe that unbalanced housing of population in their countries is due to the people's harmful and unreasonable emigration to the big cities. Therefore small cities along with good condition can be succeed via population

and action and to have more emigration from villages around. (Fani,2009, 58).

In general, most countries follow the policy of population's balanced distribution with the following goals:

-unbalanced spatial distribution of population
-uncontrolled emigration of villagers to cities, specially big ones
-unjust distribution of services and facilities
-absorption of economic forces and opportunities interested to the metropolises and against to the small cites
-imbalanced city network and overgrowth of large cities

Research background

The idea of and the research on the functional influence of towns and small places in local and regional level was first posed in Johnson's notion of "work" in 1970s, and continued with Fanel's notion of "Rural Development Centre" in 1976. To test these functions, in the beginning of 1980s, these two researchers began a project in the International Development Organization which was experienced in several countries. Its goal was to reduce rural poverty and increase rural income through the transmission of functions and services to rural areas (mainly from neighboring small towns) (Fani, 2003, 13).

Hansen (1980) is one of the researchers who have long and much studied the small towns and the his primary theories was obtained from studying of these research are including that to achieve third world countries to growth and justice, it is necessary for small and middle cities that played this role and it must connect the economic growth, justice and public welfare with each other. Ligale (1982, 9)

considered the role of small towns in Africa national development and found that they play a central role in rural zone as a development driver in rural regions.

Studying the small and medium cities as a developmental strategy in the third world countries, G. U. Umo (1983,9) believes that attainment of a reasonable housing system is necessary for them and improvement of those centers leads to the development of villages. Hardy and Sattertwhite (1986,9) have studied the importance of the small towns of third world countries as political, official, service-providing, and rural managing centers.

Rezaee and taghevay (1999) in the research as the role of small town in balancing the population spatial system of Ilam city, expressed that the small cities of Ilam province can have effective role in spatial balancing of the population, therefore it should be more attention to these groups of cities. Zarabi and Hossini (2009) in an article named "The function of small towns in urban system and regional development of Yazd province" concluded that strengthening and budgeting the small towns are suitable ways to get a balanced space structure.

Alibabai (2002) in his thesis as Examine the role of small towns in the spatial distribution of population in Sistan and Baluchestan, expressed that hierarchy of urban system has an important role in development of Zahedan province, not the other housing places.

Case study Extents

Kerman Province, located in the west south of Iran plateau and in $45°,21'-59°,34'$ east longitude and $26°,29'-31°-58'$ north latitude, with an area of 183,285 square kilometers, occupies more than 15/11% of the country's

total area. Kerman became a province in the first legal divisions in 1316 and there have occurred numerous changes in national divisions thereafter. At the end of 1391, it included 23 city, 58 districts, 65 towns, and 151 village-centers. Kerman - with an area of 44,630 km² (24/35% of the province) - and Rabor -with 1853 km² (1/01% of the province) - are the largest and smallest cities of the province, respectively. Bardsir - with 60 km - and Manujan – with 323 km - are the nearest and farthest cities from the province capital.
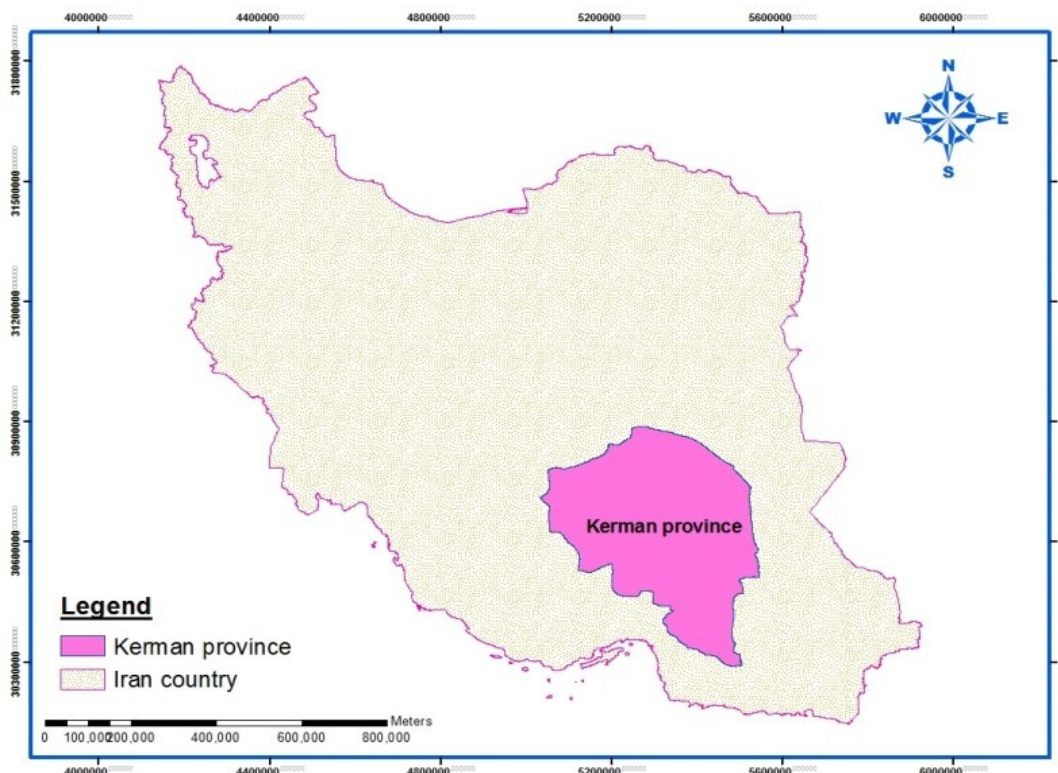
Map.1 Geographical location of the Research area

Models and methodology

model	formula	Application
Attractive coefficient	$E = (t, t=10) = \dfrac{T_n(t, t+10)}{r(t, t+10)}$	With model can consider the percent of urban population to a population of a region or country ,in the other hand the attraction and flexibility level of city center population can be evaluated to all region by this model, so the flexibility level of the small city population to all the province regions can be obtained and analyzed. If attractive coefficient to be more than 1, mean's population attraction is high, if it is less than 1, it mean's vice-versa.
Entropy modle	$H = -\sum_{i=1}^{n} P_i L_n P_i$	this model is an criteria to estimate the distribution of urban population and the number of cities of a region. And also can be used to study the spatial location of the population and the number of the cities in an urban, state, regional or national network, if the entropy coefficient to be more than one, balanced distribution , if it is less than one , means vice-versa.

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Data Analysis

Attractive Coefficient Analysis

Using this method, we can estimate and analyze the attraction level of city centers on a local scale against other centers or the whole region. This method has been used here to examine and evaluate the population's attractive level of small cities of Kerman province against the provincial total urban population. Therefore, at first it will be calculated the total growth rate and urban growth rate of each urban parts and then it will be evaluated to index. When the attractive level rises above 1, it means more urban attraction of the population, and if below that, less of it.

To estimate this coefficient, the focus is drawn to the small towns from 1986 to 2011 in Kerman province. To better understand the population growth rate of these cities, we will study attractive level of each city from 1986. As the results show, the level of population attraction in Kerman small cities has been changing from 1986 to 2011.

The cities of Jiroft and Kahnooj with attractive coefficient of 2.44 and 1.388 respectively have had the highest level of population attraction in the 1986-1996 decade during which Kahnooj's population number has been doubled and that of Jiroft nearly doubled and have had the highest rate of population growth. While the two cities of Mahan and Golbaf had the lowest rate of -o.358 attractive coefficient being people-defending towns.

The cities of Ghale Ganj, Kahnooj and Fahrej with 3.522,2.133 and 2 had the highest attractive coefficient in1375-1385 respectively shwing the government's investment there. In the same decade were formed the three cities of Ghale Ganje,

Fahrej. The one of reasons to their growth and rising their absorption population is becoming this places to urban cities and doing appropriate investments in them, also the four cities of Golbaf, Ravar, Rayen, and Koohbanan had negative -1.019, -0.217, -0.141, -0.087, attractive coefficient and hence population- defendeding.

The three small towns of Fahrej, Roodbar, and Baravat, having an attractive coefficient of 5.078, 3.581, 1.445 have had the highest rate of people attraction compared with the other small towns of Kerman Province and the six towns of Baft, Bardsir, Ravar, Rabor, Shahr Babak, and Anbar Abad have had negative attractive coefficient and hence population-defending. The rest cities haven't had a suitable attractive coefficient. (table 2 and diagram 1).

Analysis of Entropy model

Entropy model is one of the evaluation methods used to study the effect of urban levels on the special-local placing urban centers and, in fact, shows a region's special population balance. In this research with used of this model, the role of small town is considered once with counting the small town and once without counting small town existing in the province and also once without Kerman city in the different years.

To evaluate those effects, the entropy coefficient of the province cities has been estimated in 1365, 1375, 1385, and 1390 including and excluding small cities. Including small cities, it has been 0.724, 0.701, 0.671, 0.674, for those years respectively and excluding them, it equals to 0.572, 0.607, 0.588, 0.588, respectively and excluding the large city of Kerman, it has been 0.859, 0.817, 0.766 and 0.779 respectively.

Table.1 Attractive coefficient of Kerman small cities from 1986 to 2011

City	Population no				Growth rate			Attractive coefficient		
	1986	1996	2006	2011	1986-1996	1996-2006	2006-2011	1986-1996	1996-2006	2006-2011
Province	715140	1045343	1552519	1689842	3/734	2/763	1/258	1/2	1/03	0/6
Anar	7541	10207	12909	13089	3/073	2/376	0/138	0/792	0/836	0/108
Baft	17491	27920	37249	33107	4/784	2/924	-1/171	1/233	1/029	-0/919
Bardesir	18272	26040	33305	31870	3/606	2/491	-0/439	0/929	00/876	-0/344
Berevat	11013	13857	15523	18633	2/323	1/141	1/842	0/798	0/401	1/445
Ravar	16231	24903	23407	21901	4/373	-0/617	0/662	1/127	-0/217	-0/519
Rabor	7009	9837	12707	11657	3/447	2/593	-0/858	0/888	0/912	-0/673
Rayen	6974	10303	9895	11006	3/979	-0/403	1/069	1/025	-0/141	0/839
Shahrbabk	20063	31604	45751	45256	4/648	3/768	-0/108	1/198	1/326	-0/084
Anberabad	10109	15589	19011	18731	4/426	2/004	-0/148	1/141	0/705	-0/116
Koobenan	7856	10721	10457	11093	3/158	-0/249	0/592	0/814	-0/087	0/464
Kanooj	9130	22558	40633	43977	9/466	6/061	0/793	2/44	2/133	0/622
Mahan	13044	15500	17166	17178	-1/392	1/024	0/006	-0/358	0/36	0/004
Fahrej	----	3672	6382	11939	-----	5/683	6/463	-----	2	5/072
Ghalehganj	----	4665	12108	12663	-----	10/007	0/449	-----	3/522	0/352
Roodbar	----	5660	8843	12223	-----	4/562	3/289	-----	1/606	3/581
Menoojan	----	10000	12108	12587	-----	2/327	1/274	-----	0/819	1
Bam	50709	70709	75215	107131	3/288	0/709	3/6	0/847	0/249	2/825
Jiroft	35033	59201	97988	111034	5/386	5/168	1/257	1/388	1/819	0/986
Zerand	30404	41344	56139	57749	3/121	3/106	0/283	0/804	1/093	0/222
Golbaf	13044	11337	8451	8828	-1/392	12/895	0/437	-0/358	-1/019	0/343

Table.2 The Entropy coefficient with and without the small town and without Kerman city
in the years from 1986 to 2011

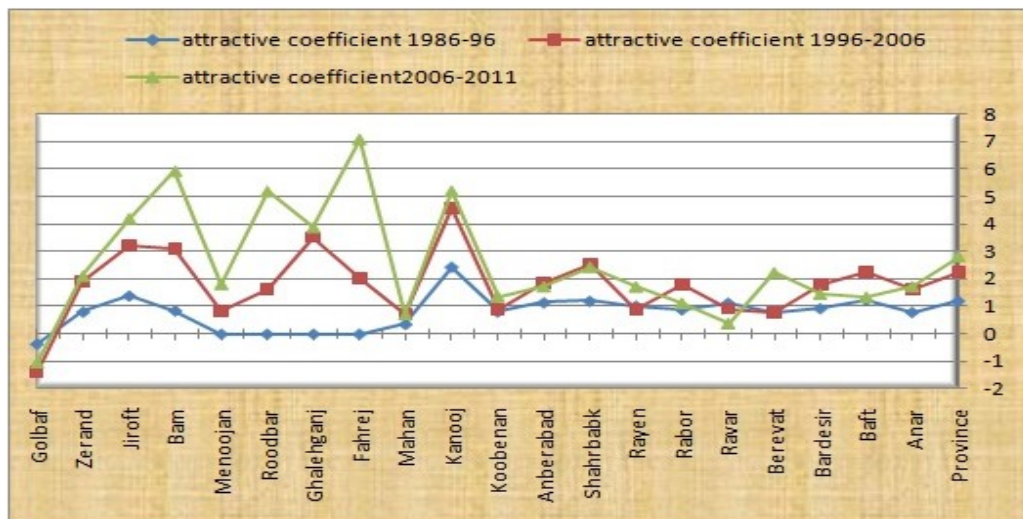| Year	Entropy coefficient including small cities	Entropy coefficient excluding small cities	Entropy coefficient excluding Kerman city
1986	0.724	0.572	0.859
1996	0.701	0.607	0.817
2006	0.671	0.588	0.766
2011	0.674	0.588	0.779

Diagram.1 Attractive coefficient of small towns of Kerman in 1981-2011
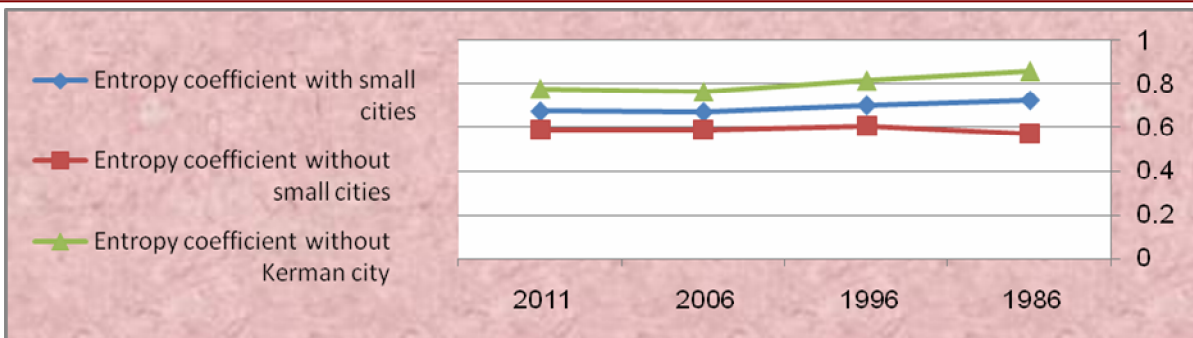
Diagram.2 Entropy coefficient with and without small cities and Kerman city from 1981 to 2011

The result in all three cases was less than 1 during those years showing imbalanced distribution and housing of population in urban places of Kerman. But as it is regarded the lack of balance is less by considering the small town and without it the lack of balance is high that it is indicative the importance of small town in spatial distribution of population and its important is more when eliminated the large city from the hierarchy and population balance gets closer to 1.

The findings of the research show that the entropy coefficient level of 1365 has had the highest effect of small cities in special distribution of population, and that of 1385, the least (table 2).

The entropy coefficient in 1986 is 0.725 including small cities of the province, and 0.572 excluding them, which shows the most balance in this decade. The entropy coefficient differential of 0.152 in 1986 shows the highest attraction of population in small cities in this period . the number of urban places is 11 in this decade including Baft, Bardesir, Bervat, Bam, Jiroft, Ravar, Zarand, Shahr Babak, Anbar Abad, Golbaft, and Mahan (table 2), and the entropy coefficient becomes more effective when the large city of Kerman is excluded with a figure of 0.859 (table 2).

In 1996, the entropy coefficient has been 0.701 and 0.607 including and excluding small cities respectively that shows more imbalance in spatial distribution of population compared with last decade. The population power of small towns in this decade is 0.094 showing 0.058 reduction. Also this coefficient was 0.817 excluding the large city of Kerman.

The two cities of Bam and Jiroft have had an extraordinary population attraction in this decade and hence changed into medium cities. The other 5 cities of Anar, Rayen, Rabor, Koohbanan, and Kanooj have been classified as small towns.

In 2006, the Entropy coefficient with numeration of small town is 0.671 and without the numeration of small town is 0.588. Also in this decade the process of spatial distribution of population is continued to lack of balance and the power of absorption the population of small cities is also decreasing trend. The number of urban places has nearly been doubled in 1385 (from 26 to 57), and most of the large villages have changed into towns, but the number of small cities is still fixed, 14. In this period, the entropy coefficient is 0,779 excluding Kerman showing the highest balance (table 2). The results show that with obtaining the Entropy coefficient 0.859, as well as the importance of small town and also more balance.

In 2011, the entropy coefficients are 0.674 and 0.588 including and excluding small

cities and 0.779 excluding city of Kerman. It shows that the urban special distribution of the region has been getting close to a balance, but the population power of small towns has been stable and two cities have been added to the number of small cities, being 16 now (table 2).

Conclusion

The present research studies the role of small cities in the population balance of Kerman district. Kerman province located in eastern west of Iran with an area of 183285 square km. According to general censuses (2011) ,Kerman Province has 65 cities and a population of 1694689 people. Its small towns are 16 (Anar, Baft, Bardsir, Baravat, Ravar, Rabor, Rayen, Shahr Babak, Anbar Abad, Koohbanan, Kahnooj, Mahan, Fahrej, Ghaleh Ganj, Roodbar, and Manoojan) with a population of 328609, 19.7% of Kerman province total population.

The results of the research are as follow:

9 cities out of 16 are located in the northern and 7 in the southern parts of Kerman province. Therefore, distribution and transmittal of these 16 cities id relatively balanced. It can be created strong growth centers in these areas with functional and demographics reinforcement of these 16 cities and this is decreased a lot of more demographics load of the first city of area (Kerman city) that it is currently played the role as growth pole.

In this research, the attraction level of population in small cities was studied using attractive coefficient criterion. The results show that when investment has been done, the attraction coefficient of small towns has been higher than the city of Kerman itself. For example in decades of 1986 and 1996 has been accomplished more investment in

two cities such as Jiroft and Bam that these cities with high have placed itself in the row of second degree cities. Also in some of others cities that has been accomplished more investment in a specific period of time has been risen the attractive coefficient that it shows the power of absorption of their high population such as Fahrej and Rodbar city that their attractive coefficient is in order of 5.078 and 3.581in decade of 2001 to 2011. In general, in 2011 from the whole of 16 small town, the cities like Barvat, Fahrej, Rodbar, were having the attractive coefficient in order of 1.455, 5.072, 3.581, that they were having the attractive coefficient upper 1.It means that they can be effective in balancing to spatial distribution of the area population and the attractive coefficient of others cities is not having the appropriate situation that it is indicate the low investment and inappropriate of facilities in these cities. Also with used the Entropy coefficient with existing it small cities has been paid to application the rate of spatial balance in establishment of population centers of urban network. Based on results of Entropy model that it is calculated once with numeration the small cities and once without numeration the small cities. It was deduced in both cases and in all the years of studies, this figure is less than 1 that this issue is indicates the the lack of balanced and harmony in distribution and establishment of population in urban areas of province. But with numeration of the small town the lack of balance is less and without it the lack of balance is more. It means with added the small town class to urban network of province, the Entropy coefficient is further desire to 1 that this subject is expressing of this fact that the small cities have capability that if they are strengthened, they are greatly balanced and poised in the spatial distribution of area population

Suggestions

1) Creating job opportunities in region's small towns.
2) Investment and providing facilities and services in small towns to attract more population with the aim of creating a population balance in the region of Kerman.
3) More government support from villages to improve living conditions in rural areas and solving their problems.
4) Population decrease of the first large city and population increase of medium and small cities to help improve the urban system.
5) Improving urban management systems in small towns by using professional and aware individuals to urban issues in municipals and giving facilities and necessary financial credits to small municipals in province level.
6) Development of urban cities of the lower part of the hierarchy by controlling their citizens' gradual migration to big cities.
7) Regarding the importance and role of small towns by providing the development and national strategies within the urban cities, to have the land space integrity.

So, by providing a careful planning and a comprehensive programming of urban hierarchy, and omitting privileges of and decentralizing urban and municipal facilities in big cities, we can improve the spatial organization of urban settlements and create a balanced population distribution in small and medium towns.

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