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ANALYSIS OF SMALL TOWNS ROLE IN RURAL DEVELOPMENT BY USING NETWORK ANALYSIS CASE STUDY: NOOKABAD CITY OF KHASH

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ABSTRACT: Problems arising from the growth of large cities, population density and the wave of rural migration to the cities Inattentive and planners emphasize the strengthening and growth of small towns. It is believed that the strengthening Small towns and rural migration to the larger cities have caused many problems in rural areas of the country due to lack of adequate access to services thus improving small town status will solve most of these problems caused via migration . Iran's policy to convert villages into towns in the past two decades has solved different issues. Nookabad is one the villages that has been recently in1990 upgraded to city status in Sistan and Baluchistan province. The purpose of this study was to evaluate the role and function of Nookabad town developed as a center of the surrounding rural areas. Therefore 5 performance criteria's in terms of 20 variables are comparing the recent status of Nookabad before and after city status. The results show that the city has managed to play a key role in serving as a central location to surrounding areas thus reducing dependency of surrounding towns and villages from Khash city.

***Keywords*:** Small towns, Rural development, Network analysis, Nookabad city.

INTRODUCTION

Today, with widespread economic development - social and technological aspects such as transport and communications, Town and village has developed broad and diverse relationships. These relationships or dependencies are shown in the form of population, goods, ideas and beliefs, investment, information and innovation. That's why most of the changes between cities and villages are less dependent of their qualities. Therefore Urban – Rural affairs must be planned, process and prioritized (Clayton , 2003, p186). During the last decades, several strategies for developing rural areas have been proposed, one of these strategies that have a spatial approach is the creation and strengthening of small rural-urban areas. In general, the role of cities in rural development is through their strong links and relationships Rural - urban bias. The new paradigm of development, networks and flows of resources for each village area must be defined, but it should be noted that the net benefits approach are achieved via different means and changes its position from one place to another with the passage of time (Lynch, 2005, p5).

As a result according to urban and regional issues analysts' urban development is necessary solution to deal with the imbalance of resources caused by the development of big cities. When growth is limited to only a few major cities, Greater tendency to escalate and growth in these centers will be extended thus smaller urban centers will have less of a gradual transition. Small towns accepting a significant share of production, investment, and man power and countries population in distant places with high vacant land are able to consolidate factors for the prosperity of the area (Amakchi, 2003, p100-168). Between small urban centers and rural areas, villages are considered to be the nuclei as they link rural areas with larger cities. Any activity in these centers are known as the primarily cause that directly effects rural areas (Fanni, 2003, p44).

Hinderdink and titus (1998) say that in real relation between cities and villages are curtail but unfortunately it's ignored. Especially Randenly (1983) highlights the development of cities influence range of services for the highlighted areas. In real Functions of urban village development in rural parts of the analyzed area is curtail as planners can spatially distribute the social and economic functions to assess urban villages. By creating urban villages the problems of planning resource for low populate villages shall decrease and their economic and social growth will increase. Thus coordination between social and economic development is established so that both urban and rural development boosts up (Asayesh, 2004, p9-10).

Today the unequal distribution and attention of urban-rural areas is the hot topic for the economist and regional planners. Hence, in order to achieve a balanced and integrated development of regional climate we must create a balanced and systematic hierarchy of settlements needs between small towns (Noori 2009, p61). Proponents of small towns considers regional service centers as the main source of development in these areas and to create Integrated settlement hierarchy to crept down the effects of stress due to lack of resources. During the last half century one of the Rapid Urbanization effects on spatial structure and population of the country is the growing number of cities through rural towns as centers. On the other hand some experts strengthening urban functionalities and conversion of rural to urban areas has led to provide better services in rural areas (Tavana, 2007, p107).

At the beginning of 90s Urban Village Developments obvious strategy which was focused on the development of small towns and medium business centers has been replaced. Small and medium-sized cities strategy is based upon enhancing third part of urban distribution thus filling the gap between rural and urban areas (Papoli Yazdi 2008, p216). Since towns can influence the development and dissemination of regional development therefore they play useful and effective role and are valuable means. In actual small towns are considered to be at the end of development and modernization chain of urban areas which are lagging behind. Authorities must pay attention to the development and modernization of urban areas and these efforts must also penetrate the far most areas.

Today many countries has adopted the policy of developing rural cities which supports the needs of surrounding villages so that most the big issues such as overpopulation of mega cities are somewhat solved (Husain, 2003, p7). Local constraints and regional problems such as unbalanced spatial distribution of population, Irregular migration from rural to urban areas especially large cities thus orientation intermediate imbalance in distribution facilities, economic opportunities at regional levels, positive tendency towards metropolitan and negative tendency toward small towns intensifies the role of mid-determination of small towns regional development planning (Fanni, 2003, p13).

In Iran policies regarding new cites development on regional and national levels has not been successful. Therefore small cities performance along with planning and appropriate management can be a solution towards prosperous city development (Fanni, 2003, p117-120). With respect to this policy, urban and regional planners for decentralization of large urban centers have tried to create new cities, stabilizing old cities and converting large villages into small cites (Saraei, 2007, p166). In Iran from the past couple of decades the policy of converting large villages into cites have been adopted thus result in increasing the number of cities more than 1000 (Reshvani 2007, p46). In Sistan and Baluchistan province the number of cities in the year 2013 has been increased up to 29 most of which were villages (according to Iran's Census). Nookabad's status upgraded to city in 1990. With respect to the aim of converting villages into cities, present article is to view the role of Nookabad city in the development surrounding villages and also to answer this question that whether Nookabad can prove as a center for development in economic, cultural and social aspects of surrounding villages hence reducing their dependency to the city center. To get our answer we use network analysis and comparing past and present of Nookabad city progress in providing public services to other villages.

NETWORK ANALYSIS

Social network analysis methods is to analyze and evaluate the recent situation and provide documents for regional development which is under study. Statistical models based on network analysis are used by researchers for almost *60* years. The purpose of these models is to test particular properties of social relations between agents and components. These applications range from studies of interactions between characters, internal relations, Relations between leadership and social group studies, Political behavior studies and studies of the power sector. This method is used for determining key types of settlements, including number of internal dependencies in a system. Key features of this method are:

1- Describe the dependencies of settlements in area.
2- The degree and significance of a settlement or a series of settlements to be determine
3- Sensitivity of the settlement system in the absence of a specific settlements.

It seems that social network analysis is appropriate for all three of the above mentioned points. Network analysis method is widely used in social science and transportation research, but these applications are rarely used to determine the functionality of living settlement.

The Foundation of network analysis is based upon analytical data which is dependent on information and assumptions for examples these data includes relationships and interactions between people and their personal attitudes toward groups. Connection and dependency between a pair is called as relation. Data communication are observed and elected by investigating one's personal interactions with others. There are only relations between the coupling agents which are suitable for analyzing relationships. There are two major relationships in network analysis:

1- Bilateral or evaluated
2- Direct or Indirect

Bilateral relationship (0-1) shows the relation or no relation between two agents or lack of relation and its intensity in a settlement.

A direct relationship with the origin which is quite clear. An indirect relationship with respect to the origin which is not clear enough. An indirect relationship is usually presented with a bow. A line between integrated factors which doesn't verify them. Usually a bow represents the linear correlation between the factors with a line at the end. For example if students from village A are send to village for education, it's the relation between A to B which indicates the educational relationship.

Diagraphs

Data are expressed not only in the form of a matrix, but also as graphs. If the nodes are directional the arced graphs are named as directional which are called as vertices Diagraph and the connection between them is expressed as an Ark. A diagraph is a set of complete an incomplete sets of N, Ni={N9,N0,….,Ng} whose entities are names as nodes along with the set of A{a90,a96,…,a9g,…,ag-9g} with ordered pairs of aij named as arks where nj,ni are separate entities f N. The graph shows how an operating system is linked with other agents. If the number of graph agents doesn't exceed then it's a suitable way to show one agent is linked with another and which agents are isolated also which is sender or receiver.

The proximity of a graph-based analysis reflects the fact that two distinct processes are directly related to each other. The external factors Nj,ni from set of n and the bows from A={aij} shows the relation between factor I with j thus agent I and j are adjacent if one of aij or aij exists. In a D-(N,A) diagraph, the adjacent matrix A(D) is defined as follows: A(D)={aij} so aij=9 if aij or aij exists otherwise its value is zero. If all the factors of a system are bidirectional thus we shall obtain a complete graph. In a complete graph all bidirectional factors have relation with each other or we can say that a complete has a density of 0/100. From mathematical point of view density (D) is a diagraph where number of bows are logical.

The power of a node as sender or receiver in a system can be measured via social matrix or adjacency matrix. The number of Arks arises from node are called as external degree of a node. In a social matrix outer degree are the collection of its rows and the number of arks attached to a node are its internal degree. The internal degree or collection of columns of node in a matrix are obtained dually. Our analysis shows that on behalf of social network analysis nodes are of great importance. There are few important criteria for node measurement which are local center, local value and central.

1-local center: shows the direct receiving point for each factor which can be measured via internal degree of node. As these criterion are based on node degree therefore these are also known as central degree or credit rating. In case of a single path a factor can detach as a sender from a bow or a carrier exists with at least 2 bows one inside one outside can enter a node with the help of a single receiver here if columns are zero row should be non-zero. A factor is known as a receiver if its outer degree is zero and inner degree is non-zero. A factor is isolated if both of its outer and inner degree values are zero. Following diagraph and matrix is a sample that shows relationship between 4 nodes A, B, C, and D.

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

As we can see that A is sender, B carrier, C receiver and D node is isolated when there is no Arc present to interconnect other nodes in a network. Adjacency matrix for the following diagraph is as follows which shows the

relation between A and B, B with C and C has not outer connections while has no inter network relation which makes it an isolated node.

3- Main Center if an agent lies in the shortest distance of other agents then it's known as main center. Distance between each adjacent node is measured precisely. The less the distance of agent I with other agent the less will be its presence according to the equation

$$C(n_i) = \left[\sum_j^n d(n_i, n_j)\right]^{-1}$$

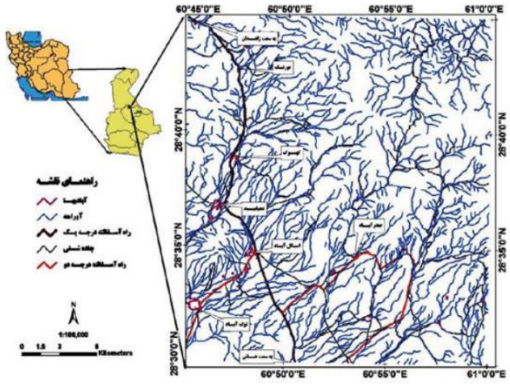
Where d (ni, nj) is the smallest geographical distance between agent I and j inside network and Nis the size of the network. These values depends on the size of the network. Therefore size must be standardized by dividing them on (N-1) Measurement is the possibility of putting an agent in the path of another one and the more this situation occur the more a node has main center. According to the research objectives, research method based upon network analysis, a comparison of situation, before and after are studied. For data collection and statistics acquired it from library and documents and those which were not available in libraries we used filed method.

Field method is mainly based on questionnaire. In this method for villages that were selected as samples (Nookabad, Gonak, Bedak Paien, Nookabad Sofla, and Gazanjeli) questionnaires were distributed regarding performance of Nookabad before status upgrade to a city (1978) and present. In order to asses trends and relationships in the above mentioned two stages, and to reach desired goal we use network analysis method.

In this study in order to understand trends and relationships of user level functions at Nookabad 20 variables divide in five groups of performance such as hygiene and health (doctors, healthcare centers, dentists and drug stores), cultural and educational (school, colleges, libraries), service infrastructures (postal office, gas station), agricultural and cattery (agricultural products sale, veterinary, agricultural equipment shop, workshop) commercial services (banks, home appliances shops, building material shop, book shop, electric shop, transport office, food stuff) were observed. A binary relation network analysis in order to analyze the relation between factors or settlement services has been considered.

Study area

Nookabad is one of the two city regions of Khash. Khash is located in the middle of Sistan and Baluchistan province and in south east of Iran. It's also lies from west to Iranshahr, north to Zahedan, south to saravan and east to Pakistan border. The city has a total area of approximately 19302.6 km square and comprises of 2 city regions and 733 villages.



Location of case study in province and Khash city

RESULTS AND DISCUSSION

In order to understand the importance and service providing of Nookabad city to near villages and towns we analyze factors such as hygiene, health, educational, cultural, public services, constructional, agricultural and

veterinary and economic factors. All the data collected have been shown in two time frames shown in both figure and table 1 and 2.

1- Unlike first period that we studied dependencies of Nookabad toward Khash city have reduced and the external host of city has become zero.

2- Nookabad city in first and second period of study doesn't receive any relationship regarding service flows from surrounding villages.

3- In first stage as most of the rural areas focus for public services were towards Khash city only one village namely Eskelabad was dependent on Nookabad city. But in second phase with the focus on service provided by Nookabad city opposite to first level, the dependencies of residents of villages were reduced from khash city except Grouk village which has the same distance as Nookabad from Khash city (outer degree level of 2) as all other villages are dependent to Nookabad as before upgrading to city status Khash was (8) and Nookabad was (1). As a city Nookabad has now the inner degree of (7) and khash (1).

4-

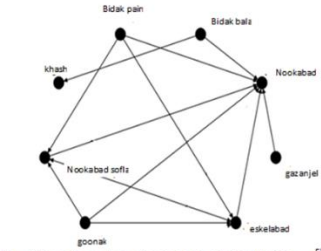


Figure ۲ Dyagraf flows and connections to the city at the tip of the Fallen

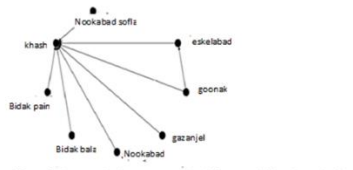


Figure ۱ Dyagraf and communication processes at the tip frequented before becoming city

5- In second phase after Nookabad's status was upgraded to city, Eskelabad and Nookabad Sofla achieved some self-services such as educational and cultural which is also the main reason of dependencies of other villages after Nookabad towards Eskelabad (internal degree of 4) and Nookabad Sofla (internal degree of 3).

6- On behalf of external degree in first phase excluding Eskelabad which is near to Nookabad and Khash city (external degree of two) all other places have same dependency values (external degree value one), but in second phase in between Nookabad village areas Eskelabad has the lowest dependency (external degree one) while Gonak and Gezanjeli has highest dependencies (external degree 3).

7- In first phase excluding Nookabad which provide facilities and services to only one village the other village near this area not only could provide any facilities to other villages but were not able to provide facilities for its own people (external degree zero). But in second phase, Nookabad Sofla and Eskelabad provided services not only to their own population but to other villages as well.

8- With respect to the rows and columns of the table below (means internal and external degree) in the two time periods before and after Nookabad upgrade to city none of the values is zero. Further studies shows that there is no isolated place in both time periods and these villages either receive services from some part or provide services to other.

Table 1. Aanalyzes all of the events and relationships in the study area before becoming Nookabad city

Settlements	Eskelabad	Gonak	Nookabad	Bidak Bala	Bidak Pain	Khash	Nookabad sofla	Gazanjeli	External Degree
Eskelabad	0	0	0	0	0	1	0	0	1
Gonak	0	0	1	0	0	1	0	0	2
Nookabad	0	0	0	0	0	1	0	0	1
Bidak Bala	0	0	0	0	0	1	0	0	1
Bidak Paien	0	0	0	0	0	1	0	0	1
Khash	0	0	0	0	0	0	0	0	0
Nookabad Sofla	0	0	0	0	0	1	0	0	1
Gazanjeli	0	0	0	0	0	1	0	0	1
Internal degrees	0	0	1	0	0	8	0	0	9

Table 2. Aanalyzes all of the events and relationships in the study area after becoming Nookabad city

Settlements	Eskelabad	Gonak	Nookabad	Bidak Bala	Bidak Paein	Khash	Nookabad sofla	Gazanjeli	External Degree
Eskelabad	0	0	1	0	0	0	1	0	2
Gonak	0	0	1	0	0	0	0	0	1
Nookabad	0	0	0	0	0	0	0	0	0
Bidak Bala	0	0	1	0	0	1	0	0	2
Bidak Paien	1	0	1	0	0	0	1	0	3
Khash	0	0	0	0	0	0	0	0	0
Nookabad Sofla	1	0	1	0	0	0	0	0	2
Gazanjeli	1	0	1	0	0	0	1	0	3
Internal degrees	4	0	7	0	0	1	3	0	5

9- Review of all current densities in the two periods, before and after Nookabad becoming city shows that the current density in first period is 12.5 percent while in second period its 20.08 percent. On the basis of the following density comparison in each period shows a positive growth level in areas under study.

10- Analysis of density of each factors is shown in table 3 and 4. This shows that before Nookabad becoming a city all pressure was towards Khash city for providing facilities to surrounding villages thus the results are not desirable. But in second period after Nookabad's status upgrade to city level the density of medical and agricultural services rises due to their presence in Nookabad city.

Table 3. Function density levels of settlements before and after becoming Nookabad city

Functions Density	Sum of rows		Total number of possible relations		Density (percent)	
	Before becoming Nookabad city	After becoming Nookabad city	Before becoming Nookabad city	After becoming Nookabad city	Before becoming Nookabad city	After becoming Nookabad city
Health - Health	8	8	72	72	11.11	11.11
Education - Cultural	8	15	72	72	11.11	8.20
Services - infrastructure	9	11	72	72	11.11	28.15
Agriculture and Amvrdamy	9	8	72	72	11.11	11.11
Services - Commercial	9	12	72	72	5.12	66.16
All events	9	15	72	72	5.12	08.20

11- Evaluation of central values in the two time periods according to table 4 shows that Eskelabad village has the closest relationship than all other areas.

12- Intermediate study review of the settlements show that on the village basis Nookabad Sofla has more central values. Villages like Bedak Balla and Bedak Paein due to their connection to the subway via tracks and the village of Gezanjeli due to its far location and their coordinating with other villages with Nookabad in the last two periods are shown in table 4.

Table 4. Survey and comparison between interstitial external and internal degrees of Nookabad level before and after becoming city

Settlements	*External Degree*		*Internal Degrees*		*Sum of distance proportion to other settlements*	*Closely*	*Interstitial*
	Before becoming Nookabad city	*After becoming Nookabad city*	*Before becoming Nookabad city*	*After becoming Nookabad city*	*before becoming Nookabad city*	*before and after becoming Nookabad city*	*before and after becoming Nookabad city*
Eskelabad	*1*	2	*0*	4	*9.937*	*0.1*	*5*
Gonak	*2*	1	0	0	*8.678*	*0.115*	*4*
Nookabad	*1*	0	1	7	*10.06*	*0.099*	*2*
Bidak Bala	*1*	2	0	0	*19*	*0.053*	*0*
Bidak Paien	*1*	*3*	0	0	*12.375*	*0.08*	*0*
Khash	*0*	*0*	8	1	*29.94*	*0.033*	*0*
Nookabad Sofla	*1*	*2*	0	3	*10.188*	*0.098*	*7*
Gazanjeli	*1*	*3*	0	0	*10*	*0.1*	*5*

In order to determine the role of Nookabad as a city providing facilities and services to the nearby villages such as economic, social and cultural, we use the method of network analysis. Result shows that upgrading Nookabad to city has positive impact on its surrounding villages. As before Nookabad becoming a city all villages including Nookabad was completely dependent on Khash city for service and facilities which lies at a distance of 65 kilometers, which has significantly reduce after Nookabad becoming a city. Hence only Eskelabad due to its location close to Khash city is still dependent on it. All villages near Nookabad due to their relative distances (8.9 km to Nookabad and 26.6 km till khash) are dependent for services and facilities. After Nookabad upgrade to city villages like Gezanjeli and Nookabad Sofla due to presence of some facilities and providing them to other villages, like before Nookabad it was 12.5 percent and after Nookabad becoming city it has risen up to 20.8 percent gave them a status of town. Keeping in view the lack of access to adequate services and facilities which make villages reluctant to leave their homes, consequently causing migration. On the other hand factors such as capital constraint that hinder the facilities to the rural areas of other supporting small cities. In settlement hierarchy it's sometime necessary that rural and urban areas develop thus solving many issues.

CONCLUSION

AS a result of examining the relationships and dependencies of settlement to Nookabad in previous chapter, Nookabad as the center to all settlements and villages plays a vital role in providing economic, social and cultural facilities. Since the aim of this study was to evaluate strategies for regional development of Nookabad through proper communication between the rural and urban area as the first approach. Relationship between city and villages is in the benefit of city and loss of the village. One the fundamental avenues is the loop between small cities as a connection to villages surrounding it. Where it's possible for developing countries to focus on investments in all rural habitations there is no central place to focus on technology strategy and investment requirements of villagers as economic and social developments are essential for settlements progress. Due to extreme poverty in the structure of center that can lead to the development of rural infrastructure and provide villagers access to facilities are small towns. These towns are usually large villages and due to their geographical location were able to merge nearby villages into itself thus converting into a city. Citizens of such towns are villagers who used to live in villages and obviously doesn't consider themselves strangers in small towns as other villagers consider small towns their second home in terms of ethnic and cultural homogeneity. Thus, they prefer to introduce their agricultural products mainly in these cities and get access to larger market via these small towns. Nookabad due to its location between Zahedan-Chabahar main roads attract surrounding people and since *1977* is considered as a part of major service provider to surrounding villages. Becoming the focus of facilitating the surrounding villages, this city is the main connecting center for 90 villages located between Zahedan and Khash. Nookabad besides facilitating its own population also provides facilities to surrounding villages. Studies shows that due to lack of medical and educational infrastructures it's unable to provide these facilities to surrounding areas and this is the main cause of people's reference to other cities.

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