

# **Central Functions and Centrality in Rural Settlements of Sargodha District**

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## **Abstract**

The centralized functions characterizing central place vary among different cultures. Different functions have been used as measures of centrality by geographers and research workers, and they have classified settlements on the basis according to their own purposes.

## **Environment of the Area**

Sargodha is one of the canal colony districts developed by Sargodha Development Authority which was established some time in 1960. The district lies between longitudes 71° 37' & 73° 18' E and latitudes of 31° 32' & 32° 44' N. Now the district is bounded on the north by Jhelum district, on the east by Chanab River beyond which lies the districts of Mandi Baha-ud-Din and Hafizabad, on the south by Jhang district and on the west by Khushab district, separating the two districts by Jhelum River. (Map 1) The total area of the district is 5,854 square kilometer, which is 0.73% of the total area of Pakistan, 2.85% of Punjab and 22.21% of the Sargodha division. The whole of the district is plain area and built by Jhelum and Chanab rivers. Administratively the district has been divided into five tehsil. There were one Municipal corporation and five tehsil councils, ten town councils, 122 union councils and 832 villages (Local Government; 1998) in Sargodha district. The total population of the district according to 1998 census was 2,665,979 persons in which 1,907,891 person's lives in rural areas and 745,455 persons in the urban areas. Total cultivated area of the district is 525,702 Hectare (1,298,486 acres).

## **Concept of Centrality**

Dickenson and Smailes (1961) highlighted the importance of centrality measurement. It was realized that it is easier to build upon a 'natural' settlement hierarchy than to substitute a more artificial order of service provision. Therefore the accurate measurement and classification of a centrality of various settlement was seem as a high research priority, particularly in the rural setting where minimum service threshold were deemed as critical in the retention of rural population.

The definition of central functions in this particular study however, has been restricted exclusively to the services and facilities available in the key settlements of Sargodha District. Villages vary in size, both in population and in the degree of services being rendered to their immediately adjacent areas. This creates gradation in the settlements, some to be designated as central places and some as dependent or tributary settlements. A central village is the village with more services than one would expect of this size and which is operating services for neighboring villages (Bracey, 1952). The higher the levels of functions higher will be the rank of the village and larger its tributary area. According to these kinds of definitions all the villages in Sargodha District were not significant, but they differ in their service providing capacities.

Centrality of a settlement is important in the provision of services of tributary area. Population is, therefore indicated by the number of services it provides, and by the proportion of these services supported solely by the tributary population. An important component of Central Place Theory (Christaller, 1933) is threshold population, which is defined as the minimum population size of a centre for the support of functions.

## **Indicators of Centrality**

There are number of indicators for measuring the centrality but due to non availability of the data on economic variables, different institutional services such as educational and medical services and other basic amenities such as communication, and electricity were chosen as measures of centrality in this study. Matters relating to communication were accomplished by post offices, telephone offices and railway stations. Road transportation could not be included because of lack of information. Law and order and Security matters are accomplished by police institutions. These functions were considered to have a bearing on the centrality of villages in Sargodha District and become indirectly responsible of the growth and development of the district. These attributes were selected on the basis of understanding of the concept of centrality in the rural context. Centrality is a useful indicator of the command of the settlements over the "umland".

## **Methodology**

This study is mainly based on the assumption that the existing pattern and functional characteristics in the Sargodha district, is the out come of changing socio-economic, cultural and political environment with population growth.

Presently two basic methods of centrality measurement have emerged, and the development of each has continuing importance to rural planners as part of the process for identifying and selecting key centers in the rural areas. The first method is the use of service indicators, as pioneered by Dickenson and Smailes and quantified by O' Farrell (1968) in county Tipperary. The second method of centrality measurement concerns the delineation of hinterland areas and is typified by the work of Green (1950) Carruchers (1957) and Johnston (1966) using bus service data. Although bus services are now an outmoded measure of fictional association, flow research has continued, notably using telephonic communication data (Davies and Lewis 1970).

## **Data Analysis**

Every study will use its own type of data in its own way defined by its aims and hypothesis, and the relationship between aims that will determine the choice of analytic method. In this study data analysis mainly has been done by using the quantitative techniques like Weighted Index, Composite Index Method (Bhatt,1976) and few simple mathematical calculation, as nature of the present study demands, distribution and pattern of the information about population, social amenities like educational facilities, health and vetnary facilities, communication facilities, and other utilities has been analyzed. The patterns of distribution of the above mentioned attributes which will be referred to as facilities in this study are shown in table 1.1 and are discussed as follows.

### ***a) Educational Facilities***

Education is an essential element in development of an area. The number as well as the distribution pattern of educational institutions is very significant to understand the development societies, particularly in a developing society. The educational institutions included in this study were government sponsored and are commonly called government schools or colleges. As private sector has no significant development in rural areas. The educational institutions are ranked as primary, middle, secondary, higher secondary schools and colleges.

Primary school was more common in the district than the other facilities. The Threshold population for primary school was the lowest (282) as compare to the other facilities. The reason why primary schools are more common was that the communication means were very poor which restricts the mobility of little children.

Middle schools were less ubiquitous than primary schools with a population threshold of 2,730. The choice of a settlement for the location of a middle school is determined by the tributary area where primary schools are located. Due to poverty, very few students continue their education and go to high schools, other discontinue at this level and either join hands with their parents in farming or look for a job in the urban centers.

A High School is an up gradation of Middle School adding two more classes' i.e. 9<sup>th</sup> and 10<sup>th</sup> classes. High school is characteristics of larger village, with a larger tributary area than middle schools. The less common occurrence of high schools in the district can be attributed to the factor of poverty of the people. In spite of the fact that government schools are far less expensive, a majority of the people prefer their youngsters to help them in farming and other occupations.

Higher Secondary Schools were introduced in the region during the early 1990s. Colleges are associated with the administrative headquarters of tehsil. Colleges depend upon the supply of high school graduates, where they are prepared for different professional colleges or post graduate studies (M.A., M. Sc.) at the universities. Colleges thus have larger tributary areas. Recently the University of Sargodha has been established.

### *b) Health Facilities*

Like many other services, medical facilities in Sargodha district were inadequate. The three important health facilities were dispensaries / hospital, Rural Health Center and Basic Health Unit. The difference between the two is that Rural Health Centre and Basic Health Unit provide very basic facilities and usually do not have registered medical officer, neither the beds are available for patients. Hospitals on the other hand, provide a little number of beds and are headed by a registered medical officer. Those villages with hospital facilities become important central villages. There were 33 dispensaries in the district i.e. only 3.87% of the villages have enjoying this facility. Remoteness from a larger settlement with hospital facility seems to be a consideration in the location of dispensaries in smaller villages.

### *c) Communication*

Post offices in the villages of Sargodha district not only deal with mail services but also perform certain additional functions. The extra functions include, collection of fees for permits (license) for rifles shotguns, driving license, insurance and utility bills and disbursement of pension money to the government retired person etc. These functions attract a considerable number of people to the village containing post offices. There were 64 post offices in the district among these 43 were in rural areas. The post offices were located only in those settlements having a population size of more than 2,530.

The railway line in Sargodha is a branch of the main North South Pakistan Railway system. It is a broad gauge line and serves nearly the whole of the district as a means of long distance transportation between Sargodha and the rest of the country. The villages located along the railway line become important centers. There were 04 railway stations in rural areas. Sargodha city, however, was by far the largest converging point of railway passenger's from all over the district.

### *d) Police Station*

There were 13 police stations in the rural area of the district. The threshold population for police station is 205309. Police stations have a wider jurisdiction that the villages where they are located.

### *e) Electricity*

As already discussed earlier the electrification of a village is an important measure of centrality in a rural society. One example of the importance of electricity is that it makes possible for the wealthy household to install such facilities as flour mills which become regular features of attraction for the surrounding villages and thus enhance the centrality of the village where electricity has been provided. Out of 832 villages only 59 were unelectrified.

### *Aggregation of Facilities*

Aggregation meant the clustering of more than one facility in a village. Settlement in Sargodha district has been ranked according to the number of facilities available in each village (as shown in table 1.1). The total numbers of facilities considered in this study are 27. Sargodha city and all urban towns treated as separately because the present study is concerned with rural settlements. All the 27 facilities are available in Sargodha and other urban towns which make them the undisputed first order settlements of the district. There are 59 villages which were without any facilities. They were entirely dependent for these facilities on the nearest central villages. Settlements with less than 1000 population have hardly any facility except for a primary school or electricity in a few of them. The presence of more than one facility in some villages in terms of population has attributed to some unique characteristics. Sial Sharif in Sahiwal tehsil and Chak No. 95 S.B in Sargodha tehsil, for instance, owes its importance to a religious leader and political figures who resides there and because of them the government has provided maximum facilities e.g. electricity, telephone, postal services, bank, school, health care centre etc.

The pattern of distribution of villages with cluster of facilities brings out the fact that there was one settlement Bhagtanwala with the maximum (17) number of facilities. The population of this settlement was 2338 (1998). In the same order according to the number of facilities are two more settlements i.e. Bhabhra and Midh Ranjha, both are situated in tehsil Bhalwal. The total numbers of facilities in each of these settlements were fifteen. These settlements were treated as central settlements and got 44 (54.32%) and 42 (51.85%) weightage out of 81. Bhabhra is also the largest settlement having population of 16690. There were four settlements which were having fourteen facilities in each settlement. These are, Dharema, Mari, Gondal and Wijn. Dharema and Mari are situated in Sargodha tehsil and Gondal and Wijn are situated in Shahpur tehsil. The population of these settlements was 11616, 10287, 5703 and 8921 respectively in 1998. There were eleven settlements having 13 functions among these eight were central settlements and five were those settlements which have population less than 5000 and were considered as non central settlements.

Chak No. 111 SB, was having population 4981 and 13 functions were performed here Stone crusher market were established here. Beside this it became an important commercial center due to Faisalabad- Sargodha road. Other settlements having 13 functions were Chak 34 SB and Chak 33 SB. Nearly all of these settlements were located on the main roads which bring out the relative importance of these settlements over their surrounding villages. The population and accessibility seem to have influence the process of characterizing of facilities in these settlements.

**Table: 1** Distribution Of Facilities

<b>Name of Facilities</b>	<b>Number of Village where they occur</b>
<b>(A) <u>Education:-</u></b>	
Mosque Primary School	263
Boys Primary School	612
Girls Primary School	573
Boys Middle School	98/85
Girls Middle School	114/104
Boy High School	114/95
Girls High School	74/53
Boy Higher Secondary School	4
Girls Higher Secondary School	9
Boys College	10/
Girls College	23/4
<b>(B) <u>Health Care:-</u></b>	
Hospital / dispensary	18+33 (51)
Rural Health Centre	28
Basic Health Unit	118
<b>(C) <u>Animal Husbandry:-</u></b>	
Veterinary Hospital	28
Veterinary Dispensary	32
Veterinary Centre	91
<b>(D) <u>Communication:-</u></b>	
Post Office	67/43
Railway Station	04
Telephone Exchange	48/28
Number of Telephones	40,000 / 5000
<b>(E) <u>Others:-</u></b>	
Banks	152/58
Petrol Pump	147/73
Police Station	131/13
Union Council	122
Patwar Circle	301
Electricity	755

Source: Field Survey 2001

### **Hierarchy of Settlements Based On Composite Index**

The simple aggregation of function in the central settlements of Sargodha district indicates that central function were not homogeneous in distribution. In order to quantify the centrality a composite index was constructed on the basis of the weightage calculated by the various variables under consideration. To assign weightage to a given facility is a simple procedure, evolved by Bhatt (1976) was followed as given in table. The procedure involves two steps, in the first part weightage were calculated and then they were combined in the form of a composite index for each settlement. Weightage to different

**Table 2** Weighted Score for Facilities in Key Settlements

<b>Facilities</b>	<b>No. of settlement where they occur</b>	<b>Weightage</b>
Mosque Primary School	33	1.01
Boys Primary School	34	1.05
Girls Primary School	31	1.16
Boys Middle School	7	5.14
Girls Middle School	17	2.11
Boys High School	20	1.8
Girls High School	9	4
Boys Higher Secondary School	3	12
Girls Higher Secondary School	4	9
Boys College	0	0
Girls College	0	0
Hospital / Dispensary	4	9
Rural Health Center	4	9
Basic Health Unit	23	1.56
Vetnary Hospital	5	7.2
Vet. Dispensary	8	4.5
Vet. Center	11	3.27
Bank	21	1.71
Post Office	35	1.02
Telephone Ex	10	3.6
Tele Phone	23	1.56
P. Station	04	9
Petrol Pump	19	1.89
Railway Station	2	18
Union Council	31	1.16
Patwar Circle	35	1.02
Electricity	36	1

Source: Computed by author

will be its weight. The simple formula used for recalculation of these weightage is as follows.

$W_i = N / F_i$  Where;

$W_i$  = weightage to the ith function

$N$  = the total number of settlements.

$F_i$  = the number of settlements having the facility.

The weights calculated according to this formula are given in table 2.

For illustration purpose one example of the calculation of the weightage for Post offices is presented here

$$W_i = N/F_i$$

N = Total No. of central settlement in Sargodha = 36

F<sub>i</sub> = Total No. of central settlements having post offices = 35

$$W_i = 36/35 = 1.02$$

facilities were given according to their distribution among all central settlements. The principle behind this procedure was that the greater the scarcity of a facility, higher Weightage of the other facilities were also calculated in the same way. Since primary schools were more common than the other facilities. Their weightage was the lowest. On the other hand, there were only 3 Boys Higher Secondary Schools in the rural areas therefore, their weighted score was the highest i.e. 12.

The second step in the procedure was to calculate composite index values for each settlement on the basis of which hierarchic patterns could be identified. This was accomplished by using the second part of Bhatt's formula. The formula is as follows.

$$C_j = \sum W_i X_{ij}$$

Where C<sub>j</sub> = composite index value for the jth settlements

W<sub>i</sub> = weightage of the particular facility

X<sub>ij</sub> = value of the ith facility in jth settlement

∑ = summation of the products of W<sub>i</sub> and X<sub>ij</sub>

As an illustration the composite index value of Bhabhra was calculated as follows. Weightage of the particular facility or function were multiplied by the number of times each facility occurs in the villages. Values were then added up to get a combined or composite index.

Composite indices for all the other central settlements were calculated in the same manner and then the final ranking of settlements was done on this basis. Five orders of central settlements or central places were identified as given in table.

### *First order settlements*

There are only two settlements which lie in the first order settlement. These are Bhabhra and Midh Ranjha. The highest value is for Midh Ranjha which is 187.2. Similarly the composite index value for Bhabhra is 164. Though the population of Bhabhra(16690) is more than double than that of of Midh Ranjha (7595) but number of functions in both settlements are almost equal. This states that it is not only the population size, rather many other factors (e.g. political influence) which determined the facilities in an area. Both the settlements are under the influence of political and cultural influence of Ranjha family. As a result there is clustering of facilities ranging from commercial activities, cultural activities as well as social activities. These settlements are only 25 kilometer apart and situated in tehsil Bhalwal.

### *Second order settlements*

This group has least number of settlements. Only one settlement namely Chak No. 46 SB is included in this category and it has a composite index value of 142.6. It is situated in Sargodha tehsil. The gap between the value of first order settlement and this group is not very much high and it is only 20. In contrast there is wide range of gap between the vale of this group and the third order settlements. Chak No. 46 SB is at equal distance from Sargodha and Sillanwali tehsil. A huge stone crushing market, which is situated at a distance of 7 kilometer from this settlement, is the salient feature of this area. It has attracted a lot of people for jobs and as a result has enhanced the economic value of settlement.

**Table 3** Classification of central Settlements On The Basis Of Composite Indices

<b>Composite Index</b>	<b>Number of settlements</b>	<b>Order</b>
157.1 – 188.0	2	First
126.1 – 157.0	1	Second
95.1 – 126.0	5	Third
64.1 – 95.0	10	Fourth
33.0 – 64.0	18	Fifth

Source: Computed by Author

**Table 4** Composite Index Calculation For central Settlement Bhabhra

Mosque Primary School	1.01	3.03
Boys Primary School	1.05	4.2
Girls Primary School	1.16	3.48
Boys Middle School	5.14	0
Girls Middle School	2.11	0
Boys High School	1.8	0
Girls High School	4.0	16
Boys High Secondary School	12	60
GHSS	9	0
Boys College	0	0
Girls College	0	0
Hospital / Dispensary	9	0
Rural Health Center	9	27
Basic Health Unit	1.56	0
Vetnary Hospital	7.2	0
Vetnary Dispensary	4.5	0
Vetnary Center	3.27	6.54
Bank	1.71	5.13
Post Office	1.02	2.02
Tele Phone Exchange	3.6	0
Tele Phone	1.56	4.68
Police Station	9	18
Petrol Pump	1.89	7.56
Railway Station	18	0
Union Council	1.16	2.32
Patwar Circle	1.02	2.04
Electricity	1	2

Source: Computed by Author



**Table 5** Classification of Key Settlements On The Basis Of Composite Indices

Groups	Settlements (name)
I	Bhabhra , Midh Ranjha
II	Chak No 46 SB
III	Chak 107SB, Chak 45SB, 126NB, Gondal, Chak 42SB
IV	Chawa, Dharma, Wjih, Mari, Alipur, Chak Ram Das, Ajnala, Chak Saida
V	Salam, Matilla, Hujan, Kalra, Bakhar, Dodha, Chak 70 NB, Deowal, Bucha kalan, Bhalwal Purana, Mouzamabad, Cahaba, Sakeser, Lak, Jahanabad, Aqil shah, Kot Bhai khan, Chak 23 ASB.

Source: Field Survey, 2004.

### *Third order settlements*

Five settlements were included in third order settlement group on the basis of composite index. Settlements which fall in this category were Chak 42 SB, Chak 45 SB, Chak 107 SB, Chak 126 SB and Gondal. The first three were administratively fall in tehsil Sargodha Chak 126 SB in Sillanwali and Gondal in Shahpur tehsil. All these settlements have a population of less than 7000. Out of 36 key settlements 15 have population more than 9000. Although the third order settlements have less population than other but functionally there were very important than other. Chak 42 SB, 45 SB, 107 SB and 126 SB, make a cluster of settlements. These are located very close to each other. All these settlements are allotted to Grantees in 'Ghoripal Scheme'. After the independence, agriculture land was allotted to migrants. As a result the land holding size became small. People of this area are very industrious. The literacy rate and education level is high, so the people are aware to there basic needs. They demanded from their political leaders for the provision of basic facilities and ultimately got it. As a result of provision of various facilities, despite of low population as compare to many other settlements, the composite index value is higher. In addition of these settlement have got the advantage of proximity to each other and being nearest to District Head Quarter. So the centrality value is high.

### *Fourth order settlements*

This order contains 10 settlements. Among these four were in Sargodha tehsil, four were in Bhalwal, while the Shahpur and Sillanwali each having one. These were 3 settlements large in rank e.g. Dharema (11616), Mari (10287) wjih (8921) and Chabba (10598). The main reason for this was the influence of administrative headquarters in respective tehsil where a variety of services are available. The availability of many facilities on the tehsil head quarter has over shadowed the development in adjacent small settlements. Similarly individual settlements have some limiting factors which are the barrier in the development, for example, Dharma which is a very old settlement, is suffering from the water logging problems. The lack of any proper road network is the main cause for the under development of Ajnala, Chack Saida, Wjih and Chack Ramdas. In Mari, the jagirdai system is the main obstacle in the development. Jagirdar are not interested to establish the education, medical and infrastructure to keep the poor people of the area suppressed.

### *Fifth order settlements*

This group has got the maximum number of settlements. There are 18 settlements in this category. These settlements have low composite index values due to lack of facilities. This class contains such settlements which could also be considered in a higher order on the basis of population size, but higher rank in the hierarchy of settlements was low and by limited number of facilities. For example, the population size of Dodha (12018), Matilla

(11409), Mouzamabad (12978), Bucha Kalan (9847), Hujan 912530), Bhalwal Purana (10093), Salam (12001) and Chak 70 NB (13814). Among these, nine were in the tehsil Bhalwal and four in tehsil Sargodha and remaining five were in tehsil Shahpur.

## **Conclusion**

The spatial pattern of distribution and the ranking of settlements on the basis of both simple aggregations of facilities and on the composite indices provide some clues to the existing pattern of hierarchy and space relations. The different levels of settlement hierarchy reflect different levels of nodality or centrality. The size of settlement can be established on the basis of population or the functions available in those settlements. This study reveals five orders of settlements on the basis of composite functions. However, the study also brings out the fact that a large sized settlement need not necessarily have a higher rank on the basis of composite functions.

Chak 70 NB, a fifth order key settlement in Sargodha tehsil was the good example which although has a higher population (13814) than a first order settlements Midh Ranjha (7595) in tehsil Bhalwal, but it has a lower rank on the basis of composite functions. This can be referred to as a "dormitory village" because of it was located only seven km away from the district head quarter. The road and transport system was well developed. People were easily goes and return from Sargodha city, all the higher and lower order facilities were available in the city. For this reason the central settlements Chak 70 NB functionally could not develop.

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