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Transforming large villages into small towns and studying their role in rural development through Network Analysis Methodology

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Within our developing world, urban concentration has caused so many problems in large cities of which dense population, immigration, lack of accommodation, unemployment and environmental destruction could be brought up as examples. Through using network analysis methodology in this research, the most efficient functions within this rural district as well as the interactions and links between the town of Javad Abad and its surrounding villages were studied before and after the transforming of this village into a town. The following functions and activities are formed in 26 parameters: 1) Educational/Cultural; 2) Clinical/Medical; 3) Political; 4) Commercial and Civil Services and; 5) Telecommunicational. The data obtained from the analysis of the activities shows that almost all of the villages of Southern Behnam Arab rural district have been linked to the city of Varamin (located in the region of Varamin) with the internal degree of 25. However, the village of Javad Abad with the internal degree of 5 had the least interactions among the rural district. Turning into a town, the internal degree increases up to 24 and this means that Javad Abad provides services to 24 surrounding villages. In addition, the reformation of Javad Abad into a town has led to a dramatic increase in the external degree and concentration of each of the functions. The average of all minimum distances and the value of centrality (vicinity) resulted. From the data show that the towns of Khaveh and Javad Abad are the most appropriate locations to be set as the centre for providing services to other residential areas and that is why they play an important role in rural development and preventing people from immigrating to larger cities.

Key words: Large village, network analysis, small town, central location, function, value of centrality.

INTRODUCTION

Within our developing world, urban concentration has caused so many problems in large cities of which dense population (crowdedness), immigration, lack of accommodation, unemployment and environmental destruction could be brought up as examples (Nazarian, 2008). Con-

sequently, the urban and regional analysts have devoted their attention to the development of small and medium towns as a necessary strategy to overcome the imbalance caused by the development of large cities. As long as the growth is limited to some certain cities, these cities are more inclined to more development and as a result, the smaller urban zones will be subject to less gradual transformation and growth (Amakchi, 2004). The less-developed countries have raised this issue that the development of the small and

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medium towns cannot be regarded as a gradual and automatic process. On the contrary, they get rapid spatial distribution through well-thought and purposeful policies with a well-accepted and appropriate prospective outlook.

Nowadays, the relations of the cities and villages have expanded diversely due to all the vast technological, commercial and social revolutions (Shekooei, 2003), especially the ones in transportation and road links. These relations manifest themselves in terms of population, goods, doctrines, capital, information and creativity. In the past few decades, there have been many strategies proposed for rural development one of which that has a spatial approach, is establishing and strengthening the small towns and town-villages (David and Cecilia, 2002; 2003). Generally, the rural and urban development will be fulfilled through bilateral links and interactions. On this basis, in development planning processes, the strengthening and growth of the large villages (small towns) could not be ignored. In fact, these centers provide facilities and services to their surrounding areas and therefore, could play an integral role in developing rural regions (Hardoy and Sterthwaite, 1996). In an overall outlook, the small towns could be regarded as centers, which play an important role in reinforcing the incentives for rural growth and development of their region of interest (Clayton et al., 2003). There is no hierarchical function for the urban network in Iran and the residential centers, spatial distribution, and population volume do not follow a hierarchical functional system, therefore, the urban network keeps evolving in centrality (Nazarian, 2006). On the other hand, if the goal of development in a country is the development of all non-urban regions in order not to only have cities developed but also rural areas, then one major effort would be taking the small towns into consideration and to assess and appoint them for regional development (Fanni, 2003). Based on this policy, setting up new towns, reinforcing planetary towns, and transforming large villages into small towns have been implemented by urban and regional planners in order to decentralize and depolarize large cities and to revive the urban hierarchy. In the past few decades, many rural zones have been transformed into urban zones through the policy of turning large villages into towns, and that is why the number of urban zones has increased to more than 1000 in Iran (Ziari, 2006). In 2009, the number of urban zones has reached to 53 in Tehran province and most of these zones had been originally formed from rural regions (The Iranian Statistics Centre, 2009).

The town of Javad Abad (the centre of Javad Abad region) is amongst these zones, which have been transformed into an urban zone in 1996 (Ministry of the Interior, 2006). In this research, the most efficient functions within the rural district in question were utilized in order to study the details and interactions between the town of Javad Abad and its surrounding villages were studied before and after the transforming of this village

into a town. These functions are: 1-Clinical/Medical 2-Educational/Cultural 3-Telecommunicational 4- Commercial and Civil Services 6- Political/Administrative. Each of these functions was evaluated based on the most functional parameters (26 parameters). Of the region which are as follow: Clinical/Medical function including: Clinical/Medical centre, Clinical House, Doctor, Medical Assistant or Midwife, Clinical Assistant, Clinical Trainee, Pharmacy, Veterinary, Veterinary Technician. Educational/Cultural function including: Primary School, Males' Secondary School, Females' Secondary School, Males' High School, Females' High School, Public Library. Telecommunication functions including P.O. Box, Post Office, Telecommunication Office, Access to Public Transportation, Access to Newspapers and Magazines. Commercial and civil including: Corporation Store, Farming Machines Repair Centre; Political and Administrative function including Islamic Council of Village, Besij Centre, Farming Development Centre, and Corporation Company of Village. Through using network analysis methodology in this research, the most efficient functions within this rural district as well as the interactions and links between the town of Javad Abad and its surrounding villages were studied before and after the transforming of this village into a town. In network methodology, the binary pair of 0 and 1 is used to refer to the existence or non-existence of relations between two factors or two residencies within one complex.

MATERIALS AND METHODS

Network analysis method

In regional science different methods have been used and suggested for analyzing patterns relations and hierarchies of human residential places. One of these methods is the method of social network analysis (Asgharpour, 2002). Researchers use statistical models based on network analysis for about 1360 years. The purpose of these models is a quantitative testing of the specifications of social relations among factors and components of a specific network (Taghvaei et al 2003). The range of these applications is from the studies on action and reaction between personality's internal relations friendship and leadership studying the relations among groups and the studies of society's political behavior and power sector. This method is used to determine the key residential place among different kinds of residential places by considering the number of internal dependencies in one system (Rezvani et al, 2009). This method should:

- 1) Describe the dependence and relations among residential places in one region.
- 2) Determine the degree and importance of a residential place or a set of residential places.
- 3) Indicate the sensibility of the structure of a residential place in the absence of some specific residential places.

It seems that Network Analysis Method proper for all three above-mentioned points. The Network Analysis Method is widely used in social sciences and transportation researches but it has been rarely used in determination of key or vital residential places.

The foundation of network analysis is based on analytical data

framework, which is dependent to information and hypothesis. Data may include data in the relations as well as action and reaction among people or individual or group attitude. The connection and dependence of two pair is called relation. the relation of data are selected by means of personal studying and negotiating the action and reaction with others .the relations are just between factor pairs and these pairs or binaries are proper units for the analysis of relations. For example, two cities connected with a road between them and shops with the customer are kinds of pairs. The data in social transaction are put in a matrix, which is calls social matrix. The social matrix indicates sender factors to receiver factors. A social matrix is not a close frame however, the sender and receiver may be different or the same. There are two basic kinds of relations in network analysis:

- 1) Bilateral or evaluated
- 2) Direct and indirect

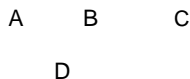
Bilateral relation (0-1) is the existence of non- existence of relation between two factors or residential places in a residential complex and a value relation concerns intensity and abundance of a relation besides its presence or absence. A direct relation has a clear origin and end. An indirect relation is not clear in relation with the origins of flow. An indirect relation is usually indicated as an arrow. A line between related factors is not specified by arrowhead. An arrow usually indicates a direct relation specified by arrowhead at the end. For example, if village A sends its student to village B the direction of education relation is from A to B, which reflects the educational.

Based on social network analysis, nodes are very important. There are some criteria to measure the importance of a node, which includes local centralization, Local Credit and General centralization.

Local centralization: Reflect the number of direct transfers and therefore is measured by the external degree of each factor.

Local credit: indicates the number of direct receiving and is measured by internal degree for each factor.

Whenever the internal degree is zero the and external degree is not zero, a factor is called origin or transfer; which means the local of rows is zero but the linear total has a non- zero factor. If external degree is zero and internal degree is non- zero the factor is called receiver. An isolate factor is the one with both internal and external degree of zero. Following digraph and matrix are a clear example that specifies the relation four nodes:



As we see, A is transferor, B is vector , C is receiver and D is As we see , A is transferor , B is vector , C is receiver and D is isolated factor . When there is no arc to attach a node to other nodes of the network, the node is called isolated one. The adjacency Matrix for this digraph is as follows which indicates that A is in relation with B, B is in relation with C, C has no relation with outside, and D has no relation with others and is an isolated node (Table 1).

General centralization: if a factor has the shortest distance from other factors, it is called central factor. The distance between factors is measured by nearness. Playing the role of being centre, it is measured by the mean. Nearness is the opposite of distance. The less the distance of i with other factors is, the more it is near to centre, from mathematical point of view we have: In which is the shortest distance between i and j in the network and N is the size of network. This criterion depends on the size of network

Case study

Having two sub-sections known as Southern Behnam Arab and

Table 1. The relation between residences of assumed nodes.

	A	B	C	D
A	0	1	0	0
B	0	0	1	0
C	0	0	0	0
D	0	0	0	0

Southern Behnam Vasat, The territory of Javad Abad and the central Javad Abad are located in the region of Varamin. Based on the census of 1388, the total population of Javad Abad territory has been 24,995 of which 17,105 is for Southern Behnam Arab and 7,890 is for Southern Behnam Vasat. Table 2 shows the population changes in Javad Abad rural zones from 1976 to 2009. The transformation of Javad Abad village into a town and its role in providing services to villages of Southern Behnam Arab and the surrounding villages are studies in this research. The territory of Southern Behnam Arab has 45 inhabited villages and 48 uninhabited ones. Based on random sampling, 24 villages have been considered as case studies out of the inhabited villages.

Findings

By using network analysis methodology, the most functional civil links and relations of the zone have been studied in order to explore the role of Javad Abad (as a small urban centre) in providing services for the rural areas of Southern Behnam Arab. These relations are categorized as: 1) Clinical/Medical 2) Educational/Cultural 3) Political/Administrative 4) Telecommunication 5) Commercial/Civil Services. These points include 26 parameters: Clinical/Medical function including:

Clinical/Medical centre, Clinical House, Physician, Medical Assistant or Midwife, Clinical Assistant, Clinical Trainee, Pharmacy, Veterinary, Veterinary Technician. Educational/Cultural function including: Primary School, Males' Secondary School, Females' Secondary School, Males' High School, Females' High School, Public Library. Political and Administrative function including Islamic Council of Village, Besij Centre, Farming Development Centre and Corporation Company of Village. Telecommunication functions including P.O. Box, Post Office, Telecommunication Office, Access to Public Transportation, Access to Newspapers and Magazines. Commercial and Civil including: Corporation Store, Farming Machines Repair Centre; These parameters have been checked in two periods, one before and one after the transformation of Javad Abad into a town (Iranian Statistics Center, 2000). In two phases before and after the urban transformation, the interactions in all 24 villages with Mohammad Abad Arab being in the center are shown in Table 3 and 4. The total number of possible functions among the villages in question and the density percentage of each of these functions before and after transformation are shown in Table 5 in order to analyze the location and concentration of services in Javad Abad.

RESULTS AND DISCUSSION

Through using network analysis methodology in this study. The most efficient functions within this rural district as well as the interactions and links between the town of Javad Abad and its surrounding villages were studied

Table 2. The population changing of the Javad Abad rural areas in 1976 -2006 (Iran's statistics center, 1985, 1995, 2006).

Confine	1976	1986	1996	2006	Growth Rate			
					76-86	86-96	96-06	76-06
Southern Behnam Arab	12555	12854	14299	17105	0.2	1.07	1.81	3.14
Southern Behnam Arab	5374	6149	8143	7890	1.36	2.85	-0.3	3.9
Javad abad	17929	19003	22442	24995	0.6	1.68	1.08	3.3

before and after the transforming of this village into a town. Table 2 presents the population changes in Javad Abad rural zones from 1976 to 2009. As the data of the table show, the growth and density rate of population has been increasing after the transformation of this rural district (Southern Behnam Arab and Javad Abad) into town 1986. Table 3 illustrates the summarizing and analysis of all interactions in the region of our concern before the transformation of Javad Abad. The data obtained from the analysis of the activities shows that almost all of the villages of Southern Behnam Arab rural district have been linked to the city of Varamin (located in the region of Varamin) with the internal degree of 25. However, the village of Javad Abad with the internal degree of 5 had the least interactions among the rural district. According to table nr.3, due to the concentration of most services in Varamin, the rural zones of Southern Behnam Arab have had the maximum dependence on Varamin and only five villages (Hesar Ghazi, Toghan, Hesar Bala, Najaf Abad and Jafar Abad Jangal) having the external degree of 2, were dependent on the present city of Javad Abad in addition to Varamin. However, the rest of the villages is having the external degree of 1, haven been solely in connection to Varamin as the center. Furthermore, the remaining villages of Southern Behnam Arab having the internal degree of zero neither are able to provide services neither for other residencies nor for their own.

Table 4a shows all the summary and analysis of the region of our concern after the transformation of Javad Abad into town. The table's data indicate that in the second period, due to the concentration of such services in Javad Abad (in contrary to the first period). The dependency of the residencies on Varamin is decreased, and there are only the following villages, which are dependent to Varamin (due to short distance to Pishva with the external degree of 2) in addition to Javad Abad. Nevertheless, the rest of the villages depend on the town of Javad Abad. In another sense, before the transformation of Javad Abad into town, the internal degree of Varamin has been 25 and the internal degree of Javad Abad has been 5. However, after the transformation of Javad Abad into town, it is indicated that the internal degree of Javad-Abad is 24. In the second period (after the transformation of Javad Abad into town), the villages of Khaveh, Mohammad Abad Arab and Ghaleboland have become capable of providing some services such as: educational, cultural, clinical and medical. That is why after being

mainly dependant on Javad Abad; the rural zones are dependant on the villages of Khaveh (internal degree of 7), Mohammad Abad Arab (internal degree of 6) and Ghaleboland (internal degree of 4) . According to the external degrees in the first period, all the residencies were equally dependent (external degree of 1), except for Hesar Ghazi, Toghan, Hesar Bala, Najaf Abad and Jafar Abad Jangal which were dependent on both Javad Abad and Varamin (external degree of 2). However, in the second period and among the rural district of Southern Behnam Arab, the villages of Hesar Ghazi, Hesar Bala, Jafar Abad Jangal and Najaf Abad had the least dependency (external degree of 1) and the villages of Bolarz, Sureh and Hesar Kuchak had the maximum dependency (external degree of 3) on other residencies. Considering that there is no simultaneous 'zero' in all rows and columns of the tables (i.e. external and internal degree) before and after the transformation of Javad Abad into a town, therefore, there is no isolated and separate location in the region of our concern which has not had been giving and taking services to and from other residencies.

Table 5a and 5b depict the level of facilities and services in the residencies of Southern Behnam Arab in the two periods of before and after Javad Abad transformation. In this table, the relations in five function are studied: 1) Clinical/Medical 2) Political /Administrative 3) Educational/Cultural 4) Telecommunication 5) Commercial and Services, these functions includes 26 parameters. As it is clear in the table, the external degree of clinical/medical function has increased from 32 (before transformation) to 54 (after transformation), and the concentration of function has increased from 4.92 to 9%. The political/administrative function has increased from 31 to 35 in its external degree and its concentration has moved from 4.76 to 6.66%. The external degree of educational/cultural function has increased from 32 to 56 and its concentration from 4.92 to 9.33%. The external degree of telecommunication function has increased from 26 to 45 and its concentration from 4 to 5.33%.The external degree of commercial/services function has increased from 10 to 15 and its concentration from 1.53 to 5.83%. The overall view on all functions shows the external increase of 30 to 42 and the concentration from 4.61 to 7%. Table. 6 and 7, illustrate the values of the centrality (vicinity) and the total of minimum distances to the other residencies before and after the transformation of Javad Abad into a town. The data inferred from the

Table 3. Summation and analysis of all flows and relation in the studied zone before becoming a town.

Residential places	Hcar gazy	Najaf abad	Toghan	Jafer abad	Jafer abad	Hsar bala	Ebrahim abad	Gale gajh	Mohamd abad	sorh	Bolarz	Haft jobh	Shamc abad	Ali abad	Taher abad	Hcar corg	Tajrh	Hcar hacan	Khavh	Haj abad	Hcar kochak	Kazem	Javad abad	Galeh boland	Zavarh var	Smaeil	Varamin internal degree	
Hcar gazy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Najaf abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Toghan Jafer abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Hsar bala Ebrahim abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
abad Gale gajh Mohamd abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
abad sorh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Bolarz Haft jobh Shamc abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Ali abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Taher abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Hcar corg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Tajrh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Hcar hacan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Khavh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Haj abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Hcar kochak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Kazem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Javad abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Zavarh var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Smaeil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Varamin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Internal degree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	25	30

Table 4. Summation and analysis of all flows and relation in the studied zone after becoming a town.

Residential places	Hcar gazy	Najaf abad	Toghan	Jafer abad	Jafer abad	Hsar bala	Ebrahim abad	Gale gajh	Mohamd abad	corh	Bolarz	Haft jobh	Shamc abad	Ali abad	Taher abad	Hcar corg	Tajrh	Hcar hacan	Khavh	Haj abad	Hcar kochak	Kazem	Javad abad	Galeh boland	Zavarh var	Smaeil	Varamin internal degree	
Hcar gazy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Najaf abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Toghan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Jafer abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Hsar bala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Ebrahim abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Gale gajh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mohamd abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
corh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Bolarz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Haft jobh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Shamc abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Ali abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Taher abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Hcar corg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Tajrh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Hcar hacan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Khavh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Haj abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Hcar kochak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Kazem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Javad abad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Galeh boland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Zavarh var	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Smaeil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Varamin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Internal degree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	25	30

Table 5a. The rate of facilities and services in the residencies of Southern Behnam Arab in two periods of before Javad Abad transformation into a town.

Residential places	Commercial and Civil		Political and Administrative				Telecommunication				Educational- Cultural					Clinical- Medical									
	F.M.R.C	C.S	C.C.V	F.D.C	B.C	I.C.V	A.N.M	A.P.T	T.O	P.O	P.B	P.L	F.H.S	M.H.S	F.S.S	M.S.S	P.S	V.T	V	PH	C.T	C.A	M.A.M	P	C.H
Hcar gazy	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Najaf abad	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Toghan	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Jafer	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hsar bala	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ebrahim	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gale gajh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Mohamd	0	1	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1
Corh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Bolarz	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Haft jobh	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Shamsabad	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Ali abad	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taher abad	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Hcar corg	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tajrh	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hcar hacan	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Khavh	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	0
Haj abad areh	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Hcar kochak	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Kazem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Javad abad	0	1	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1
Galeh land	0	1	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1
Zavarh var	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Smaeil			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Varamin							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peishva							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Internal degree																									
	Before10		Before town31						Before becoming a town26						Before becoming a town32										Before becoming a town32

Table 5b. The rate of facilities and services in the residencies of Southern Behnam Arab in two periods of after before Javad Abad transformation into a town.

Residential Places	Commercial and Civil			Political and Administrative			Telecommunication			Educational- Cultural						Clinical- Medical									
	F.M.R.C	C.S	C.C.V	F.D.C	B.C	T.C.V	A.N.M	A.P.T	T.O	P.O	P.B	P.L	F.H.S	M.H.S	F.S.S	M.S.S	P.S	V.T	V	PH	C.T	C.A	M.A.M	P	C.H
Hcar gazy	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0
Najaf abad	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Toghan	0	1	0	0	0	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	1	0
Jafer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hsar bala	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ebrahim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gale gajh	0	0	0	0	0	1	0	1	1	1	1	0	1	1	1	1	0	0	0	1	1	0	0	1	1
Mohamd corh	1	1	0	0	1	1	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	0	1	1
Bolarz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Haft jobh	0	0	0	0	1	1	1	0	1	0	1	0	0	1	0	1	0	0	0	0	1	0	0	0	0
Shamcabad	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Ali abad	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Taher abad	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hcar corg	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Tajrh	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hcar hacan	0	1	0	0	0	1	0	1	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	1
Khavh	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1	0	1	0	0	1	1	1	1	0
Haj abad	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hsar kuchak	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Kazem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Javad abad	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Galeh land	1	1	0	0	1	1	0	1	1	0	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1
Zavarh var	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
Smaeil	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Varamin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peishva	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Internal degree	After15			After becoming a town35			After becoming a town45			After becoming a town54						After becoming a town56									

Table 6. The density of operations in the studied region before and after Javadabad becoming a town

Operation	Total of rows		Total of possible relation		Density (percent)	
	Before becoming a town	After becoming a town	Before becoming a town	After becoming a town	Before becoming a town	After becoming a town
Health care	32	54	650	600	4/92	9
Cultural -educational	31	40	650	600	4/76	6/66
Fundamental-service	32	56	650	600	4/92	9/33
Agricultural and Animal affairs	26	32	650	600	4	5/33
Commercial - service	10	35	650	600	1/53	5/83
All flows	30	42	650	600	4/61	7

tables show that the village of Khaveh as the central location has a potential value and this is because, the village of Khaveh has 4.45 km as the total of minimum distances from other residencies and 0.224 as the highest centricity value (vicinity). In addition, the town of Javad Abad having the total average distance of 4 km from other residencies and the centricity value (vicinity) of 0.25 is approximately Khaveh. Moreover, Varamin has the most minimum total of distances (10.65 km) and the least vicinity of 0.93 in regard to other residencies.

Conclusion

Utilizing network analysis methodology, this research has been an attempt to analyze the relations and functions of concern before and after the transformation of Javad Abad into a town in order to study the role and function of Javad Abad in developing the surrounding villages. The analysis shows that the transformation of Javad Abad into a town has had a positive effect on providing services to the other residencies such as the residencies of Southern Behnam Arab. Before the transformation of Javad Abad into a town, it was only able to provide services to only five villages, and therefore, all its surrounding residencies in addition to itself were dependent on Varamin, which is located 10 km away from the Javad Abad zone.

In this phase, there have been only the villages of Mohammad Abad Arab, Bolarz and Sureh, which were dependent on the town of Pishva in addition to Javad Abad in order, enhance their requirements for transportation and some services. However, the rest of the rural residencies were in contact with Javad Abad due to the vicinity of facilities and services. Preceded by Javad Abad, some villages (Mohammad Abad Arab, Khaveh and Ghaleboland) are able to provide some services to their surrounding villages due their location. As a result, through analyzing the obtained data and the regional studies in the zone of our concern, we are witnessing that by transforming Javad Abad into a small urban spot (central location), this city has gained a key

role in providing services to its surrounding villages as well as decreasing the dependency of the concerned villages on Varamin. Furthermore, the rural concentration analysis of functions and relations shows that this rate had been 4.61 before the transformation of Javad Abad into a town and 7 after the transformation. This fact simply indicates more links among the rural residencies within the second period. Thus, it could be concluded that the town of Javad Abad as the central zone could establish the maximum level of contact to its surrounding residencies, and consequently plays an integral role as a catalyst for rural development and an obstacle to stand against the immigration to larger cities.

Nomenclatures

F.M.RC	Farming Machines Repair Centre
C.S	Corporation Store
C.C.V	Corporation Company of Village
F.D.C	Farming Development Centre
B.C	Basij Centre
I.C.V	Islamic Council of Village
A.N.M	Access to Newspapers and Magazine
A.P.T	Access to Public Telecommunication
T.O	Telecommunication Office
P.O	Post Office
P.B	Post Box
P.L	Public Library
F.H.S	Females High School
M.H.S	Males High School
P.S	Primary School
V.T	Veterinary Technician
V	Veterinary
PH	Pharmacy
C.T	Clinical Trainee
C.A	Clinical Assistance
M.A.M	Medical Assistant or Midwife
P	Physician
C.H	Clinical House
C.M.C	Clinical Medical Centre

Table 7. Studying and comparing internal and external degree nearness the level of rural district before After Javad abad becoming a town

Residential places	External degree		Internal degree		Total of distances to other resident places Before and After Javad abad becoming a town	Nearness before and After Javad abad becoming a town
	Before Javad abad becoming a town	After Javad abad becoming a town	Before Javad abad becoming a town	After Javad abad becoming a town		
Hcar gazy	2	1	0	0	6.96	0.143
Najaf abad	2	1	0	0	7.89	0.126
Toghan	2	1	0	0	7.61	0.131
Jafer abad	2	1	0	0	7.30	0.136
Hsar bala	2	1	0	0	5.76	0.173
Ebrahim abad	1	2	0	0	4.65	0.215
Gale gajh	1	1	0	0	7.90	0.126
Mohamd abad	1	2	0	6	6.67	0.149
Corh	1	2	0	0	6.19	0.161
Bolarz	1	3	0	0	7.38	0.135
Haft jobh	1	2	0	0	6.28	0.129
Shamc	1	2	0	0	6.24	0.160
Abadarb						
Ali abad mohit	1	2	0	0	4.92	0.203
Taher abad	1	2	0	0	5.76	0.173
Hcar corg	1	2	0	0	5.46	0.183
Tajrh	1	2	0	0	4.87	0.205
Hcar hacan	1	2	0	0	4.54	0.220
Khavh	1	1	0	7	4.45	0.224
Haj abad	1	2	0	0	5.96	0.167
Areha						
Hcar kochak	1	3	0	0	5.75	0.173
Kazem abad	1	2	0	0	8.49	0.117
Javad abad	1	0	5	24	4	0.25
Galeh Boland	1	1	0	4	7.32	0.136
Zavarh var	1	2	0	0	5.67	0.176
Smaeil abad	1	2	0	0	4.81	0.207

Abad into a town and 7 after the transformation. This fact simply indicates more links among the rural residencies within the second period. Thus, it could be concluded that the town of Javad Abad as the central zone could establish the

maximum level of contact to its surrounding residencies, and consequently plays an integral role as a catalyst for rural development and an obstacle to stand against the immigration to larger cities.

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