CHAPTER - 7

SPATIAL DISTRIBUTION OF SERVICE CENTRES

Central Place Theory - Christaller, Losch & others

The word 'service centre' is synonym of 'Central Place' (Christallers Zentralort), has been used to cannote a Centre of Manifold activities for the surrounding countryside. A central place may not necessarily be located in the centre of its area, but it generally enjoys almost central location, as its name indicate and performs certain very important functions for the people of its surrounding area. A hierarchy of central places ranging from a metropolitan town to a village. There is one superior centre where all goods are produced and sold, there is specialisation division of labour and trade between centres, the lowest order centres produce and sell lowest order goods, higher order centres are larger with respect to the number of activities, rager of goods produced and the amount of business handed distances in term of transporation and communication costs, plays an important role in the location of central place, smaller places tend to locate at the gravity centre of triangle formed by places of higher order or half way between
two larger centres. A theoretical framework for study of the discription of settlement is provided by the work of Walter Christaller.¹ The essence of the theory is that a certain amount of productive land supports an urban centre. The centre exists because essential services must be performed for the surrounding land.

As a working hypothesis one assumes that normally the larger the city, the larger its tributary area. Thus there should be cities of varying size ranging from a small hamlet performing a few sample functions, such as providing a limited shopping and market centre for a small contiguous area, up to a large city with a large tributary area composed of the service areas of many smaller towns and providing more complex services, such as wholesaling. Large scale banking, specialised retailing, and the like services performed purely for a surrounding area are termed 'central' function by Christaller and the settlement performing them 'central' places. An industry using raw materials imported from outside the local region and shipping its products out of the local area would not constitute a central service.
A central place may not necessarily be located in the centre of its area, but it generally enjoys almost a central location, as its name indicates and perform certain very important functions for the people of its surrounding area. All such services or functions performed by a service centre are known as central functions. The central functions are those which by their nature are available in a few places but are availed by a number of settlements. Thus, the central functions are non-obiquitous in nature. These central functions are education, health, administration, transport and communication, trade and extension services. Therefore, a central place may be termed as "a permanent human establishment where an exchange of goods, services and necessities. Socio-economic in nature, primarily and basically for population other than the local one, exists and which therefore commands as its region, the immediately continuous encircling area."

The central place theory originally formulated by German Geographer, Christaller has been refined and improved by Losch and others. In central place theory, a central place (service centre) is supported by a certain amount of
productive land and exists to provide goods and services for a tributary area larger than itself. It can be either the location of a single function or a group of central functions in terms of goods and services. These services may be extensive or limited but the service function is common to all service centres. Service centres which have central functions and cater to the needs of population of an area in which service centres of lesser importance exist, are service centres of higher order and those centres which have only local importance in the immediate vicinity are termed as service centres of lower order. Small service centres which usually do not have central importance are called service centres of auxiliary nature.

According to Christaller, the founder father of the central place theory, the services offered purely for the surrounding area are termed as Central functions and the service centres may be classified under various hierarchical orders depending upon the degree of concentration of central functions and the size of their tributary area. Especially the higher order service centres are fewer in number and more widely spaced than the lower order centres which are most numerous and closely
spaced. They together constitute the total functional system which may include an entire country or part there of.

These service centres may house educational administrative, transport and communication, trade and commerce, medical and other services choosing their locations at transport junctions, market places or at the seats of local administration. A well developed functional system helps in the dissemination of new ideas and innovations accelerating the pace of economic progress, whereas a truncated system leads to spatio-functional gaps where by higher order centres become parasitic in nature swallowing the gains of economic development.

Here the qualifying limit for a settlement to function as a service centre has been determined on the basis of six major service groups: (A) Education, (B) Medical, (C) transport communication, (D) trade and commerce, (E) Administration, (F) Extension services alongwith persons engaged in tertiary activities (percent of tertiary population to total population). Hence, a settlement fulfilling one of the following requirements has been identified as service centre provided it has rail / road
connections and houses at least 25 workers engaged in tertiary activities.⁶

(1) All the six services with at least 5% of its working population engaged in tertiary services.

(2) Any three of the six services with at least 10% of its working population engaged in tertiary activities (the per cent being the regional percentage of tertiary population).

(3) Two of the six services with at least 15% of its workers dependent on tertiary services.

(4) Any one service with at least 18 per cent of its working population deriving livelihood from tertiary activities.

(5) Twenty five per cent of its workers engaged in tertiary services with or without any of the six services.

Thus there are 205 settlements in the Lakhimpur district qualifying as service centres in which ten are urban centres and one hundred and Ninty five are rural centres.
Methodology

Bi variate graphs using alternative indices have been prepared for the identification of hierarchical system of central places. The hierarchical orders have been identified on the basis of the grouping tendency of service centres around certain values and noticeable breaks in their distribution over the graph. Relative and absolute centrality indices have been calculated for the hierarchical analysis on the basis of census data and functional distance and integrated functional index have been used for the determination of hierarchy on the basis of primary survey.

The following formula (Singh, 1971 and Singh, 1979) has been used to calculate the relative centrality of a centre:

\[
R_{CI} = \frac{P_{ci} \cdot \left( \frac{R_c}{R_t} \right)}{P_c \cdot \left( \frac{R_c}{R_t} \right)} \times 10
\]

where, \( R_{CI} \) = Relative Centrality Index of a centre
\( P_{ci} \) = Commercial Population
\( P_{ti} \) = Total Population
\( R_c \) = Regional Commercial Population
\( R_t \) = Total Regional Population
\[ P_c = \text{Summation of } P_{c1}, P_{c2}, \ldots, P_{cn} \text{ and } \]
\[ P_t = \text{Summation of } P_{t1}, P_{t2}, \ldots, P_{tn} \]

In this method the numerator of the fraction denotes rural commercial population of a place serving the region, while the denominator explains service provisioning rural commercial population of the region. \( P_t (R_c/R_t) \) stands for the figure which may serve only. The local internal population of the centre, is substraction from the total.

The data on commercial population has been collected from the district Sankhyaki Patrika, 1984. The total commercial population of the study area (District) is 20,720 while, the total rural population is 17,65,295 and total population (urban and rural both) is 19,52,680. After analysis 205 service centres. The centrality scores have been computed on the basis of above technique. The centrality score range from 0.24 (Modipur in Nighasan sub-division) to 73.51 (district head quarter Lakhimpur).

Broadly speaking, such indices as number of banks, educational institutions. Hospitals, Postal institutions, administrative units. etc.
have been considered by most of the geographers for measuring. The centrality of an area. In the present study growth centres, their hierarchy and class system have been determined on the basis of median population threshold method.\(^9\)

The absolute centrality index may be calculated by using following formula:

\[
\text{A.C.I.} = \frac{P_b}{2400}
\]

Where \(\text{A.C.I.} = \text{Absolute centrality index of a centre}\)

\(P_b = \text{Basic Population of the Centre, and}\)

\(2400 = \text{Constant figure of population*}.\)

In order to calculate the size index, the following formula has been used -

\[
\text{S.I.} = \left(\frac{P_{t_i}}{P_t}\right) \times 100
\]

Where \(\text{S.I.} = \text{Size index}\)

----------

* Though the A.C.I. calculation indicates 2394 persons as the average size of a centre yet a population of 2400 has been accepted.
\[ P_t = \text{Total population of the centre} \]
\[ P_r = \text{Total population of all the selected centres} \]

Integrated functional index has been calculated with the help of location coefficient method (Davis, 1967\textsuperscript{10} and Singh, 1979\textsuperscript{11}) by adopting following procedure.

(i) Firstly, the location coefficient of each establishment of individual function has been calculated using. The following formula:

\[ C = \frac{(t \times 100)}{T} \]

when \( C \) = Location coefficient of the function
\( t \) = one establishment of the function, and
\( T \) = Total number of establishment in the region

(ii) The location coefficient were multiplied by the average number of workers in an establishment of each type of function.

(iii) Location coefficients were multiplied by the number of establishment under each function to give a centrality value to each centre.
(iv) All the centrality values for individual functional types were added to produce a functional index which measures the functional magnitude of individual centres.

(v) Functional index does not present the total centrality score of a centre because it is based on commercial functions alone whereas administrative and institutional service functions have qualitative dimensions attributes of central places which serve as nucleus for crystalizing commercial functions around them. So, such functions are assigned weightage commensurate with the relative importance of such functions on the basis of following formula:

\[ W_i = \frac{TP_{if}}{TP_{lf}} \]

when, \( W_i \) = Weightage of function.

\( TP_{if} \) = Average threshold population by individual function, and

\( TP_{lf} \) = Average threshold population by lowest grade function.
The weightage score each centre on the basis of the number of each facility were added to yield a total score.

(vi) The total weightage score of 205 service centres, when plotted on a linear scale show a definite trend of clustering. Therefore, the scores are arranged into five classes ranging in ascending order from 1 to 5.

(vii) The functional index of a centre divided earlier is combined with this weightage measure for the service functions of a centre by multiplying it with its corresponding status on the linear scale obtained on the basis of total scores to calculate the integrated functional index.

The centrality index has been calculated using the following formula:

\[ CI = \frac{nC_{v1}}{(i = 1)} \]

\[ C_{v1} = \frac{P_c}{PE} \times 100 \]

When \( CI = \) Centrality Index of a centre.
$C_{vl} = $ Centrality Index of a particular type of commercial establishment;

$P_c$ Number of establishments of that type of a centre, and

$PE$ Number of establishment of that type in the region.

Hierarchical order of Central Places:

Five bi-variate graphs have been prepared for analysing the hierarchical order of 205 service centres in the study area on the basis of different indices and indicators using primary and secondary data. A scatter diagram (Fig. 22.A) with the absolute centrality index and size index has also been prepared which reveals the distinction of five tier. Lakhimpur comes at the top most order. Central place of second order is also clear in the diagram. Though the break in the distribution of the centres of other orders is comparatively low, yet third, fourth and fifth order central places have been classified according to absolute centrality indices. It is clear that Lakhimpur stand at first order and 8, 32, 74, 90 centres come in the second, third, fourth and fifth orders respectively on the basis of the figure.
CENTRAL PLACES IN LAKHIMPUR-KHERI DISTRICT

Fig. 22
Lakhimpur denoting its importance stands at the first order in all the diagrams. Gola Gokaran Nath is also falls in the first order (Fig. 22.B) only, and other diagrams its importance stands at the second order. Though the break in the distribution of the centres of other orders is comparatively low, yet second, third, fourth and fifth orders: 31, 35, 65, 72 centres respectively emerge in Fig. 1.B. Gola Gokaran Nath, Mohammadi, Palia Kalan fall under second order followed by Kheri, Dhaurhra, Singahi Bhiraura, Mailani, Nighasan in third order based on Fig. 22.C (functional magnitude and population) while Fig. 22.D shows Gola Gokaran Nath, Mohammadi, Palia Kalan, Kheri, Mailani in second order and twenty Eight in third order. Seventy seven in fourth order and Ninty Four in fifth order on the basis of the figure. Fig. 22.C shows 25, 45, 126 centres in fourth, fifth and sixth orders respectively. Much difference is noted in the number of sixth order centres. The hierarchical order according to centrality index and population (Fig. 22.E) presents a different picture. Though first and second orders are the same as on Fig. 22.A but others are different in numbers. It has 24, 77, 95 centres in third, fourth and fifth order respectively.13
Spatial distribution of service centres:

The spatial distribution of service centres in the study area is quite uneven. It is interesting to note that Nakha (6), Bankeganj (8), Behjam, Palia, Dhaurhra (9), Block have the minimum number of service centres followed by Nighasan (31), Kumbhi (19), Lakhimpur (17), Pasgawan, Foolbehar (16 each), Ramiabehar, Isanagar (14 each), Mohammadi, Mitauli (13 each), Bijua (11). These are the areas located on the periphery of the district (Fig. 23) with less development of transport and communication facilities and low economic development. In this way there are 205 service centres have been selected for the study. There are four tahsils in the district viz. Nighasan, Dhaurhra, Lakhimpur and Mohammadi of which Lakhimpur is the largest in population and Dhaurhra the smallest, while in area tahsil Nighasan is largest and Dhaurhra the smallest.

Tahsilwise distribution of the service centres in the study area are 67, 61, 54 and 23 Lakhimpur, Mohammadi, Nighasan and Dhaurhra respectively. Forests of the district occupy an important place, about 22% of the total land of the district in under the management of forest department. On the contrary there is maximum concentration of service
Fig. 23
centres in Lakhimpur Tahsil owing to their greater transport accessibility and higher prosperity. The density of service centres (number of service centres per 100 km. of Area) also shows similar trends exhibiting its highest and lowest values in Lakhimpur (73.51 Service Centres) and Rangiley-nagar (24 service centres) respectively.  

In general education, health, administration, transport arteries and market places etc., have favoured the localisation of service centres, while revive tracts, terai, ill drained and usur infested areas of low agricultural productivity, etc. are the negative factors regarding their growth and development.

The spatial pattern of service centres has also been analysed through nearest Neighbour method' (Clark and Evans, 1954 and Clark, 1956) Which shows that the distribution is tending towards regularity \( (R_N = 2.05) \). However the regularity is not very pronounced in different hierarchical orders (I to IV ) and in case of 5th order centre random distribution \( (R_N = 0.75) \) is apparently seen (Table II), these finding are also confirmed through normalised index \( (Di) \) values which except in case of V order centres \( (Di = 0.4530) \) always range between
0.68 and 0.78 (district average = 0.875) indicating an apparent tendency towards regular pattern. The actual mean distance, which increases with the higher order centres, is much less than corresponding hypothetical distance* in all the five classes of service centres (Table 7.1). Maximum uniformity is seen in the distribution of second order centres where actual mean distance (24.3 km.) is (69.4) percent of the hypothetical distance (35.6 km.). On the other hand 5th order service centres are unevenly distributed showing spatial gaps in Eastern, North-Western, South Western and South Central parts of the region. Here the actual mean distance (2.3) and actual number (95) of service centres are 45 percent of the hypothetical distance (6.7) and 

* The hypothetical distance has been calculated by using the following formula (Mathur, 1944, pp. 173-183)


\[ D = 1.0746 \sqrt{\left(\frac{A}{N}\right)} \]

where, \( D = \) Hypothetical Distance
\( A = \) Area, and,
\( N = \) Number of centres
hypothetical number (18.0). It may be suggested that a $K = 3$ hierarchy (Christaller's marketing principal) holds more relevance to the region than $K = 4$ and $K = 7$ indicating the effects of markets on the development of service centres. (Table 7.1)

**Service Regions of service centres:**

The service region is an area around a service centre which has an easy accessibility with the service centre and is benefitted by its centralised services. Many methods have been suggested by the scholars to delineate these regions both by qualitative and quantitative means while Christaller's attempt is based on the centrality and hierarchy of respective service centres. Godlund (1956) and Green, 1952 have used the data of bus service to demarcate their boundaries. Bracey, 1953 and 1956 used rural component of centrality in their delineation, and recently (Berry, 1967) utilised (Reilly's 1931), Law of Retail Gravitation and breaking point equation for the purpose. The authors have used following formula (modified after (Berry, 1967, p.40) to delimit service regions of service centres in Lakhimpur District which have been shown in Figure 24.
First order
Second order
Third order
Fourth order
Fifth order

Railway line
Roads
Rivers

LAKHIMPUR-KHERI DISTRICT
Central Place Service Regions

Service regions
1. Lakhimpur
2. Dhaurahe
3. Nighasan
4. Mohammadi

Fig. 24
<table>
<thead>
<tr>
<th>Hierarchical Order</th>
<th>Centrality score</th>
<th>No. of service centres</th>
<th>RN values</th>
<th>Observation mean distance (Km.)</th>
<th>Hypothetical Mean distance (Km.)</th>
<th>Averagge population</th>
<th>Actual no. as % of hypothetical</th>
<th>Actual Mean distance as % of hypothetical</th>
<th>Di</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>&gt; 48</td>
<td>1</td>
<td>1.25</td>
<td>38.0</td>
<td>62.7</td>
<td>2</td>
<td>45000</td>
<td>50.2</td>
<td>60.5</td>
</tr>
<tr>
<td>II</td>
<td>16 - 48</td>
<td>8</td>
<td>1.38</td>
<td>24.3</td>
<td>35.6</td>
<td>10</td>
<td>22467</td>
<td>65.5</td>
<td>64.8</td>
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<td>III</td>
<td>4 - 16</td>
<td>24</td>
<td>1.17</td>
<td>6.8</td>
<td>12.4</td>
<td>32</td>
<td>3048</td>
<td>53.3</td>
<td>54.1</td>
</tr>
<tr>
<td>IV</td>
<td>1 - 4</td>
<td>77</td>
<td>1.15</td>
<td>3.6</td>
<td>8.7</td>
<td>90</td>
<td>2482</td>
<td>51.2</td>
<td>52.5</td>
</tr>
<tr>
<td>V</td>
<td>&lt; 1</td>
<td>95</td>
<td>0.75</td>
<td>2.3</td>
<td>6.7</td>
<td>115</td>
<td>1474</td>
<td>45.0</td>
<td>43.1</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td>205</td>
<td>2.05</td>
<td>4.1</td>
<td>4.2</td>
<td>249</td>
<td>6530</td>
<td>48.1</td>
<td>95.2</td>
</tr>
</tbody>
</table>

Table 7.1

SPATIAL CHARACTERISTICS OF SERVICE CENTRES
\[ L_s = 1 + D \sqrt{ (A_c + B_c) } \]

where, 
- \( D \) = Distance between A and B service centres
- \( A_c \) = Centrality score of A
- \( B_c \) = Centrality score of B, and
- \( L_s \) = Limit of service region of centre A from B.

Of the five order centres, Lakhimpur comes in the first order of the service centre.

The second place of the area in the district is occupied by Lakhimpur centre. Being the seat of district head quarters and enjoying a central location it has full command over the district's entire area. It is situated on the high bank of the Ul river. On the south-west of the city is the railway station which is 134 km. distance from Lucknow, which is the capital of Uttar Pradesh. Roads run from Lakhimpur to Nighasan on the North with branches to Khairigarh and Dhaurhra, to Mohammadi on the west, the main road running parallel to the railway track up to Gola Gokaran Nath and the shorter route running direct through Kaimahra to Mitauli and Aurangabad in the south-west to Oel and Sitapur on the south and the Bahramghat and Baharaich on the south east. It renders various specialised central functions in respect of health,
education, Banking administration, transport and communication. It needs proper planning and may be developed as a major centre for cottage and sugar industries. A large export trade is carried on in Gur, Jute, Groundnut, Sugar and Grain, Mustard oil and Wooden articles. It serves 61 thousand of population through various services like degree college, post and telegraph office, police station, town area hospital, maternity and childwelfare centre, bank, market etc. It exercises control over 205 services centres. (1 : 8 : 24 : 77 : 95) first, second, third, fourth and fifth respectively.

Of the eight second order centres the Gola Gokaran Nath municipal board is first service centre. It covers 29 thousand of population. It exercises control over 69 service centres (1 : 2 : 14 : 21 : 29) like various services like degree college, Post and telegraph office, 1: 3: 12 : 19 : 32 ) police station, hospital, maternity and child welfare centre. cinema theatre, bank, market etc. on the road leading from Lakhimpur to Mohammadi at a distance of 35 km. North West of Lakhimpur. From Gola, branch roads split North-West to Khutar Khas in Shahjahanpur District, North to Bhira, and North East to Aliganj. Gola is also connected by
rail. The railway station being located less than a mile to the east of the place. It has been declared a fifth tahsil of the district Lakhimpur.

In the East of the town lies the celebrated shrine of Gokaran Nath or Mahadeva and a big tank around which are clustered the many smaller temples, dharamshalas and the monasteries of Goshains. The main temple stands lower than the surrounding ground, the lingam, standing in a well about four feet deep is a round stone. It bears mark of a heavy blow caused, according to one account, by the thumb of Ravana. The temple is supposed to be the central spot of a large tract of sacred ground.

A market lies to the West of town, where a flourishing trade in food grains and sugar is carried on regularly. The main industrial establishment at Gola Gokaran Nath is the Hindustan Sugar Mills which has been in production since 1932. Now that name is converted to Bazaz Sugar Mills Ltd. It is said that it is the biggest Sugar Mill of Asia.

Dhaurahra Region:

22 The head quarter of the tahsil of the
same name commands the smallest service region in (Table 7.2) Dhaurahra and Isanagar block. It exercises control over 26 service centres (0 : 1 : 3 : 7 : 15) housing services like post and telegraph office, police station, dispensary, Bank, Cooperative Society and Intermediate College, etc. and serving a total population of 2,94,664. It has been declared tahsil after the 1971 Census taking some portions of tahsil Nighasan, recording a phenomenal rise in its population owing to its favourable location in respect of transport routes and agricultural productivity.

Mohammadi Region:

23 The head quarter town of tahsil Mohammadi is at a distance of about 58 km. West of Lakhimpur. It exercises control over Western part of the district through 61 service centres of various orders (0 : 3 : 10 : 19 : 29) lying within its tributary area. The Gomti flows about 5 km. to its East. From the Eastern outskirts of the town branch roads run North-West to pawayan (Shahjahanpur District) and South-West to Aurangabad. Its service region (Fig. 24) which mainly incorporates part of the Pasgawan, Mitauli, Kumbhi, Mohammadi blocks covers
a total area of 1753.7 km$^2$ and meets the service requirements of 5,57,077 inhabitants through various services like Post and Telegraph Office, Police Station, Banks, Educational Institutions, Tahsil and Block headquarters, markets, cooperatorative society etc.

Nisghasan Region:

Nighasan, the tahsil head quarter of Nighasan tahsil exercise control over Western part of the district through 51 service centres of various orders (0 : 3 : 5 : 13 : 30) lying within its tributary area. Its service region (Fig. 24) which mainly incorporates part of Palia, Nighasan and Ramiabehar blocks covers a total area 2411.6 km$^2$ and meets the service requirements of 3,15,640 inhabitants through by weekly markets, bank, cooperative society, Land Development Bank, Post and Telegraph Office, Tahsil and Block Head Quarters, police - stations, hospital, dispensary, Veterinary hospital, educational institutions, and Sugar Mills. Tahsil Nighasan was entirely rural in 1971, but now consist of 2 towns. Tahsil Dhaurahra was created after the 1971 census staking from the parts of tahsil Nighasan, at a distance
if 37 km. North of Lakhimpur district. There is a regular bus service available for it from Lakhimpur. It is bounded on the North East by the Suheli River in the vicinity of which there is a small terai area with a little rice cultivation. To its West is the Bastia nala, a branch of which cuts through the place close to the tahsil and falls into the Suheli Tarai. Articles of wood and agricultural implements are manufactured here. 24

Table 7.2
Central Place Service Region

<table>
<thead>
<tr>
<th>Hierarchical Regions order</th>
<th>No. of actual places</th>
<th>Area km$^2$</th>
<th>Population 1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Lakhimpur</td>
<td>205</td>
<td>7680.0</td>
<td>1952680</td>
</tr>
<tr>
<td>II Lakhimpur</td>
<td>67</td>
<td>2380.3</td>
<td>785299</td>
</tr>
<tr>
<td>II Mohammadi</td>
<td>61</td>
<td>1753.7</td>
<td>557077</td>
</tr>
<tr>
<td>II Nighasan</td>
<td>51</td>
<td>2411.6</td>
<td>315640</td>
</tr>
<tr>
<td>II Dhausrahra</td>
<td>26</td>
<td>1134.4</td>
<td>294664</td>
</tr>
</tbody>
</table>

Appendix
Lakhimpur Region (67)

I order - (1)
1. Lakhimpur
II order - (3)

2. Kheri
3. Oel Dhakwa
4. Mailani

III order - (12)

5. Bira
6. Bijua
7. Neemgaon
8. Kasta
9. Nakha
10. Behjam
11. Bankeganj
12. Sansarpur
13. Lakesar
14. Baragaon
15. Phardhan
16. Foolbehar

IV order - (19)

17. Kukra
18. Kaimahra
19. Telarpur
20. Srinagar
21. Jagdeopur
22. Maheshpur
23. Ramnagar kalan
24. Asrahi
25. Aggarbuzurg
26. Sundarwal
27. Thendhua
28. Pipragoon
29. Odara
30. Khaiyan
31. Suabojh
32. Jalalpur
33. Basha
34. Atkohna
35. Palia

V order (32)

36. Bail
37. Khagi Oel
38. Lagucha
39. Gopalpur
40. Motipur
41. Ganeshpur
42. Kalaam
43. Sadhauna
44. Rangileyanagar
45. Ghungchi
46. Nardwal
47. Siswan Kalan
48. Muria  
49. Tikaula  
50. Bhulanpur  
51. Sanigaon  
52. Ashogapur  
53. Mohala  
54. Mahewa  
55. Gaura  
56. Sisaura  
57. Pratapur  
58. Bilaria  
59. Piprawan  
60. Sisaura Nasir  
61. Ambara  
62. Bhanpur  
63. Rudrapur gularia  
64. Raipur  
65. Daulatpur  
66. Aliganj  
67. Paharnagar  

Mohammadi Region (61)  

I order - NIL  

II order - (3)  

1. Mohammadi
2. Gola Gokaran Nath
3. Barwar

**III order - (10)**
4. Kumbhi
5. Pasgawan
6. Unchaulia
7. Aurangabad
8. Maigalganj
9. Sikandarabad
10. Mitauni
11. Abgawan
12. Landanpur Grant
13. Grandapur

**IV order - (19)**
14. Rampur Madari
15. Munda Galib
16. Piparia Dhani
17. Pharenda
18. Ajehra
19. Machhechha
20. Mohiuddinpur
21. Rampur Grant
22. Salliya Gokan
23. Maqsoodpur
24. Ahmadnagar
25. Pareli
26. Ajan
27. Kikiyara
28. Mamri
29. Dohak
30. Kakarha
31. Dhakha
32. Bankigaon

V order - (29)
33. Atwapur
34. Sonauwa
35. Chhitaunia
36. Baikuna
37. Suhela
38. Parsehra
39. Kalwa Moti
40. Dhakhawra
41. Rajgarh
42. Allipur
43. Islamabad
44. Roshannagar
45. Piparia Khas
46. Sahaspur jogi
47. Soiyumbar Khera
48. Bijuli Sahaspur
49. Bhikhampur
50. Lodhaura
51. Sheopuri
52. Khamaria
53. Aminnagar?
54. Magdapur
55. Mohammdabad
56. Salliya
57. Kotwara
58. Dharthania
59. Nimchaini
60. Khanjannagar
61. Haiderabad

Nighasan Region - (51)

I order - NIL

II order - (3)
1. Nighasan
2. Singahi Bhirauba
3. Palia

III order - (5)
4. Laudhouri
5. Munda Buzurg
6. Semra
7. Majhgain
8. Rakehti

**IV order - (13)**

9. Dudhwa
10. Tirkaulia
11. Singahi Khurd
12. Bela Parsua
13. Bhiraura
14. Sothna Barsola
15. Barsola kalan
16. Lodhoura
17. Dhakheria Khalsa
18. Teliyar
19. Tilokpur
20. Naurangabad
21. Ramiaibhar

**V order - (30)**

22. Bhanpur colony
23. Bela
24. Sonaripur
25. Keoria
26. Banbirpur
27. Raipur
28. Sodhia Kalan
29. Bamhanpur
30. Dharmapur
31. Chakhra
32. Modipur
33. Belipur
34. Hardahi
35. Suratnagar
36. Daultapur
37. Manjha
38. Chhidui Pathie
39. Lalpur
40. Adalabad
41. Harsinghpur
42. Tirkaulia Purab
43. Barotha
44. Naubana
45. Padhuwa
46. Sisaiya
47. Semri
48. Matera
49. Debipurwa
50. Derari
51. Bokaria

Dhaurahra Region - (26)

I order - NIL
<table>
<thead>
<tr>
<th>Order</th>
<th>List</th>
</tr>
</thead>
<tbody>
<tr>
<td>II order - (1)</td>
<td>1. Dhaurahra</td>
</tr>
</tbody>
</table>
| III order - (3) | 2. Isanagar  
| | 3. Kafara  
| | 4. Dulhi |
| IV order - (7) | 5. Adlispur  
| | 6. Kharwahia  
| | 7. Ramlok  
| | 8. Sujanpur  
| | 9. Jatpurwa  
| | 10. Kabirha  
| | 11. Khamaria Pandit |
| V order - (15) | 12. Hasanpur Katauli  
| | 13. Lakhun  
| | 14. Dundki  
| | 15. Basantapur  
| | 16. Unchagaon  
| | 17. Mooseypur  
| | 18. Gularia Taluqa Amethi  
| | 19. Nainapur  
| | 20. Firozabad  
| | 21. Dilawalpur |
22. Rajapur
23. Samaisa
24. Husainpur
25. Birsinghpur
26. Laukahi Mollapur
References


6. Based on authors observation.

7. Ibid.


12. Formula applied by author in his study area.

13. Based on author's personal observation and calculations.


22. Based on author's personal observation and calculation.

23. Ibid

24. Ibid.