TRA''SPORT CONNECTIVITY AND THE REGIONAL STRUCTURE OF INDIAN ECONOMY - A SPATIAL ANALYSIS

CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT

SCHOOL OF SOCIAL SCIENCES

JAWAHARLAL NEHRU UNIVERSITY

I certify that the dissertation entitled "Transport Connectivity and the Regional Structure of Indian Economy - A Spatial Analysis" submitted by Ajay Kumar, in fulfilment of six credits out of the total requirements of twenty four credits for the degree of Master of Philosophy(M.Phil) of the University, is, to the best of my knowledge, a bonafide work and may be placed before the examiners for evaluation

Dated 6.1.77 SUPERVISOR

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TRANSPORT CONNECTIVITY AND THE REGIONAL STRUCTURE OF INDIAN ECONOMY — A SPATIAL ANALYSIS

IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF PHILOSOPHY

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ABSTRACT

The present study is an attempt to understand the structure of transportation network as it has evolved in time and the extent to which it facilitates the process of rapid economic development. Transport network study imparts a spatial element to the planning process. Firstly, the connectivity (local degree) of about 2300 urban centres has been determined considering five modes of transport: Railways, Road, Airways, Inland waterways and Coastal shipping. Only these appear to be of significance in the inter-urban movement in India. Next a composite score of the connectivity index for each town is arrived at by differentiating the transportation modes in terms of four elements: carrying capacity, charge, time and energy required. From the composite indices, four categories of towns have been identified. The fields of the towns in each category have then been demarcated. It is then attempted to analyse the nesting pattern as it emerges within the hierarchy of urban centres. Lastly, the connectivity index, and the number of lower order centres subserving each higher order centres has been correlated with select indicators of economic development. As a case study, indirect connectivity of air network has been determined.

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CHAPTER I

I N T R O D U C T I O N

Transport is a common denominator, of every kind of social activity and is an essential prerequisite of all socio-economic development. Transport - the movement of goods and people is hardly ever desired for its own sake; but is merely a means to serve other objectives. These objectives are both economic (to exploit netural resources, to raise agricultural productivity, to enhance per capita consumption) and non-economic (to promote political cohesion, to strengthen the country's defences etc.). It is the channel through which production-economic links are established in space. It could perhaps be said that transport is the basic infrastructure for establishing production complexes-creating economic opportunities through making areas accessible. By providing a media of fast and bulk movement, transport facilities alter the pattern of mobility and bring a change in the price relationship of production factors which offers scope for the rise of industrial complexes, and an increase in industrial productivity[1].

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1. Moonis Raza and Ishwari Prasad "Railways and Regionalization" (1850-1914) (Under publication)

The paramount role of transport in economic development basically arises from the fact that mankind is not spread evenly over the face of the earth but tends to cluster in certain areas which differ from each other both in terms of size netural endowments and economic activity. The clustering of population into communities is one of the basic forms of human settlement. Within such areas, relationships arise-which are a precondition for any kind of development as no unit of human settlement can prosper by remaining a self-sufficient isolated unit. It is through the means of transportation that these relationships are set up and maintained. It is through the establishment of transport network that a region acquires its particular character. Transport, thus participates in region forming processes, being the necessary condition both for the specialization as well as all round economic development.

However, in India, as in other excolonial countries, the spatial structure of the economy was greatly distorted by the development of a port oriented network of railways. The interests of the metropolitan country exercised a dominant influence on the transport development during the pre-independence period. Transport technology was injected generations ahead the requirements of the internal economy

of India. For a long time, the transport net was formed not so much in the interest of territorial dividion of labour within the country, as to promote geographical division of labour between India and Great Britain[2] (with India serving as raw material supplier and consumption market; and Britain specializing in industrial production).

Accordingly, the main railway lines were laid from the major ports to the interior parts of the country, but at the same time inter-links between the latter remained weak; no attention was paid to construction of branch lines from the main lines. Different gauges used in India also hampered the free development of communication between the interior parts.

Furthermore, the new transport technology emerged as a competitor to the already existing transport modes (e.g., river transport, bullock cart), The railway network thus, strangled the existing transport system. Railway lines were laid on both sides of the Ganges which necessitated the traffic to switch over from conventional to the new transport modes. The location and direction of alignment were artificialy controlled instead of their independently opening new frontiers of accessibility.

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2. Sen Gupta and Calina Sdasyuk "Economic regionalization of India - Problems and approaches", (Census of India 1968) p. 191.

These features of transport development in India in the pre-independence period had had their effect on the growth and formation of economic regions in the country during subsequent periods. These developments led to an economy which could not bind together its spatially dispersed areas. Growth occurred in and around the metropolitan centers with vast stretches of undeveloped, unexploited hinterlands. Planners in India, have mainly concentrated on the sectoral aspects of economy while the spatial elements have largely been relegated to the background. Development of transport could not fully play its role of knitting together the diverse parts of the country.

In contrast, Taaffe has put forward four phases in the process of transport network development[3] : (i) Scattered Ports with small hinterlands and few inter-connections, (ii) the development of penetration lines connecting the ports with the inland areas, (iii) inter-connection of the penetration lines, (iv) development of trunk lines and high-priority linkages between the largest centers.

Evolution of Indian transport system presents a sharp contrast to this model, where the fourth phase was, perhaps, the first to come up.

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3. Taaffe and Gauthier "Geography of transportation", (Prentice-Hall, Inc, 1972) p. 47.

THE PROBLEM POSED:

A study of the transport network and its effect on the national economy would require probling into the following three aspects:

(1) Network analysis: the pattern of network alignment; number of transportation links from focal points into the interior etc.
(2) Flow pattern
(3) Relationship of these two with the national economy.

In the present study, an attempt has been made to understand the Indian regional structure through transport linkages. Omission of flow pattern has become necessary to limit the study to a menageable size.

At the national level, the integeration of the economy, perhaps, starts from the lowest order urban centre. The present analysis restricts itself to inter-urban transport network. Urban centres are the first order nodal system. They are characterised by specialization, division of labour and are centres of all forms of activity.

The analysis would deal with the following three aspects:

(1) The spatial distribution of inter-urban o transport network.

(2) Identification of centres of different orders in terms of connectivity.

(3) Deleniation of nodal regions.

Thus an attempt has been made to understand if the transport network still reflects port domination; the extent to which, the nature of functions performed by a centre reflect its level of connectivity.

CHAPTER II

M E T H O D

The different modes of transportation, In India, are as follows:

(1) Rail

(2) Road

(3) Sea (Coastal Shipping)

(4) Air

(5) Inland Water-ways.

In the above list, Air and Sea are distinct classes by themselves, not directly related to the other modes. Rail, Road and Inland water transport are much more closely inter-related when viewed in the context of inland traffic in country. Each of these different modes has its own place in the trans-portation structure of the country. It is difficult to cate-gorically segregate any one as better than the other. Each one has its own merits and demerits depending upon the situation. Thus, while rail transport requires greater initial investment per unit of distance, greater maintainence cost as compared to road and inland water transport, it can move much larger load of cargo and ~~progress~~ passengers over a distance. On the other hand, inland water transport requires minimum energy to move a ton-mile

of cargo. Road transport is advantageous in so far it has maximum flexibility, low cost of investment per unit and and there is a possibility of laying out roads on rough terrain. Air transport has the advantage of reducing the time element. These characteristics associated with different mode of transport make it difficult to commend any particular form of transport irrespective of the situation and need.

The necessity of studying the merits and demerits of various modes of transport arises from a need to arrive at a unified picture of the transportation facilities available at a place in a regional framework. To understand quantitatively the level of transport facilities available at specific places, one needs to transform the different modes into a common additive unit such that all the modes of transport connecting a particular town to all the surrounding regions could be added to give us a composite value of the transport facilities. This would facilitate in comprehending the potentialities of each town in terms of the total flow of transport possible to all other towns. The essential problem is of converting a qualitative picture into a quantitative one, thus increasing the exactness of one's conclusions.

The logic of the above problem proceeds as follows: Supposing we have two centres, one connected by a railway line

and the other having inland waterways facilities available, how do we know as to which has a better accessibility? Perhaps, one may give an instant reply that the former centre has better connections. But then how much better? Besides, there is a limit to which general conclusions can help us. All scientific enquiry has to be based on some rational understanding of the phenomena. This requires a study of the comparitive advantage of each mode of transport in terms of some common elements which help in high-lighting the benefits of each mode.

II.1 METHOD OF OBTAINING THE CONNECTIVITY MATRIX:

To begin with, it is attempted to calculate the accessibility index of about 2300 towns in India for all the modes of transportation as mentioned. The measurement of accessibility is obtained directly from the connectivity matrix. A summation of the individual rows of the matrix produces a column, or vector, of values. Each row sum equals the total number of direct linkages from a given centre to the set of all other centres in the network. For illustrative purposes, consider the figure II.1. This figure indicates the hypothetical railway connections between six towns. These direct connections may be considered linkages between nodes, and the network may be constructed as a graph and represented in a matrix format (Fig. II.2).

FIG. II.1

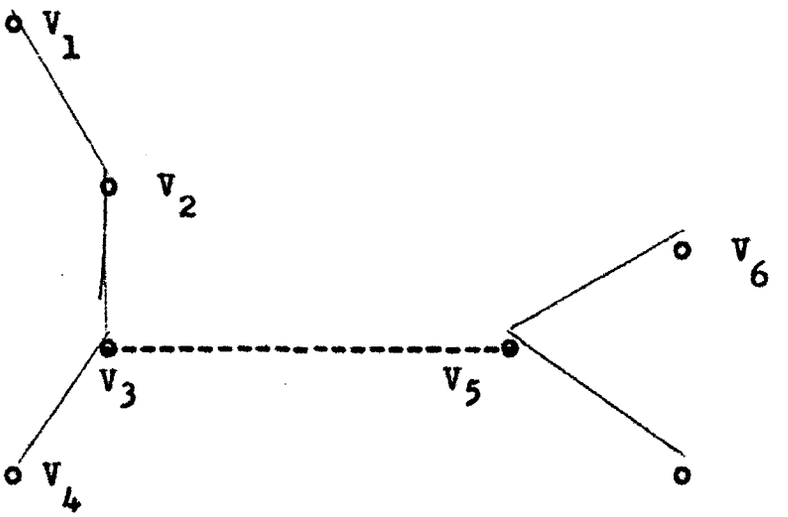

FIG. II.2

Nodes		V_1	V_2	V_3	V_4	V_5	V_6
	V_1	X	1	0	0	0	0
	V_2	1	X	1	0	0	0
Nodes	V_3	0	1	X	1	1	0
	V_4	0	0	1	X	0	0
	V_5	0	0	1	0	X	1
	V_6	0	0	0	0	1	X

Summing across the rows of the matrix gives a vector, each element of which represents the total number of direct linkages from a given city to the other five cities in the network. The same exercise is repeated for all the different modes of transport and the matrix we ultimately arrive at is shown in Table II.1. Note that we have differentiated between Broad, Metre and Narrow gauges; National Highway and others; and finally between Perennial and seasonal inland waterways. In the table, rows indicate the connectivity of each town in terms of different modes.

TABLE. II.1

Table showing local degree of Urban Centres

Town	RAILWAYS			ROADS		COASTAL		AIR	I.W.T.	
	BG	MG	NG	NH	OTH.	MAJOR	OTHER		PERNN.	SEOS.
1.										
2.										
3.										
-										
-										
2300										

The degree of a node has serious limitations as a measure of accessibility. For surface modes of transport, accessibility involves more than the direct connections between nodal pairs. We may be interested in knowing the accessibility between nodes that takes into account indirect connections - that is, a linkage between a pair of nodes which passes through one or more intermediate centres. It is possible that many major cities are connected by a series of indirect linkages. However, it is impossible to compute direct as well as indirect linkages for a 2300 x 2300 matrix. This is because determination of indirect linkages involves matrix multiplication and even the most sophisticated third generation computer available cannot handle such huge matrix. This is a limitation of the present analysis. However, as a case study, indirect linkages have been determined for centres having airways connections. There exists 58 such Centres in India.

Indirect Connectivity: It is possible to manipulate the connectivity matrix, which records the elementary structure of a network, to derive two measures of accessibility involving indirect connections - one relating directly to the structure and one related to topological distance. The number of indirect

connections or paths between nodal pairs can be determined by matrix multiplication.

If we sum the matrix recording direct paths with all of the matrices recording indirect paths between the nodes, the result is a matrix specifying all direct and indirect connections between the nodes of the network. Thus for airways, all the direct and indirect linkages have been obtained. [For detail see Appendix I]

II. 2 METHOD OF ARRIVING AT A COMPOSITE INDEX:

Thus, the connectivity matrix specifying the linkages between all the centres for five different modes of transport has been obtained. Next is the problems of weighing each mode in terms of certain indicators to arrive at a composite comparable picture.

The four elements chosen in this study to emphasize all the qualitative aspects of the different transportation modes are[1] :

(1) Carrying Capacity

(2) Time

(3) Charge

(4) Energy Consumption

---

1. Investment and Maintainence cost have not been taken into consideration to distinguish between different modes because the analysis concerns the transport structure at a particular year (1973). These indicators concern only in case of perspective planning.

It is traditional to measure the capacity over individual sections of the railways in terms of the number of trains that can be run each way daily. The rationale of this is the system of working trains on the 'line clear' system. Not more than one train can at any time be on a single line of track between any two adjacent stations. Therefore, the theoretical maximum number of trains that can be run over the section in any one day is obtained by dividing the twenty-four hours of a day by the running time of a train between those two adjacent stations in the section situated at the longest distance apart from each other[2]. The railway capacity is given in table II.2.

TABLE: II.2 NORMAL LIMITS OF CAPACITY[3]

System of operation	Limit of capacity in[4] terms of number of trains each way daily
Single line with standard signalling with diesel traction	19
Double line with diesel traction	40
Number of wagons in each goods train	50
Capacity of 1 wagon in Broad Gauge	22 tons
Capacity of 1 coach in Broad Gauge	50 persons
Number of coaches in passanger train	12 coaches
Capacity of 1 wagon in Metre Gauge	15 tons
Capacity of 1 coach in Metre Guage	35 persons

2. Regional Transport Survey of Madras and Pondicherry (NCAER, 1967, New Delhi) p. 74

3. ibid. p. 215 4. Capacity of a railway track is assumed to be the same throughout the country.

The capacity of any road section or net-work may be defined as the number of vehicles that can be cleared subject to a given minimum average speed for the mechanised vehicles of 40 Km an hour[5]. Capacity of road section is given in Table II.3.

TABLE: II.3 NORMS OF CAPACITY FOR ROADS OF DIFFERENT WIDTHS[6]:

Description of road section	Capacity in terms of p.c.Us. per day
Single lane road 12 ft. wide, black topped carriageway	3000
Two lane raod 22 ft. wide, black topped carriageway	7500

1 p c u = 2 tons.

Airport capacity is expressed in terms of the number of planes that can be handled by an airport during a day of twelve working hours. Night hours are excluded as no permanent night flying facilities are provided at any of the regional airports[7].

Port capacity, like other transport modes capacity, cannot be exactly measured. It depends upon a number of varying factors. e.g., the number and size of the ships that

5. NCAER Op.cit. p. 80.

6. ibid. p.214

7. ibid. p.117

can be handled at the berths or in mind-stream at a time, the differences in the rate of discharge or of the loading of different cargo, the number of working days in a year etc. The particulars of available port capacity at various ports are set out in Table II.4[8].

TABLE: II.4 CAPACITY OF PORTS

Port	Handling capacity (tonnes)
Mangalore	800,000
Karwar	384,000
Belekeri	720,000
Coondapur	240,000
Honavar	216,000
Malpe	36,000
Todri	24,000
Calicut	480,000
Allippeg	240,000
Trivandrum	192,000
Quilon	240,000
Ponnai	48,000
Bodagara	124,000

8. Port Transport Statistics 1971-72, Directorate of Transport Research, Navwahan aur Parivahan Mantralaya, Ministry of Shipping and Transport, Govt. of India.

Port	Handling capacity (tonnes)
Tellicherry	180,000
Cannanore	144,000
Azhikkal	96,000
Tuticorin	1,250,000
Cuddalore	650,000
Nagapattinam	100,000
Pondicherry	300,000

Second variable is time taken to move one Kilometre. Time taken for various transport modes is given in table II.5[9].

TABLE. II.5 TIME TAKEN BY DIFFERENT TRANSPORT MODES:

Mode of Transport	Time/Km. (Min.)
Railways	2.00
Roads	1.50
Airways	0.70
Inland Water Ways	10.00
Coastal	6.70

9. All India Railway Time Table; Water Transport Statistics of India, 73 (Govt. of India).

Fare (Charge is the third index taken into consideration. Approximate charges for various modes of transport is given in Table II.6.

TABLE. II.6 CHARGES OF TRANSPORT MODES[10]

Mode of Transport		Charge (paise per Km.)
Railways (Goods)	B.G.	6.70 per ton
	M.G.	9.45 per ton
	N.G.	36.36 per ton
Railways (passangers)	B.G.	2.5 per passanger
	M.G.	2.5 per passanger
	N.G.	2.5 per passanger
Roads (Goods)	N.H.	30.00 per ton
	OTHERS	30.00 per ton
Roads (Passangers)	N.H.	3.5 per passanger
	OTHERS	3.5 per passanger
Airways (Goods)		210.00 per ton
(Passangers)		35.00 per passanger
Coastal Shipping (Goods)		17.00 per ton
(Passangers)		N.A.
Inland Water Transport (Passanger)		3.00 per passanger
(Goods)		14.00 per ton

10. All India Railway Time Table, Obtained from averaging the fare of various transport companies, Report of Inland Water Transport Committee (Govt. of India, 1970).

Last indicator is the Energy required to move ton-mile cargo and is given in table II.7.

TABLE II.7[11] ENERGY REQUIRED TO MOVE TON-MILE OF CARGO

Water	500
Rail	750
Road	2400
Air	6300

Table II.8 is arrived at by putting all the values so obtained in a common format.

TABLE II.8

Indices	RAILWAY B.G.	M.G.	N.G.	ROADS N.H.	OTH.	COASTAL MAJ.	OTH.	AIR	I.w.T	
Capacity	2450	1675	7292	15000	6000	5167	1000	N.A.	N.A.	N.A.
Time	2	2	2	1.5	1.5	6.7	6.7	11	10	10
Charge	4.6	6	19.5	16.8	16.8	17	17	122	8.5	8.5
Energy	750	750	750	2400	2400	500	500	6300	500	500

11. "National Seminar on development and co-ordination of transportation" (The institution of engineers Feb. 75) Paper No. 2.03 p. 43. The absolute figure refer to USA standards. However, the comparitive ratios are assumed to hold true in the Indian case.

2450 8
1675 5

In the above table all the passenger figures have been converted into goods keeping in view that two-third of the movement is of goods train. Note the whole the first row indicates higher the value, higher the efficiency, other three rows give lower the value, higher the efficiency. To convert them to a common scale first row is inverted. Thus we arrive at the table No. II.9.

TABLE II.9

Index	RAILWAYS			ROAD		COASTAL		AIR	I.W.T.[12]	
	B.G.	N.G.	M.G.	N.H.	OTH.	MAJ.	OTH.		PERNN.	SEAS
Capacity	.041	.059	.139	.067	.167	.196	1	NA	NA	NA
Time	18.2	18.2	18.2	13.6	13.6	61	61	1	91	
Charge	1	1.30	4.24	3.65	3.65	3.7	3.7	26.5	1.85	
Energy	1.5	1.5	1.5	4.8	4.8	1	1	12.6	1	
SUM/a	5.185	5.264	6.019	5.53	5.55	16.47	16.67	13.36	31.28	
(X) Total sum : 120.96										
X/05j	23.32	22.99	20.1	21.87	21.52	7.34	7.25	0.05	3.87	

12. The values for seasonal water ways have been taken just half of the perennial waterways.

In the above table, lower the value for each of the indices, higher would be the efficiency. Each element of the last row is divided by the total sum :

$$C_{5J} = \left\{ \sum_{i=1}^{4} C_{iJ} \right\} / a$$

where J is column and varies from 1 to 9; i is the number of rows and varies from 1 to 4; a is the number of indicies for each mode of transport. For Railways, Road and Coastal a = 4; for Air and Inland waterways a = 3.

This provides us with a number in the fifth row which varies inversely with efficiency. In the sixth row each of these numbers have been divided by the total sum to give us values which varies directly with efficiency of the mode of transport. These are further manipulated to give us the table II.10.

TABLE. II.10 WEIGHTAGES ALLOCATED TO DIFFERENT TRANSPORT MODES.

MODE OF TRANSPORT	RAILWAYS			ROAD		COASTAL		AIR	I.W.T.	
	BG	MG	NG	NH	OTH	MAJ	OTH		PERENN	SEASON
Composite weightage Index	6	5.9	5.2	5.7	5.6	1.9	1.9	2.3	1	0.5

In the table II.10 composite weightage index varies directly with the efficiency of the mode of transport i.e., higher the weightage, better the efficiency of that particular transportation system. Thus in this particular context, Railways emerge as the most efficient most of transport followed by Roadways, Airways, Coastal and lastly inland water ways.

Next, each element of table II.10 is multiplied with the corresponding coloumn of table II.1. A summation of the individual rows of the thus arrived matrix produces a column of values. Each row sum equals the total number of direct linkages from a given centre to the set of all other centres in the network considering all the five different modes of transportation. Note that the coloumn of values derived are dimensionless quantities and hence can be subjected to comparative analysis.

The coloumn of composite values arrived at are then arranged in descending order and frequency distribution curve drawn. Three threshold points are marked and we arrive at the following four categories:

(I) Composite Index > 80

(II) Composite Index 60-80

(III) Composite Index 45-60

(IV) Composite Index < 45

There are about 12 centres falling in the I category;

55 centres in the II category; about 300 centres in the III category and 2000 centres in the IV category.

For the purpose of deleniating the hinterlands of each centre, gravity model has been used. The gravity model lends itself to being mapped.

II.3 A Note on the Gravity Model:

In recent years increasing attention is being paid to the concept of gravity model. The gravity model and its many variations have been applied to understand spatial arrangements involving intercity travel, commodity flow, identification of hinterlands and hinterland systems, and the general concept of accessibility.

In general terms, the gravity concept of human interaction postulates that an attracting force of interaction between two areas of human activity is created by the population masses of the two areas, and a friction against interaction is caused by the intervening space over which the interaction must take place[1]. In mathematical terms, this relationship may be expressed as follows:

$$I_{ij} = \frac{f\left(P P_i, P_j \right)}{f\left(D_{ij} \right)}$$

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1. Carrotners G.A.P. "An historical review of the gravity and potential concepts of human interaction". "Analytical human geography" ed. Ambrose Peter. pp. 226-242.

Where I_{ij} = interaction between centre i and Centre j;

P_i, P_j = Population of areas i and j, respectively; and

D_{ij} = distance between centre and centre j.

One extensive use of the gravity model has been as a predictor of intercity passanger traffic. This model has also been applied to the study of commodity movements both within and between countries. In 1920 E.C. Young made an attempt to measure migration. Young hypothesised that the relative volume of migration to a given destination from each of several source areas varies directly with the 'force of attraction' of the destination and inversely with the square of the distance between the source and the destinations. That is:

$$_iM_j = k \frac{Z_i}{D_{ij}^2}$$

where Z_i = the force of attraction of destionation i

k = a constant of proportionality.

In practice there exists difference of opinion with regard to exponent in the denominator. However, in the present exercise distance square has been taken as the frutional element. In place of population, the connectivity index

of the few cities have been replaced. It is based on two simple propositions: (i) Firstly, that an attracting force of interaction between two areas of human activity is directly proportional to the connectivity index of the two places, (ii) Interaction between the two towns is inversely propotional to the intervening space. This could be expressed as:

$$I_{ij} = \frac{N_i X \ N_j}{D_{ij}2}$$

Where N_i , N_j = Composite value of network facility available at area i and j respectively.

D_{ij} = distance between centres i and j.

CHAPTER III

IDENTIFICATION OF ELEMENTS OF REGIONAL STRUCTURE OF INDIAN ECONOMY

Transport, as has been mentioned in the earlier chapter, gives expression to the spatial organisation of the area. Thus Transport is one of the most widely pervasive services within the economy. The transportation facilities, once established, subsequently affect developmental process both spatially and sectorally. Production cannot be regarded as completed process until the product is delivered to consumer. Geographical division of labour is not possible without transport development. Organisation of space is achieved by facilitating transferability (measured in terms of time and money costs) thus minimising frictional element between two potential places-potentiality to be measured in terms of complimentarity and intervening opportunities. This so happens because things moving in nature attempt to reach their goal by the least costly route. The idea was first hypothesized in natural science as the principle of least effort.

Transport participates in region forming process, being the necessary condition both for the specialisation as well as for the all round economic development of the area. There exists a close inter-relation between the formation of economic regions and transport development[1].

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1. G. Adasyuk "Transport & formation of economic regions in India" "Economic Regionalization in India-Problems and approaches" (Census of India 1968) p. 173.

In the process of development, transport structure of a country is characterised by centres having varying degree of relative accessibility. The transport structure, at any point of time, is featured by nodes arranged in ahierarchy in terms of the nodal accessibility. Highest order nodes would demarcate their own tributary area (or hinterland) which is a function of the number of competing highest order nodes and their various characteristics. Tributary areas of a particular centre may be defined by the linkages most clearly associated with that node. These hinterlands in turn are organised into systems of hinterlands of lower order nodal centres each, in turn, having its own set of strong linkages but eventually subserving the highest order node.

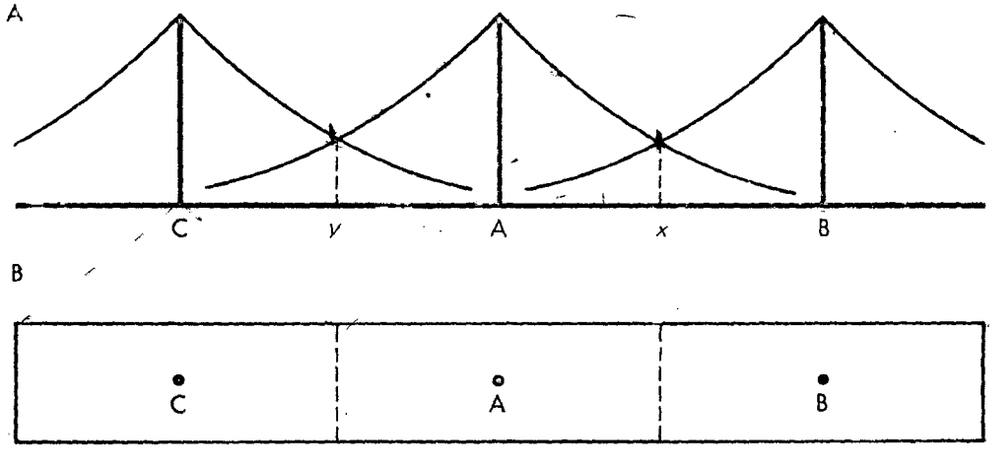
When there exists a number of nodes having similar accessibility index, the result is a pattern emerging in figure III.1 Here the height of the vertical bar represents proportional of local degree of that particular centre. The influence divide between city A and B is represented by the point x; the influence divide between city A and cityC is represented by the point y in the diagram. The zone between x and y delemits the hinterland of city A - the zone within which city A's field of influence overrides the influence fields of B and C. Highway traffic from this zone would be more likely to be diverted to city A than to B or C. Figure III.2

represents a hypothetical distribution of hinterlands for a set of equal sized cities with influence fields. This is referred to as "dominant association." A nodal region, therefore comprises a central place and the surrounding area predominately subordinated to it. Note that ~~as~~ if the accessibility index of A is greater than that of surrounding cities, its zone of dominance tends to expand at the expense of these cities.

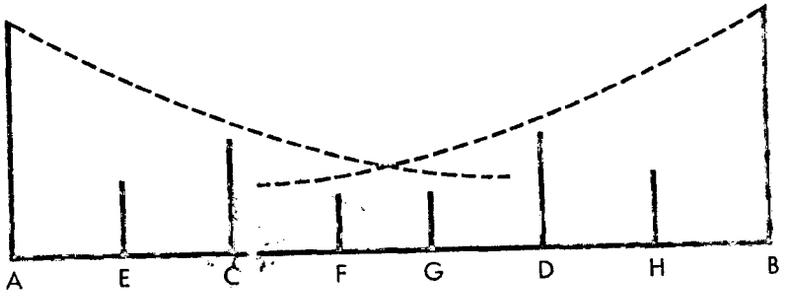
The hinterlands of higher order nodes are, in turn, organized into a system of hinterlands of lower order nodal centres - each having its own set of linkages but eventually subserving the highest order node. Figure III.3 expresses the hierarchy of nodal regions within A's tributary area. In a nodal hierarchy described by a network of points and lines, the points represent central places and lines represent linkages between dominant and subordinate centres.

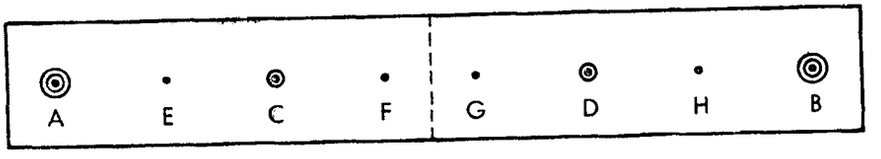
In the present exercise, it is attempted to understand firstly the linkages comprising the transportation network; secondly, the centres or nodes and their accessibility to the rest of the network; Lastly, the entire system of hinterlands derived at by studying the structure of dominance and competition among the nodes within each network of linkages and hierarchical relationships associated with the network over the entire crossection of Indian sub-continent.

Equidistant Hinterlands



Hierarchy Diagram





For determining the basic structural elements of the transportation system, the routes or edges (considering all modes of transport) passing through the towns is known. The most primitive measurement of accessibility is obtained directly from the connectivity matrix with 2300 rows and 2300 coloums. A summation of the individual rows of the matrix produces a coloumn of values. Each row sum equals the total number of direct linkages from a given centre to the set of all other centres in the network and is defined as the degree of a node[2].

Subsequently, the accessibility index of the towns gives us nodes of varying significance classified by the magnitude of their degree. The higher the value of an individual node, greater would be its accessibility to other centres. Thus centres of highest order are recognized (through the criteria mentioned in chapter II) and their regions demarcated. A region consists of a set of points grasitating towards the node. Linkages between the lower order nodes and the central node, within the region are much stronger as compared to their linkages with other node of the same class as the central node.

In the country as a whole, 9 centres of I order, 58

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2. E.J. Taaffe and H.L. Gauthier "Geography of transportation" (Prentice-Hall, 1972) p. 119

centres of II order, 295 centres of III and 2006 centres of IV order have been recognized. Table III.1) indicates the normative number of Centers at various levels[3] and the factual order as observed during the study.

It need be noted that much higher or lower ratio than 1 : 6 would indicate a dysfunctional development.

THE NESTING PATTERN*

TABLE III.1	Normative pattern[4]	Actual pattern
I order	9	9
II order	54	58
III order	324	295
IV order	1944	2006

*Detailed table is presented at the end of the Chapter III.

3. The ratio of highest order node to lower order node should be 1 : 6 (based on hexagenal pattern of Tributary area)

4. Number of I order Centre in normative order is taken same as the observed number of I order nodes. Subsequent numbers follow from the Christellar's model.

III.1 Number and size of I order Centre and their fields

Eight Centres of I order as recognized are :

1. Calcutta
2. Hyderabad
3. Delhi-Agra
4. Amritsar
5. Bombay
6. Ahmedabad
7. Madras
8. Lucknow

These centres are arranged in the decreasing order in terms of their connectivity index.

Needless to mention, the number of I order centres depend upon the density of transport network structure. In a situation of dysfunctional development, few centres would appear serving the entire country having strong inter-connections but weakly linked to the vast barren hinterland. Size and field of each I order Centre[5] seems to depend upon five factors: (i) presence or otherwise of other competing centres in the near vicinity, (ii) the economic functions performed by the town, (iii) the physiography of the region, and (iv) the location of the centre and (v) the historical

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5. In the present study, for a Centre to be classified as a I order centre, it should have a local degree greater than 80 and must also have a B.G. passing through it.

influences. First and the third points mentioned above are not mutually exclussive but are inter-related.

1. CALCUTTA: Calcutta stands out as the I order, centre having highest local degree of 136.3. This centre also has the highest population (more than 7 million). The high value could be explained in its being the focal transportation point and the gateway since the British days. Besides, in the absence of any Centre of significance in the entire South-east region, that complete area, theoretically, appears to be gravitating around the Calcutta nodal centre. Calcutta region encompasses, besides West Bengal State, and North-eastern region, the entire Bihar State and northern parts of Orissa. Large expanse of under-developed land lying in Bihar and Orissa State on the one hand and the strong transport routes linking Calcutta with the rest of the country is the reason for the centres much farther off to get linked with the Calcutta node. In all, about 340 or one-ninth of the Centres at the national level are served by the Calcutta Centre.

2. HYDERABAD: Hyderabad having a local degree of 119 and 1.8 million population appears the second highest centre within this category. This derives its good connections with the rest of the country from its central location with transportation routes running on all the four sides and also from the historical

importance of the town. Hyderabad region encompasses Andhra-Pradesh State, northern most districts of Karnataka, eastern parts of Maharashtra, parts of Madhya Pradesh and Orissa State. This region thus, cuts across five states. This region has about 290 centres of lower order - One eighth of the centres at the national level, just equal to the proportion of centres it can legitimately ask for. But this must be compared to the extent of the area at its disposal. A cursory glance at the map No. 16 indicates that Hyderabad region incorporates much more than one-eighth of the total area in the country. When seen in this background, the intra-regional transport appears to be weak. This point shall be discussed in detail in the later sections.

3. DELHI - AGRA[6]: This is a bimodal region. Delhi has a 110 local degree and a population of 3.6 million. It need be noticed that although Delhi has much higher population than Hyderabad, it has a lower connectivity index. Delhi nodal region served about 410 lower order centres -- which is much more than the national average.

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6. Though Agra satisfies the requirements of a I order Centre, it has not been felt appropriate to consider it separately.

4. AMRITSAR: This occupies fourth rank within the first order regions. It has 102 local degree and a population of 4.6 lakhs. The high value despite its perepheral location could be attributed to its strategic importance and the market functions, and also to the fact that Punjab stands at a very high level of economic development. Amritsar nodal region has babout 170 centres of lower order which is much less than the national average. However, when this is compared to the size of the region, Amritsar appears to have strong inter-regional and intra-regional connections.

5. BOMBAY: This occupies fifth place among the I order centres. This has 97 local degree and a population of 6 million. Though having a high population and access to the sea, it still has a lower local degree as compared to other I order centres. It is because of its perepheral location, that its gravity field cannot extend in all the directions. Besides, the western ghat alighment offer formidable obstacle to the construction of transport routes transerve to the western ghats. Also the Satpura-Vindhyas range running across the Central limit on the north of Bombay limit the number of rail-road routes that can cut across the mountains and run into the interior of the northern plains. Furthermore, Bombay node has a small functional region which is reflected by the area occupied and the small number of lower order

centres (150) contained therein. Small extent of the Bombay region is because of other competing centres in the vicinity. There is Ahmedabad in the north and Hyderabad in the east which encroach upon the dominance of Bombay.

6. AHMEDABAD: with 96 local degree and 1.7 million population, this centre appears sixth within this category. Though having a small accessibility index, Ahmedabad has a large region associated with her, possessing about 100 lower order centres. The vast Ahmedabad nodal region is partly because of absence of any competing centre in the north up till Delhi and Lucknow in the north-east.

7. MADRAS: with 89 local degree and 2.5 million population Madras appears quite low among the I order centres. Its low value is primarily because of its pereptual location and cannot be attributed to weak inter-regional linkages. Madras nodal region includes three centres -- Madurai, Tiruchirapalli and Bangalore which although statistically get qualified to be a I order centres, have nevertheless been put into the II order class and another qualifying mark suggested subsequently has been the number of Broad Gauges serving the town. This has resulted in having a large Madras nodal region. The region incorporates the states of Kerala, parts of Karnataka and Andhra Pradesh besides the whole of Tamil Nadu. This region includes about 400 centres of

lower order which is much greater than the national average.

8. LUCKNOW: This appears last among the I order Centres, having a connectivity index of 86. The population of this centre is about 1 million. Lucknow node has a small region in area as well as a small number of lower order centres (160) contained therein. The region includes eastern Uttar Pradesh and northern most parts of Madhya Pradesh.

It should be noted that all these centres also happen to be the State centres, except Amritsar, which ranks high, perhaps, because of its strategic location. Calcutta has the highest population and the highese connectivity index, despite its pereptual location. On the other hand, Bombay has a nigh population but has a low local degree, because of her perepheral location. Furtheremore, within this category only Amritsar has a population of less than one million.

III.2 Number and Size of II Order Centres and fields:

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Fifty eight centres in India stand out as the II order Centres - having a local degree between 60 and 80. Madras nodal region has the greatest number of second order centres (16)- showing strong intra-regional linkages at the second order level. Delhi nodal region has the next higher number of II order centres (12). As a matter of fact, the entire northern plain and Tamil Nadu region has very well laid out rail-road routes. Although Calcutta has the highest local degree, it has a much lesser number (10) of II order centres. This reflects weak intra-regional connections. But if the north-eastern region having weak transport routes is excluted from Calcutta region, then this region emerges as having strong intra-regional links. ~~Same~~ Ahmedabad nodal region has only 6 II order centres. This is because the region includes arid plains of Kutch and Rajasthan and the underdeveloped parts of Madhya Pradesh. In the Kathiawar region the network is quite dense. Lucknow nodal region, engulfing a small area has as much as 7 II order centres reflecting strong intra-regional flows at the second order level.

Hyderabad nodal region is very neatly divided into two II order regions with Nagpur node in the north and

Guntur in the South. This shows that the dominance of Hyderabad penetrates II order and other centres are not given sufficient opportunity to come up. Bombay nodal region has only Pune as the second order centre. This-f reflects the dominating influence of the Bombay node. The found II order centres in Amritsar when compared to the size of the Amritsar nodal region show strong intra-regional connections. Centres with highest local degree within this class are: Vadodre (78) in Gujarat region, Gaya (70) and Kanpur (74) in Lucknow region (excluding Tiruchirapalli, Madurai, Bangalore and Jaipur).

Kanpur nodal Centre appearing as a second order of Centre has a population more than that of Lucknow which appears as a I order Centre. Low accessibility value of Kanpur as compared to Lucknow despite the former's higher population could be because of the administrative importance of Lucknow. Other Centres like Vadodre, Coimbatore, Gwalior, Allahabad and Varanasi having accessibility index between 75 and 80 have a population between 5 and 7 lakhs. Jorhat in Assam and Villupuram in Tamil Nadu appear to be exceptions in this category. These centres having accessibility index more than 72 have only about 60-70 thousand population. Broadly speaking it can be said that in Assam and Tamil Nadu, centres generally have a lesser population as compared to centres in other regions with the same accessibility index. In Punjab and Rajasthan, there is no centre having index lying in the range 70 to 80.

III-3. Number and Size of III order Centre and Fields:

Number of III order centres characterise nodes at the local level serving the smaller centres at the base level. In India, 295 centres stand out as the III order centres. Madras nodal region claims the maximum number (70) of the third order centres. Kumbakonam and Mayuram nodal centres at III order level together serve about 14 III order centres. South Yamangalam serves about 14 lowest order centres. Virudhunagar node serves 12 lower centres. Tirunelvelli serves 13 other places. Holeanasipur and Channarayapatna together serve 20 lowest order centres. Srirangapatna alone serves 20 other places.

Delhi nodal region incorporates 50 III order centres. Jhaggar is the only III order centre in the Charkhi Dadri region. Calcutta nodal region also serves about 50 centres at III order. Bombay and Amritsar region have about 20 centres each at the III order level. Lucknow and Ahmedabad have about 32 and 37 centres respectively.

Except Kumbakonam having more than one lakh population and Cochin and Trivandrum having more than four lakh population, other third order centres have less than 40,000

population in the Madras nodal region. On the other hand, all the third order centres in the Calcutta region except those falling in the Assam State and Malda, Ondal, Nemari, Jainthia, Bankura, Purulia in West Bengal State, Buxur, Narkiagany & Katihar in Bihar State, all the other III order centres have a population more than 80,000. Vijayawada in Andhra Pradesh though classified as III order centre has a population of 3.5 lakh. All centres in Bombay region except Chalisgaon and Parola have population greater than 2 lakh. In Ahmedabad nodal region all III order centres except Nadia (population 1 lakh), Surat (5 lakh) and Rajkot (3 lakh) have a population less than one lakh.

SUMMARY:

1. Except Amritsar, all I order centres are over million population towns. Within this group, tthere apparently is a relationship between population and local degree.

2. Centres falling in II category have population between one lakh and one million with some exceptions.

3. Centres falling in III category have population less than one lakh.

4. Administrative functions of towns appears as the overlying factor in the level of connectivity.

5. Lucknow and Ahmedabad have balanced transportation links at all levels. Other centres have imbalances existing at various levels.

TABLE CENTRES SUBSERVED BY I ORDER CENTRES

Sl.	I Order Centres	No. of II Order centres
1.	Madras	16
2.	Hyderabad	2
3.	Calcutta	10
4.	Ahmedabad	6
5.	Lucknow	7
6.	Delhi-Agra	12
7.	Bombay	1
8.	Amritsar	4

TABLE: CENTRES SUBSERVED BY II ORDER CENTRES

Sl.	II Order Centres	No. of III order centres	Sl.	II Order Centres	No. of III order centres
	MADRAS FIELD:			HYDERABAD FIELD:	
1.	Tiruvannamalai	8	17.	Nagpur	3
2.	Tiruchirapalli	3	18.	Guntur	19
3.	Villupuram	3		CALCUTTA FIELD:	
4.	Thanjavur	2	19.	Patna	7
5.	Salem	5	20.	Samastipur	7
6.	Coimbatore	3	21.	Ranchi	3
7.	Dindigul	1	22.	Burdwan	4
8.	Madurai	9	23.	Ranaghat	1
9.	Tiruvarur	3	24.	Katwa	7
10.	Calicut	1	25.	Dhanbad	5
11.	Palghat	7	26.	Gauhati	6
12.	Bangalore	7	27.	Jorhat	3
13.	Hassan	11	28.	Gaya	4
14.	Kolar	5		AHMEDABAD FIELD:	
15.	Manoya	2	29.	Mahasana	7
16.	Mysore	1	30.	Udaipur	1

Sl. No.	II Order Centres	No. of III order centres
	AHMEDABAD FIELD:	
31.	Jodhpur	4
32.	Vadadra	16
33.	Indore	5
34.	Khandwa	4
	LUCKNOW FIELD:	
35.	Unnao	6
36.	Kanpur	3
37.	Bela-Pratapgarh	5
38.	Allahabad	3
39.	Saidpur	5
40.	Varanasi	3
41.	Jabalpur	7
	DELHI-AGRA FIELD:	
42.	Ambala	3
43.	Panipat	4
44.	Charkhi-Dadri	1
45.	Rewari	3
46.	Mathura	1
47.	Meerut	3
48.	Hathras	11
49.	Gwalior	4
50.	Jaipur	9
51.	Bikaner	1
52.	Moradabad	4
53.	Bijnor	4
	BOMBAY FIELD:	
54.	Poona	17
	AMRITSAR FIELD:	
55.	Batala	4
56.	Ludhiana	8
57.	Firozpur	-
58.	Bhatinda	10

TABLE: CENTRES SUBSERVED BY III ORDER CENTRES:

Sl. No.	III Order Centres	No.of IV order centres	Sl. No.	III Order Centres	No. of IV order centres
MADRAS FIELD:					
1.	Tumkur	3	19.	Malur	2
2.	Chikaballapur	3	20.	Krishnagiri	3
3.	Anekal	2	21.	Renigunta	12
4.	Hasur	2	22.	Gudur	6
5.	Bellary	2	23.	Maddur	2
6.	Hospet	1	24.	Channapatna	2
7.	Holenarasipur	10	25.	Srirangapatna	20
8.	Channargapatna	10	26.	Tirupattur	2
9.	Tiptur	1	27.	Jolarpet	2
10.	Arsikore	1	28.	Arni	2
11.	Birpur	4	29.	Walajbab	3
12.	Kadur	5	30.	Sholingur	3
13.	Shimoga	7	31.	Chingleput	3
14.	Sagar	7	32.	Ponneri	4
15.	Ranibennur	3	33.	Tindivanam	4
16.	Davangore	4	34.	Padukottai	8
17.	Chitradurga	5	35.	Karur	1
18.	Bangarpet	2	36.	Manaparai	1

Sl. No.	III Order Centres	No. of IV order centres
37.	Panruti	3
38.	Vriddachalam	3
39.	Tirukoilur	3
40.	Kumbakonam	7
41.	Mayuram	7
42.	Dharmapuri	3
43.	Tiruchengode	3
44.	Sankaridry	3
45.	Rasipuram	2
46.	Namakkal	1
47.	Sathiyamangalam	14
48.	Dharapuram	3
49.	Vdumalpet	3
50.	Usilampatti	6
51.	Sivaganga	3
52.	Monamdurai	3
53.	Paramakusi	5
54.	Virudhunagar	12
55.	Kovilpatty	5
56.	Tirunelveli	13
57.	Tenkari	4
58.	Trivandrum	7
59.	Attingal	1
60.	Mannargudi	1
61.	Thiruthuraipundi	1
62.	Puttukotai	5
63.	Trichur	12
64.	Cochin	2
65.	Alwaye	2
66.	Muvattupula	1
67.	Kottayam	9
68.	Ettumanoor	9
	HYDERABAD FIELD:	
69.	Amravati	37
70.	Raipur	24
71.	Chandrapur	34
72.	Sholapur	40
73.	Mahbubnagar	18
74.	Bijapur	6

Sl. No.	III Order Centres	No. of IV order centres
75.	Barawari-Bagwadi	10
76.	Ahmedanagar	12
77.	Koppal	5
78.	Raichur	13
79.	Gooty	5
80.	Ongole	4
81.	Tenali	4
82.	Gudivada	3
83.	Vijayawada	18
84.	Eluru	4
85.	Bheemavaram	3
86.	Rajahmundry	8
87.	Samalkot	8
88.	Vizianagram	8
89.	Bobbili	24
90.	Jalagaon	7
91.	Amalner	1
92.	Parola	1
93.	Pachora	1
94.	Chalisgaon	8
95.	Navsarz	3
96.	Valsad	5
97.	Nasik	12
98.	Thana	4
99.	Pannel	26
100.	Ahmedanagar	15
101.	Kasad	20
102.	Sangli	5
103.	Athani	1
104.	Kolhapur	5
105.	Nandurbar	10
	AMRITSAR FIELD:	
106.	Taran Taran	3
107.	Kapurthala	2
108.	Gurdaspur	14
109.	Pathankot	54
110.	Nawashahr	14
111.	Khanna	2
112.	Jullundur	2
113.	Nakodar	2
114.	Phagwara	3

Sl. No.	III Order Centres	No. of IV order centres
115.	Jagraon	4
116.	Dhuri	10
117.	Jakhal Mandi	2
118.	Kot Kapura	8
119.	Muktsar	3
120.	Mandi Dabwali	7
121.	Ganganagar	4
122.	Hanumangarh	1
123.	Jagadhari	1
124.	Kapurthala	1
125.	Phagwara	1
	CALCUTTA FIELD:	
126.	Narkatiaganj	5
127.	Bettiah	4
128.	Siwan	3
129.	Kishnanagar	3
130.	Buxur	3
131.	Malda	2
132.	Hajipur	8
133.	Madhubani	3
134.	Darbhanga	14.
135.	Purnea	10
136.	Siliguri	6
137.	Jalpaiguri	6
138.	Katihar	8
139.	Muzaffarnagar	2
140.	Chaibasa	44
141.	Arrah	36
142.	Memari	8
143.	Bishnupur	10
144.	Kharagpur	7
145.	Midnapore	6
146.	Kishnagar	22
147.	Malda	8
148.	Dubrajpur	1
149.	Suri	1
150.	Sainthia	1
151.	Rampurhat	2
152.	Bahrampur	3
153.	Jigganj-Azim-Ganj	3
154.	Purlia	6
155.	Adra	6
156.	Ondal	6

Sl. No.	III Order Centres	No. of IV order centres
157.	Bankura	4
158.	Cooch-Behar	5
159.	Dinhata	5
160.	Rangia	20
161.	Nowgong	10
162.	Karimganj	11
163.	Badarpur	11
164.	Sibsagar	8
165.	Golaghat	6
166.	Tinsukia	12
167.	Jehanabad	4
168.	Nawada	9
169.	Aurangabad	6
170.	Sasaram	7
	AHMEDABAD FIELD:	
171.	Himatnagar	15
172.	Kalol	4
173.	Viramgram	2
174.	Dhrangadhra	7
175.	Gandhidham	9
176.	Morbi	3
177.	Dwarka	7
178.	Chittorgarh	22
179.	Pali	5
180.	Balotra	2
181.	Barmer	2
182.	Ganganagar	1
183.	Junagadh	19
184.	Jetalser	11
185.	Rajkot	15
186.	Nankaner	3
187.	Limbdi	4
188.	Dholka	6
189.	Nadiad	6
190.	Anand	5
191.	Godhra	6
192.	Dohad	8
193.	Vadadra	6
194.	Dabhoi	6

Sl. No.	III Order Centres	No. of IV order centres	Sl. No.	III Order Centres	No. of IV order centres
195.	Ankleshwar	5	214.	Jhaggar	10
196.	Surat	2	215.	Gurgaon	3
197.	Bardoli	5	216.	Palwal	4
198.	Mandubar	2	217.	Nakodar	12
199.	Jaona	12	218.	Hapur	14
200.	Ujjain	10	219.	Buland Shahr	5
201.	Bhopal	9	220.	Khurja	5
202.	Dewas	5	221.	Aligarh	4
203.	Mhow	13	222.	Bareilly	4
204.	Horda	8	223.	Kasganj	3
205.	Jeoni-Malwa	5	224.	Etah	3
206.	Akola	12	225.	Shahjahanpur	5
			226.	Mainpuri	5
DELHI-AGRA FIELD:			227.	Shikohabad	3
207.	Patiala	30	228.	Sirsaganj	2
208.	Jagadhari	6	229.	Etawah	4
209.	Kanpur	12	230.	Farukhabad	4
210.	Karnal	5	231.	Mauranipur	3
211.	Jind	3	232.	Jhansi	10
212.	Rohtak	3	233.	Bijnor	14
213.	Sonepat	3	234.	Patiala	9

Sl. No.	III Order Centres	No. of IV order centres
235.	Didwana	6
236.	Ajmer	2
237.	Beawar	2
238.	Kishnagarh	2
239.	Bijainagar	7
240.	Kota	16
241.	Kashipur	7
242.	Rampur	7
243.	Bilari	7
244.	Pilibhit	4
245.	Muzaffarnagar	4
246.	Chandpur	3
247.	Najidabad	20
248.	Saharanpur	10
	LUCKNOW FIELD:	
249.	Hardoi	11
250.	Sitapur	2
251.	Lakhimpur	3
252.	Biswan	3
253.	Bahraich	2
254.	Raebarelli	2
255.	Orai	6
256.	Fatehpur	1
257.	Banda	12
258.	Balrampur	4
259.	Basii	1
260.	Faizabad	2
261.	Akbarpur	3
262.	Sultanpur	1
263.	Phulpur	2
264.	Rewa	2
265.	Beohair	1
266.	Gorakhpur	2
267.	Deoria	1
268.	Shahganj	5
269.	Azamgarh	5
270.	Ghazipur	4
271.	Chandauli	5
272.	Chundar	5
273.	Mirzapur	16
274.	Matihar	14

Sl. No.	III Order Centres	No. of IV order centres
275.	Damoh	3
276.	Sagar	5
277.	Gardarwara	5
278.	Sihora	9
279.	Bilaspur	6
280.	Champa	3

C H A P T E R - IV

NESTING OF CENTRES

A theoretical framework for the study of the distribution of settlements is provided by the work of Walter Christaller. The essense 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. Each class possesses specific groups of central functions and is characterised by a discrete population level of its centres. This argument based on the functional classification of the settlements can be extended to have a hierarchical class-system of the settlements based on the index of relative accessibility (or local degree). Note that (i) the central places have the highest connectivity index, possessing all modes of transportation facilities differentiating them from the central places of lesser order, (ii) as a working hypothesis, one assumes that larger the connectivity index of a centre, the larger its tributory area and (iii) thus, there should exist cities having small local degree served by one or two weekly existing transport routes upto a large city with a large tributary area possessing all modes of transportation.

The theoretically based hierarchical pattern may get distorted because of certain extraneous forces such as presence of other competing centers or physiography or certain imbalances arising out of the distorted development.

Nevertheless, evidence is provided in the present study that a hierarchy of central places does exist. In India, it is found that centres could be arranged into four types L I,II, III and IV (Map No. 16). These centre types differ more one type from another than they differe within types.

In data studied involved total of about 2300 urban centres. [1] Of these 9 centres have been classified as I order centres. Within the field of these centres, about sixty centres of II order have been delineated. The second order centres are not equally distributed among the first order centres, rather the proportion of II order centres falling in the I order nodal region is a function of the characteristic of the I order node (its population, relative accessibility, functions etc.). Further, about 300 centres of III order and 2000 centres of IV order have been recognized.

---

1. Including urban agglamaration, single urban entities.

The association of each higher order centre with the lower order centre is illustrated in Table IV 1 and IV 2.[2]

TABLE IV. 1 THE NESTING PATTERN

	I : II	II : III	III : IV
NATIONAL	1 : 6.2	1 : 5.1	1 : 6.2
LUCKNOW	1 : 7	1 : 4.6	1 : 4
AHMEDABAD	1 : 6	1 : 6.1	1 : 7.4
CALCUTTA	1 : 10	1 : 4.8	1 : 8
MADRAS	1 : 16	1 : 4.3	1 : 4.7
HYDERABAD	1 : 2	1 : 11	1 : 13
BOMBAY	1 : 1	1 : 17	1 : 8
AMRITSAR	1 : 4	1 : 5.5	1 : 6.5
DELHI -AGRA	1 : 6	1 : 4	1 : 7.2

2. Table IV.1 considers Tiruchirapalli, Madurai, Bangalore, and Jaipur as II order centres within the Madras nodal region and Delhi nodal region. Though these five centres statistically get qualified as I order centres but it has been considered more appropriate to associate them with Madras and Delhi nodal regions. However, in Table IV.2 these are considered as I order centres within Madras and Delhi region and the proportions computed thereafter to observe their influence.

TABLE IV.2

	I : II	II : III	III : IV
NATIONAL	1 : 4.1	1 : 5.6	1 : 6.2
LUCKNOW	1 : 7	1 : 4.6	1 : 4
AHMEDABAD	1 : 6	1 : 6.1	1 : 7.4
CALCUTTA	1 : 10	1 : 4.8	1 : 8
MADRAS	1 : 3.2	1 : 5.3	1 : 4.7
HYDERABAD	1 : 2	1 : 11	1 : 13
BOMBAY	1 : 1	1 : 17	1 : 8
AMRITSAR	1 : 4	1 : 5.5	1 : 6.5
DELHI-AGRA	1 : 3.3	1 : 4.8	1 : 7.2

Distortions in Nesting : Aggregate Analysis:

First row in the matrix indicates the ratio emerging at national level of I to II order centres II to III and III to IV order centres. Similarly 2nd row indicates the ratios within Lucknow nodal region and so on. First column indicates ratio of I to II order centres at national level and all the eight I order centres. Similarly second column indicates the ratio of II to III order centres in all the regions and similarly in the third column we obtain III to IV order centres ratio.

If values at the regional level between centres of

various orders is much above or below the national level, it is then designated as distorted development. If the ratio is much above than at national level, that would imply that there is better connectivity than is required to maintain a balanced development and would subsequently mean wastage of scarce resources at the cost of other logging centres. Lesser ratio would imply that fewer centres are dominating the whole scene and other places are not encouraged to come up.

In the present study, Lucknow and Ahmedabad appear to have balanced development in terms of existing transportation network at all levels, while Amritsar has balanced development only at III and IV order level Calcutta has ratios approaching national ratio at III and IV order. Other centres have imbalances existing at all levels. In Table IV.2 in contrast, the proportion at National level goes down. Madras and Delhi fields present a completely different picture in this table.

Distortions at the disaggregated level:

The eight accompanying diagrams (Map No. 1 to 8) show the fields of all the nodal regions at the first three levels. Present section highlights the distortions existing at the various levels.

CALCUTTA:

1. Gauhati and Jorhat II order centres in Assam state have 6 and 3 III order centres respectively - which approximately corresponds with the christellar's model. Even the IV order centres associated with each of these III order centres approximate to the normative pattern except Rangia which has 20 centres at the IV order.

2. Except Ranchi and Ranaghat, all other II order centres in Calcutta modal region have approximately 6 centres at the III order level. Ranchi, serving three nodes at the III order has as much as 90 centres at the IV order level. Similarly Ranaghat having only one III order centre has 22 centres at IV order. This reflects the dominant influence of Ranaghat order the neighbouring region. With few exceptions like Arrah, Darbhanga, Suri, Rampurghat, Durgapur and Modhupur, all the other III order centres served by Patna, Samastipur, Burdwan, Katwa, Ananbad and Gaya, have very balanced regions serving approximately 6 centres.

SALIENT FEATURES:

(a) Nodes having few lower order centres within their region have a very large number of centres at still lower order level.

(b) Although Assam has a very low level of network connectivity, it has a balanced transport network linkages.

AHMEDABAD:

1. Udaipur and Vadadara II order nodel centres serve one and sixteen centres at III order. The II order node served by Udaipur i.e. Chittorgarh, in turn dominater over 22 centres at IV order. The III order centres served by Vadadara have their own regions and serve approximately 6 centres each except Rajkot, Jetalser, Junagadh and Shrat. The first three dominate over more than 10 centres at the lower level while Surat has only 2 centres in its region.

2. Other centres at II order level i.e. Mahasane, Jodhpur, Indore and Khandwa appear to have a balanced transport network development. Even at still lower order, these centres have a fairly balanced development except for some exception like Himatnagar, Junagadh, Jetalser, Bardoli and Mhow.

SALIENT FEATURES:

(a) The development of Udaipur at II order and Surat at III order has proceeded to a point where it undermines the development of other smaller centres.

(b) Nodes having balanced pattern at II order level also have a balanced pattern at still lower orders. On the other hand nodes showing imbalances at one level have distortions present in lower levels also.

BOMBAY:

Bombay nodal region has only one II order centre (Poona) and in turn Poona nodal region has 17 III centres. Except for Jalagaon, Valsad, Sangli and Kolhapur, all the other III order nodal centres have imbalances in transport network.

SALIENT FEATURES:

Nodal region having few centres at lower level has a very large number of centres at still lower order.

AMRITSAR:

1. Amritsar nodal region, with four II order centres, presents a fairly balanced network development. At II order level Firozpur has zero while Bhatinda has 10 III order centres. In turn Firozpur region contains 4 IV order centres. All the 10 III order regions contained in Bhatinda nodal region have only 28 IV order centres while theoretically they should contain as much as 60 IV order centres.

2. Further, Batala and Ludhiana, though having fairly balanced network, the III order regions earned within these appear imbalanced. Former has 73 IV order centres in place of ideal 24 centres and later has 39 centres in place of about 50 centres.

SALIENT FEATURES:

One conclusion that definitely emerges is that lower (or higher) the number of III order centres as compared to normatively prescribed, the higher (or lower) the number of IV order centres.

DELHI-AGRA:

1. Number of I^{A} order centres within the region of highest nodal centre is first equal to as suggested by the central place model.

2. Charkhi-Dadri, Mathura and Bikaner (II order) fields, containing only one each III order centre have 10, 14 and 10 centres at the IV order respectively.

3. Other II order centres i.e. Panipat, Rewari, Meerut, Gwalior, Ambala, Moradabad and Bijnor have balanced transport network.

4. Mathura and Udaipur having a large number of III order centres have very few centres at the lowest level.

SALIENT FEATURES:

(a) Lower the number of III order centres to within II order nodal regions, higher the number of IV order centres and vice-versa.

(b) Stable transport network at III order level is characterised by a stable development at IV order.

LUCKNOW:

1. Lucknow nodal region contains 7 II order centres.

2. In turn, the second order nodal regions contain a fairly balanced number of III order regions.

3. Some distorions exist at the lowest order although, broadly speaking even this level is characterized by an orderly development.

SALIENT FEATURES:

Lucknow nodal region is featured by an orderly development at all levels.

HYDERABAD:

1. Hyderabad field contains only 2 II order centres.

2. Nagpur nodal region contains 3 III order centres which in turn support about 100 lowest level centres.

3. Guntur nodal region contain 19 III order centres which further accomodate about 200 IV order centres.

SALIENT FEATURES:

Though containing only 2 II order centres as compared to theoretical 6, the number of III and IV order centres is much greater than the legitimate number.

MADRAS:

1. Contain 16 centres of II order. If we consider Tiruchirapalli, Madura and Bangalore as I order centres than the ratio of I to II order centres becomes 1 : 3 - which becomes much lower than theoritically prescribed.

2. Centres having a higher level of development i.e., Tiruchiarapalli, Thanjavar, Coimbator, Dindigul, Calicut, Mandya and Mysore have only 1 or 2 III order centres contained within their regions.

3. Bangalore and Tiruvannamalai have 7 and 8 III order centres. However, the former has only 16 and later 23 centres as compared to 42 centres in Bangalore and 48 centres in Tiruvannamalai nominatively prescribed.

SALIENT FEATURES:

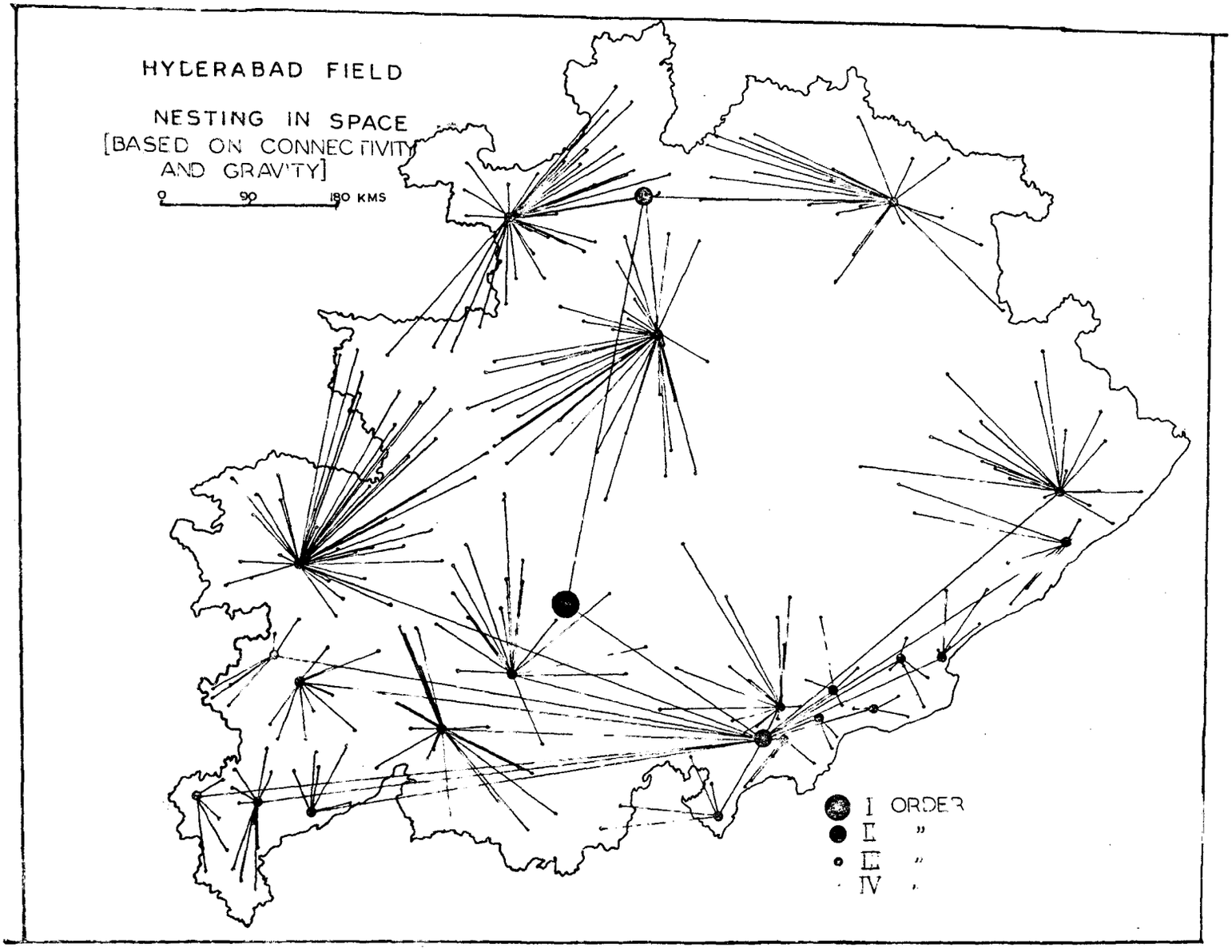
Madras field contains a large number of lower order centres and it encompasses or large area incorporating the states of Tamil Nadu, Kerala, parts of Karnataka and Andhra Pradesh.

SUMMING UP:

1. Nodes having balanced pattern at II order level also have a balanced pattern at still lower orders. However, nodes showing imbalances at one level have distortions present at lower levels also.

2. Tentatively, perhaps, it can be said that when the development level of production forces is high, a large number of centres emerge with slight transportation facilities available, with a few dominant centres have their influence penetrating down to the lowest level. However, when development level is low, their appears a well maintained hierarchy.

3. Extending the first point, it can further be postulated (there is however not sufficient evidence to say it conclusively) that Amritsar and Lucknow region on the one hand and Bombay field on the other hand corraborates that when the nodal centres are in a evolutionary stage, the role of transport and its influence on region formation is especially great. However, in a mature economy, the role of transport declines.


HYDERABAD FIELD
NESTING IN SPACE
[BASED ON CONNECTIVITY
AND GRAVITY]
0 90 180 KMS
I ORDER
II "
III "
IV "

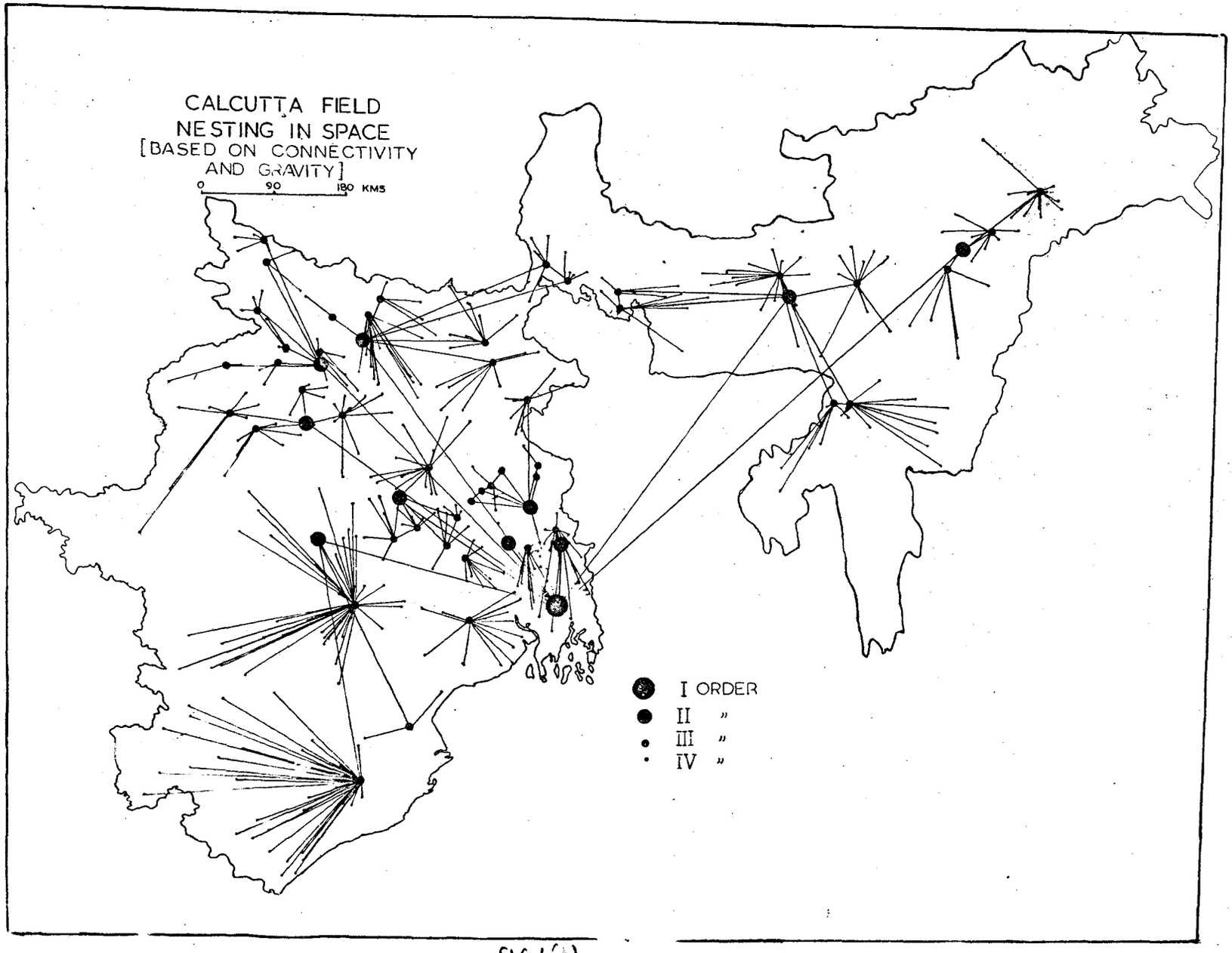

CALCUTTA FIELD
NESTING IN SPACE
[BASED ON CONNECTIVITY
AND GRAVITY]
0 90 180 KMS
I ORDER
II "
III "
IV "

FIG 1 (a)

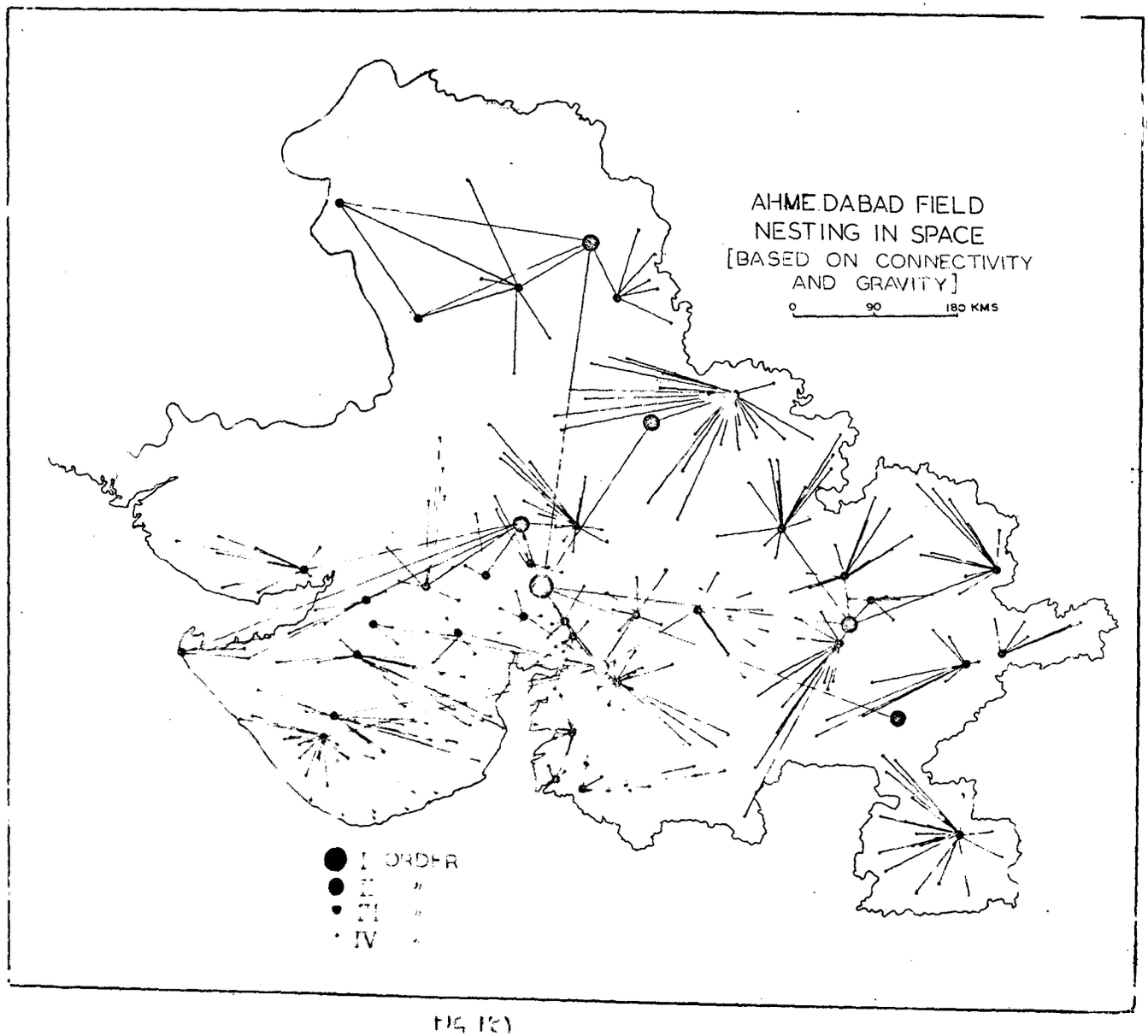

AHMEDABAD FIELD
NESTING IN SPACE
[BASED ON CONNECTIVITY
AND GRAVITY]
0 90 180 KMS
I ORDER
IV

FIG (2)

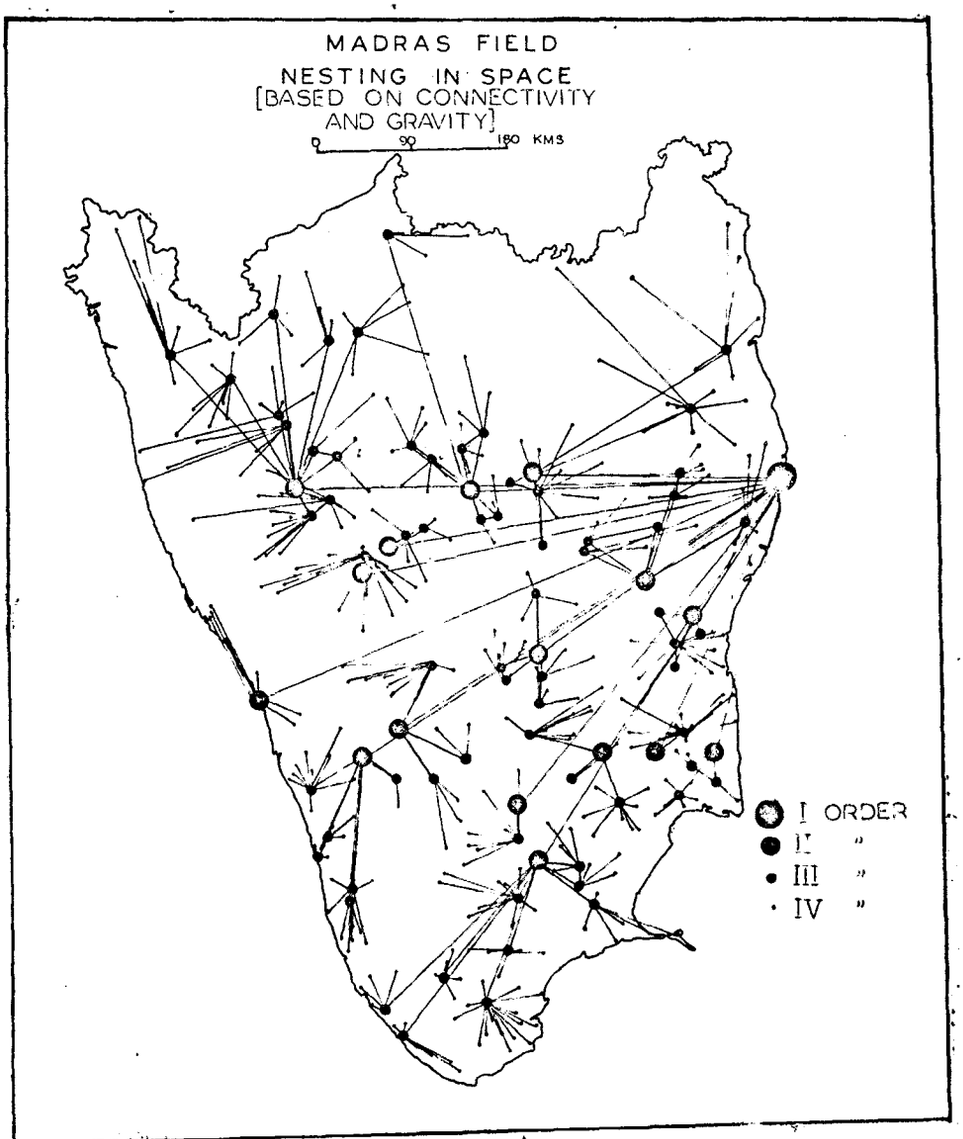

MADRAS FIELD
NESTING IN SPACE
[BASED ON CONNECTIVITY
AND GRAVITY]
0 90 180 KMS
I ORDER
II "
III "
IV "

FIG 1(d)

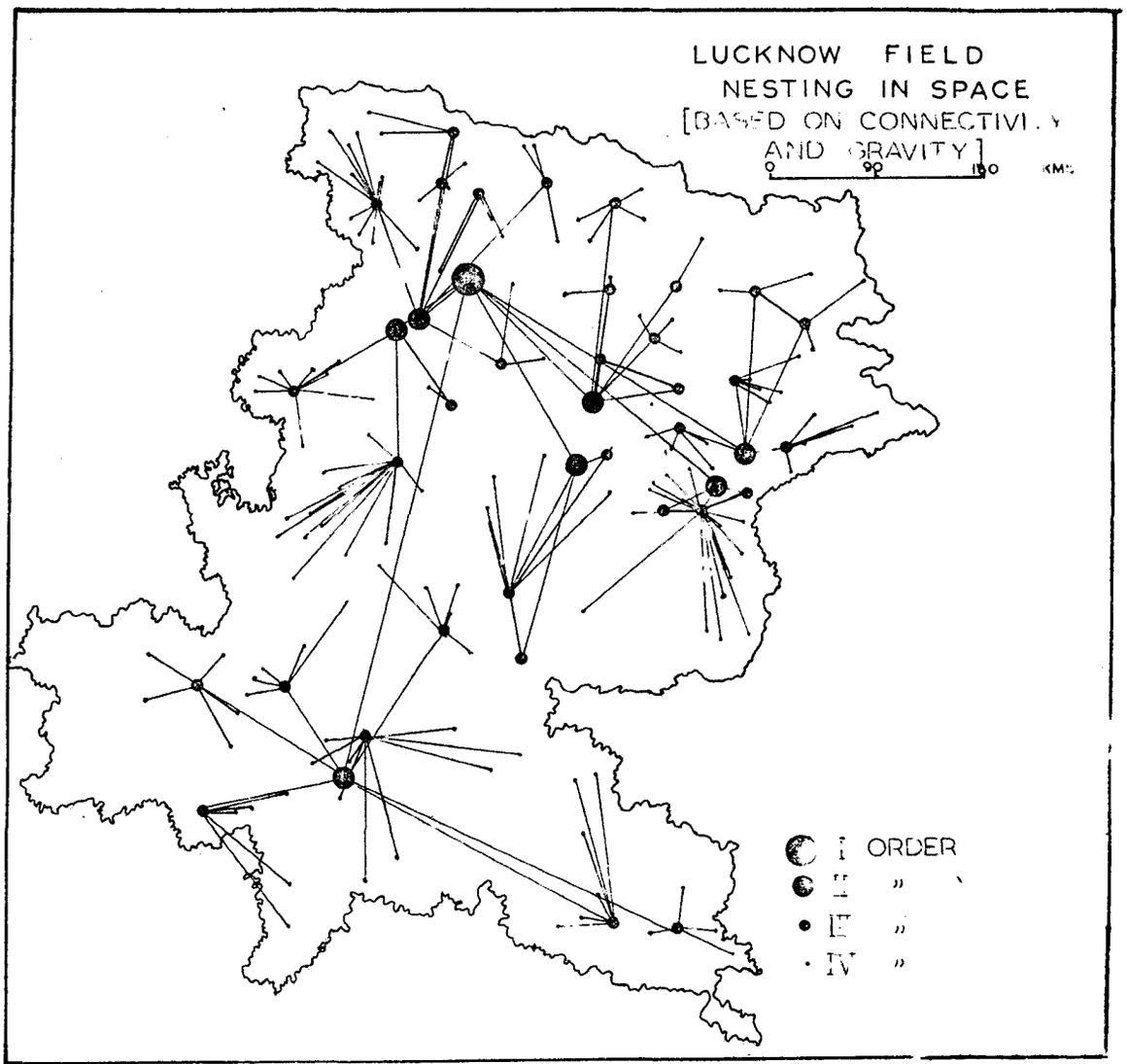

LUCKNOW FIELD
NESTING IN SPACE
[BASED ON CONNECTIVITY
AND GRAVITY]
0
90
180
KMS
I ORDER
II "
III "
IV "

FIG I (e)

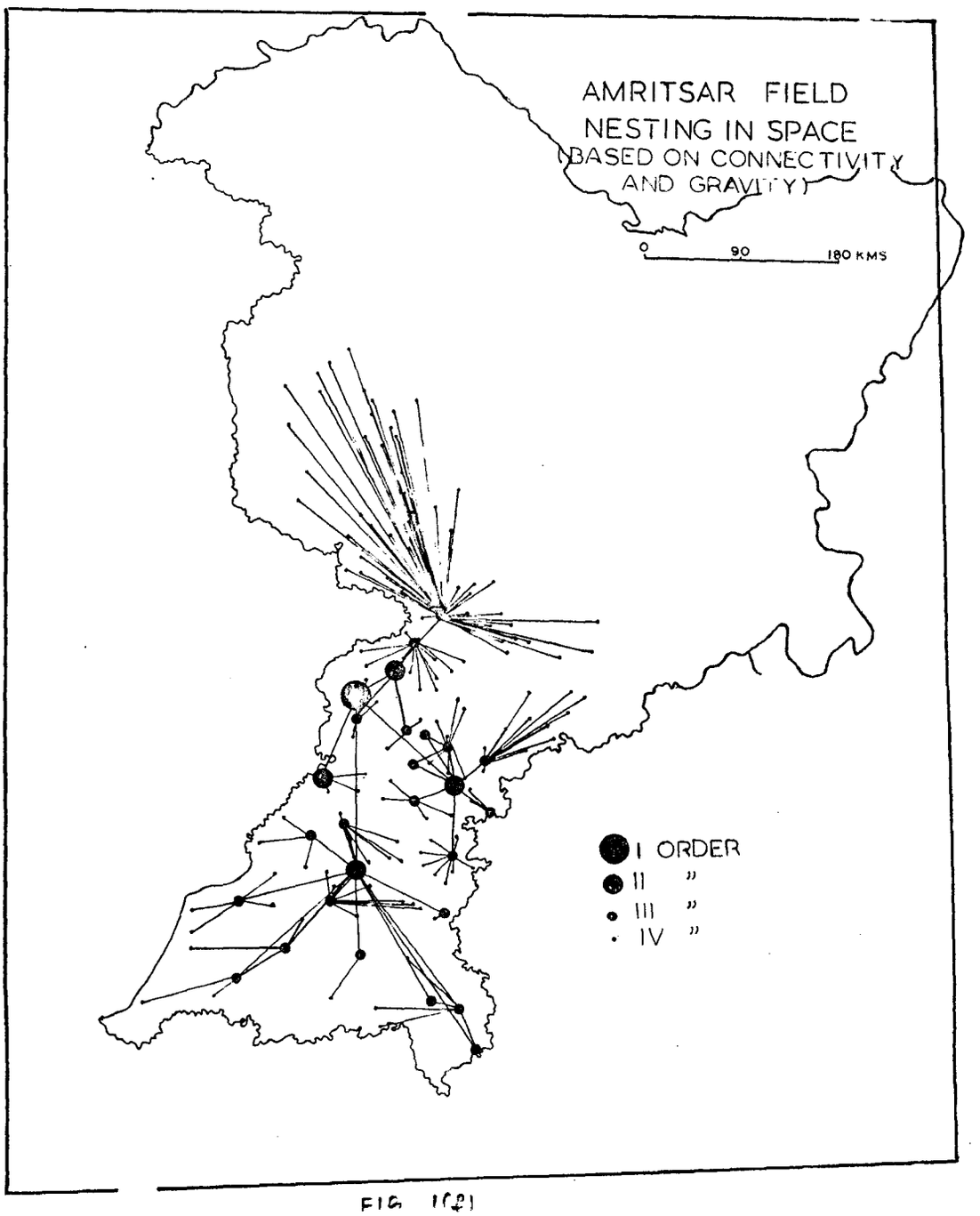

AMRITSAR FIELD
NESTING IN SPACE
(BASED ON CONNECTIVITY
AND GRAVITY)
0
90
180 KMS
I ORDER
II "
III "
IV "

FIG 1(21

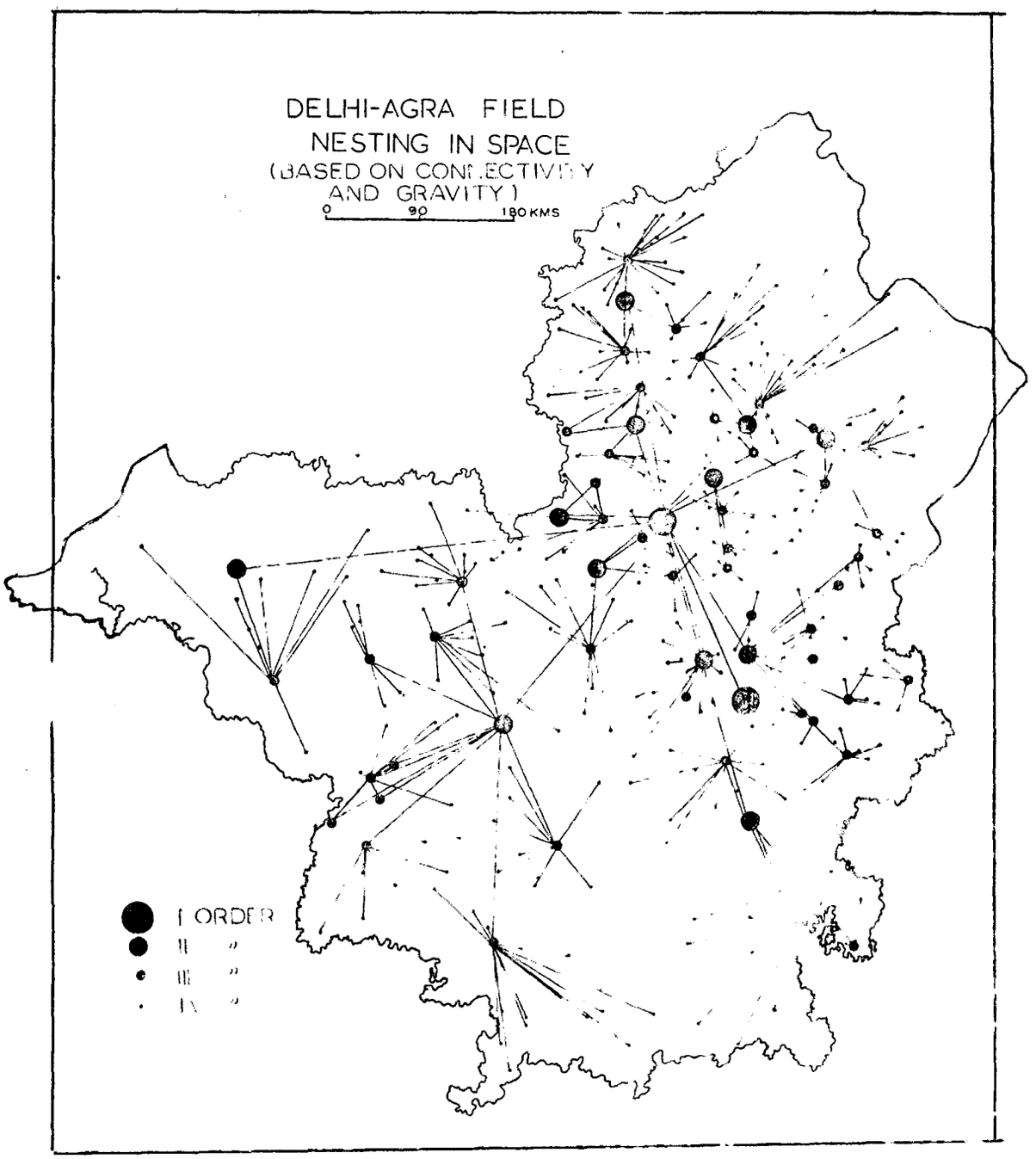

DELHI-AGRA FIELD
NESTING IN SPACE
(BASED ON CONNECTIVITY
AND GRAVITY)
0 90 180 KMS
I ORDER
II "
III "
IV "

FIG. 1 (a)

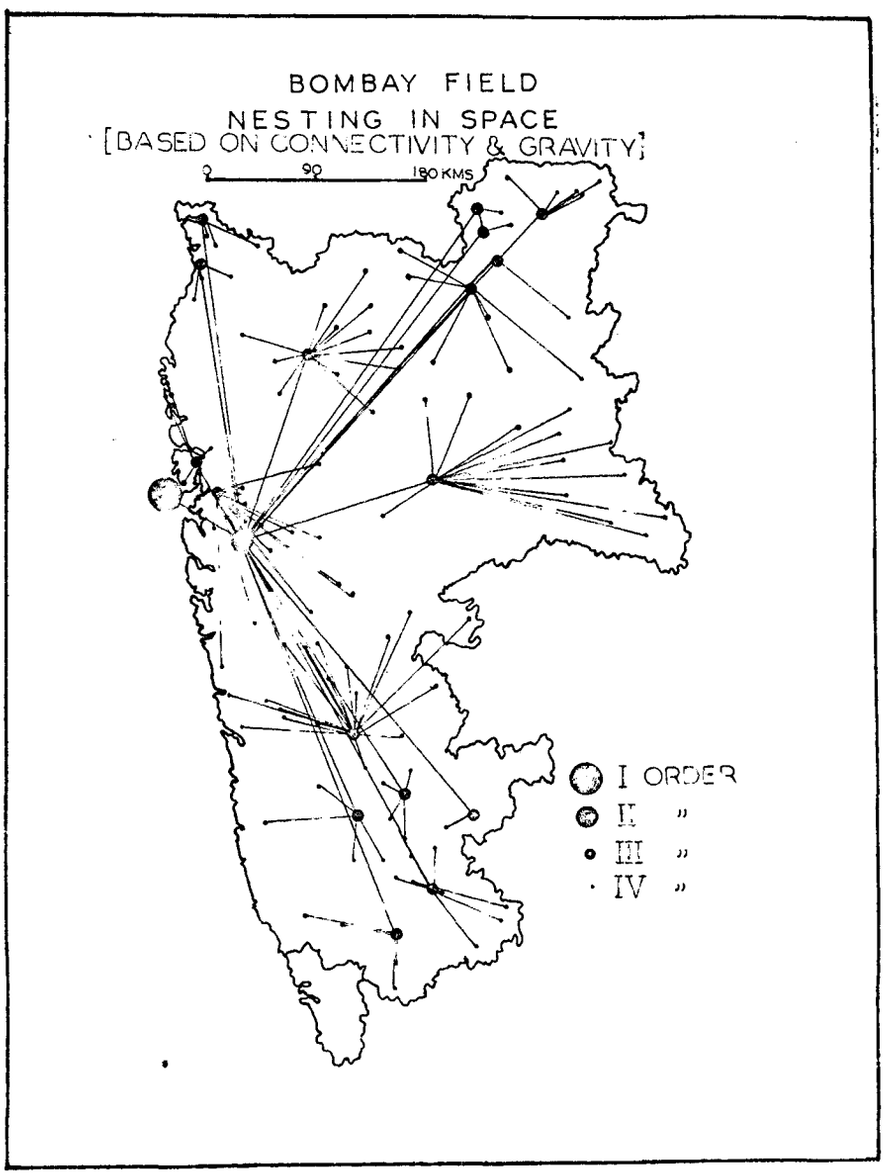

BOMBAY FIELD
NESTING IN SPACE
[BASED ON CONNECTIVITY & GRAVITY]
0
90
180 KMS
I ORDER
II "
III "
IV "

FIG 1(A)

CHAPTER V

CORRELATES OF GRAVITY FIELDS

In the previous chapter gravity field of the centres in different orders, were demarcated. It was observed that the centres do not divide the field available proportionately to their transport/linkages. Rather the size of the region dominated by a centre is in part a function of the nature of activities pursued by the centre. The purpose of this chapter is, firstly to classify each centre according to the nature of services performed by it; secondly to find the relationship between the relative accessibility index and the functions of each town and lastly to explain the discrepancy if any between the observed values of accessibility under and the theoretical values obtained from the regression line.

The basis of classifying cities according to services they perform has been desired from Nelson[1], The source of statistical data of present study involving cities with network efficiency greater than forty five is the 1971 census. The proportion of the labour force of a city engaged in performing a service is the best means of measuring the distribution of

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1. Howard J. Nelson "A service classification of American cities" "Readings in Urban Geography" ed. by H.M. Nager and C. F. Kohn pp. 139-160. (Central Book Depot 1967)

that activity. The following six categories of service have been recognized for investigation in this study: 1 Primary (Agriculture, mining, querring, livestock, fishing, hunting etc.); 2 household industry ; 3 manufacturing; construction; Tertiary (Trade and commerce and other services); and lastly transport storage and communication.

Next, the percentage of the total labour force in each activity group for each of the 358 cities (having local degree more than 45) was calculated. However, as individual percentages are almost meaningless without some point of reference, the arithmatic averages for each activity group were computed. Table V.1 indicates the average percentages of those gainfully employed in various activity groups for the total of 358 cities.

TABLE V.1 AVERAGE PERCENTAGES OF PERSONS EMPLOYED IN VARIOUS SERVICES

Functions	Mean
Household Industry	5.88
Manufacture	17.28
Construction	3.28
Tertiary	48.86
Transport	10.31
Primary	14.39

Table V.1 indicates that the average proportions of the labour force in each of the activity groups differ greatly. The performance of tertiary activities occupies the largest proportion of labour force. Next comes the manufacturing activity. Thus about 65 percent of workers in cities are engaged in providing these two services. Activities related with the exploitation of land account for about 15 percent of the labour force. To portrary graphically the distribution of economic services among indian cities the frequency graphs were constructed.

To classify the cities having a far greater proportion of labour force engaged in an activity than those at the peak, the device used is that of standard deviation. Standard deviations from the mean have been calculated for each of the six activity groups and are presented in table V.2. Three degree of variation from the average are recognized and the cities grouped in their appropriate categories (See Appendix)

TABLE V.2

	Household industry	Manufacture	Construction	Tertiary	Transport	Primary
Average	5.88	17.28	3.28	48.86	10.31	14.39
S.D.	6.10	9.03	1.61	11.26	7.30	12.84
Average +1SD	11.98	26.31	4.89	60.12	17.61	27.23
Average +2SD	18.08	35.34	6.50	71.38	24.91	40.07
Average +3SD	24.18	44.37	8.11	82.64	32.21	52.91

When applied to the 358 Indiancities chosen, the method described is not mutually exclusive; that is, a city may provide more than one type of service in outstanding proportions. Some cities do not rank high enough in any service to some under any of the above six categories. These are lumped together in a single "diversified" group. This means that they are simply not unusually high in any service. All the cities that were more than one S.D. above the average for any of the six service categories and the diversified for any of the six service categories and the diversified cities have been plotted on figure 9.

Any detailed explanation of either the map or the frequency distribution curves has not been felt necessary as that would mean astraing from the main topic. This study of functional classification has been undertaken as a reference tool than as an end in itself. In the following sections it is attempted to understand how do cities in each of the above categories compare with respect to the network efficiency.

Subsequently, the seven independent variables chosen to explain the network efficiency (dependent variable) for the Indian towns are :

1. Population of town.
2. Proportion of labour force engaged in Household industry.
3. Proportion of labour force engaged in Manufacturing.
4. Proportion of labour force engaged in Construction.
5. Proportion of labour force engaged in Tertiary Activities.
6. Proportion of labour force engaged in Transportation.
7. Proportion of labour force engaged in Primary Sector.
8. Network Efficiency (Dependent variable).

The correlations between these variables is indicated in table V.3. The correlation co-efficient is an index of the closeness of fit.

TABLE V.3

1.000	0.152	0.221	0.171	0.001	0.169	-0.40	0.724
	1.000	0.959	0.978	-0.047	0.931	0.622	- 0.001
		1.000	0.982	-0.935	0.939	0.562	0.062
			1.000	0.007	0.961	0.615	0.014
				1.000	-0.033	-0.458	0.102
					1.000	0.552	0.035
						1.000	-0.228
							1.000

From the table it is obvious that population of a centre and the accessibility index are very highly positively correlated; that is the accessibility index of a town increases with increasing population. The index does not appear to be depending on other variable chosen significantly, the correlation between percentage of workers engaged in primary sector and network efficiency is negative. This is essentially a rural activity. Thus, higher the importance of primary occupation in the economy of a town, lower would be its connectivity index. The value r^2 , the co-efficient of determination, indicates the percentage of variation in the dependent variable that is statistically 'explained' by the variation in the independent (explanatory) variations chosen. In the present case $r^2 = 0.57$. This means that 57 percent of the variation in the connectivity index of the town is explained by the variation in the other seven variables chosen. This association appears quite high.

Next, a scatter diagram was plotted showing a relationship between the actual connectivity inded (y) and the expected index ($\bar{Y}$) calculated on the basis of seven variables chosen. Then a line was fitted to the points to give a more precise measure of the functional relation between the actual and expected connectivity index. This regression line may be determined by a procedure designed to minimize its total

squared deviations from the plotted points, and it can be expressed in the terms of the equation for a straight line in the form.

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 .$$

The constant (a) locates the Y- intercept, the point on the Y-axis where the line would cross if it were extended back to a value of X = 0. The constant (b's) indicate the slope of the multiple regression line.

Another useful measure based on statistical analysis of the relationship between actual and projected connectivity index comes from an examination of the deviations of actual individual values from these computed by the regression equation. These residual deviations are obtained by substracting the expected value ($\bar{Y}$) from the actual value (Y) (see Appendix) A cursory look at the table indicates that for Gwalior the residual is +18.3. This means that the actual value of connectivity is greater by 18.3 as compared to expected computed from the regression line.

Similarly, for Bijnor, Mathura, Agra, Bangalore Villupuram, Madurai, Tiruchirapalli, Udaipur, Ahmedabad etc., the actual connectivity index exceeds the expected index by

more than 15. For Amritsar, Agra, Madurai, Tiruchirapalli and Jaipur, the difference exceeds + 25. For Amritsar, the discrepancy is the highest at 42.

Next, relative residuals were computed a relative residuals were computed by dividing the basic residuals with the observed value of connectivity (Relative residuals = $\frac{Y - \bar{Y}}{Y}$) (See Appendix). Again, a positive value of relative residuals would indicate that observed value is higher than the expected value.

Appendix indicates that wide variation exist in the value of relative residuals for the 358 towns in India. It varies from an extrem value of + 0.41 for Amritsar to - 0.77 for Ludhiana. Note that both centres fall in the Punjab. Relative residuals have been grouped into five following categories:

1. - 0.01 to + 0.01
2. + 0.01 to 0.15
3. $>$ 0.15
4. - 0.01 to - 0.15
5. $<$ -0.15

For the centres falling the I category the observed value of accessibility index is almost equal to the expected value obtained from the regression line. The reflects a

balanced development of transport network in the centres possessing these values, commensurate with the development in the other sectors of the economy. For the centres falling in the third and fifth category, the transport network development is either very much higher or below as permitted by their overall economic development centres falling in the third category would, in course of time, prosper even more-supported by their good transport facilities. On the other hand, centres falling in the fifth category (having residue less than - 0.15) would in course of time stagnate and their economic growth retard. The centres falling in the other two categories i.e., +0.01 to 0.15 and -0.15 to -0.01 are perhaps in transitional stage i.e. those in the former category attempting to improve their level of development while those in the later category sinking to the rank of stagnant centres. 27 centres appear in 1st category; 42 centres in third category; 50 centres in 5th category and about 240 centres fall in the second and fourth category.

As mentioned earlier, centres in the 1st class are those having a balanced transport network development. It is significant that Delhi appears in this class. There, thus exists a correspondence between transport development and the growth of the other sectors of economy. Comparing this table with the table giving functional classification of Indian

towns indicate that all the centres falling in this category perform some service of national importance and do not generally get classified as diversified centres.

Centres falling in the third category (relative residuals $> + 0.15$) are those where network efficiency bypasses development in other spheres of economic activity. Thus, here, transport facilities available would support a more efficient development in time. It is significant that four of our I order centres i.e. Lucknow, Ahmedabad, Amritsar and Hyderabad fall in this category of fast growing centres. Residuals is highest in case of Amritsar (+ 0.41) which also happens to have a small gravityfield. Besides, Madurai, Tiruchirapalli, Bangalore and Jaipur, which statistically emerged as the I order centres, also fall in this category. Looking at the services performed by these centres, it can be broadly said that these have been either classified as diversified or manufacturing centres.

Towns falling in the fifth category (residuals < -0.15) have a weak transport facilities available to support their existing economic structure. These would disintegerate or would at least be characterised by stagnation. It is significant that Calcutta, having the highest connectivity index falls in this category. This reflects that its existing economic structure is not supported

by appropriate network development. Four centres falling in this category are in Kerala. Most of these centres have functionally been either classified as diversified or those performing tertiary activities in significant proportions. This reflects dysfunctional development.

Unexplained Connectivity and distortions in hierarchy.

It is attempted here to relate the relative residuals of connectivity - obtained after substracting the actual connectivity index as observed and the estimated value obtained from multiple regression line, with the number of centres served by each higher order centre. For the purpose, following contingency table was obtained:

No. of Subserving centres / Unexplained residuals	4	4 to 8	8	
0.05	36	40	33	109
+ 0.05 to +0.05	40	45	20	105
-0.05	57	50	37	144
	133	135	90	358

Chi-square test was applied to this contingency table. Value of x^2 as obtained = 4.668.

x^2 .05 = 9.488 [From Table]

As calculated value is less than the tabulated value, we can say that the two (number of subserving centres and unexplained residuals) are independent,

CHAPTER VI

C O N C L U S I O N S

Transport network, is essentially a spatial phenomena, the development of which bring about spatial integration, through the sectoral specialisation and areal concentration of economic activities. Network is made up of more than one mode of movement, each with its specific characteristics, advantages and disadvantages. Nevertheless, the different modes of Network coexist, inplaces competing and in others complementary. What is however, necessary is to look at the network of different modes as a single network, which is the means to bring about greater spatial integeration. In otner words, there is a necessity to make the multi-modal network into a unimodal one.

This question would necessitate a study of the advantages and disadvantages of different modes, through which, a scheme of weightage may be attributed to them, so that the different modes become additive. Four considerations are involved for the purpose in this study: the Cost of transportation media, the energy consumed, the time taken, and the capacity of networks. The former three reflect inversely the efficiency of the modes, whereas the last of

them is a positive indicator. Thus, what has been accompalished in this study initially, is the ranking of urban centres on the basis of their inter-modal network connections. The composite values derived for each of the centre is given as an appendix table in the next section.

Following this, the question arises as to their arrangement in space and their hierarchy. This is dealth with cartographic methods and portrayed in maps. On the basis of the analysis we are able to conclude that :

1. The regional structure of the Indian economy as reflected by the inter-modal network connections is built by nine I order centres organised in eight fields: (a) Madras (b) Hyderabad (c) Bombay (d) Ahmedabad (e) Amritsar (f) Delhi-Agra (g) Lucknow (h) Calcutta

2. The most distorted fields are exemplified by Bombay, Calcutta and Madras and Hyderabad.

3. The least distorted fields are exemptified by Lucknow, Delhi-Agra and Amritsar.

4. Examples of higher level of network development and least distortions are brought out by Amritsar and Delhi-Agra nodes, and that of low network development and less distortions are reflected by Assam.

5. Distortions in hierarchy at higher levels percolate to lower levels also, while distortions at lower levels do not necessarily affect the pattern above.

6. Population size is the single factor which explains inter-nodal network connections.

The distortions in the hierarchy have been identified. An attempt can therefore, be made on the basis of findings of the study to rectify the distortions and bring about efficient spatial integeration of the economy. The conclusions drawn pertain to a particular time period and any changes in technology or other spheres of economic activity can seriously alter the conclusions. In spite of the sensitivity of network to the technological innovations, the approach to the problem would substantially remain the same. If this is so, the study can be extended to bear fruitful results by considering the integeration at lower levels including villages.

APPENDIX -I

Indirect Connectivity of Air Network

As a case study, indirect connectivity of airways network has been determined. It is possible to manipulate the connectivity matrix, which records the elementry structure of a network, to derive two measures of accessibility involving indirect connections - one related directly to structure and one related to topological distance.[2] The number of indirect connections or paths between nodal pairs can be determined by matrix multiplication. An example of the use of the matrix powering procedure to determine nodal accessibility is the study by William L. Garrison of the interstate highway system in the southeastern United States. However, one of the difficulties in determining nodal accessibilities by matrix manipulation of the connectivity matrix is that all linkages between nodal pairs, no matter how indirect, are regarded as equal in importance. A more realistic procedure would be to decrease the relative importance of indirect connections between nodes. What is required is a method that takes into account the indirect influences of a sequence (path) of linkages, with each step in the sequence being weighted inversely to its order in the sequences.

To determine the elementry path, it is necessary to eliminate redudancies from our computations. A practical procedure for doing this is offered by Shimbel, whereby we are interested not in the total number of paths between any

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2. Taafee and Gauthier " Geography of Transportation" (Prentice-Hall 1972) pp. 116-158.

two nodes, but in the length of the shortest path between a pai pair of nodes, Subsequently each element of the matrix indicates the number of inter mediary steps required to commute between two nodes. The greater the number of intermediary steps the lesser is the value allocated to that element. For example, for direct connection between a node A and B, a value 1 has been given; if from A one has first to come to C to reach B than a value ½ (.5) has been given; if there exist two intermediary points (C and D) then a value 1/3(.33) has been given and so on. When no zero element remains in the matrix, the exercise is terminated.

Summuring across the rows of the resultant matrix gives us a vector, the individual elements of which are measure of the shorter-path connections from each node to all other nodes on a network. Shimbel refers to this as the accessibility of a node to the network. (See appendix I) The larger the numberical value of node, the greater is the accessibility of that node to the network.

Further, Latent roots and composite indices of air network were calculated (see table) . Latent root of airways network is one dimensional. Only Delhi airport emerges as explaining 11 percent of the air network facilities available in India. Subsequently, Delhi airport gets the neighest weightage (0.96) followed by Calcutta (0.72), Bombay (0.60). Hyderabad (0.47) and Madras (0.47). Factor scores follow the same pattern with Delhi possessing the largest score (7.16). Almost all the other airports get a weightage less than 0.20.

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PASSENGER AIRWAYS CONNECTIONS

(FIRST FACTOR SCORES)

S.N.	Air Ports	Connectivity Index	S.No	Air Ports	Connectivity Index
1.	Delhi	41.33	19.	Tiruchirapalli	21.44
2.	Calcutta	39.00	20.	Trivandrum	28.98
3.	Bombay	38.33	21.	Tirupati	22.19
4.	Madras	34.33	22.	Vis-akhapatnam	24.72
5.	Bangalore	25.81	23.	Vijaywada	21.26
6.	Hyderabad	32.33	24.	Dabolim	26.21
7.	Cochin	25.31	25.	Kanpur	26.86
8.	Jaipur	28.36	26.	Varanasi	27.86
9.	Jodhpur	27.36	27.	Lucknow	26.86
10.	Udaipur	27.36	28.	Patna	27.36
11.	Gwalior	27.36	29.	Bhubaneshwar	23.38
12.	Bhopal	27.36	30.	Mangalore	24.26
13.	Indore	26.86	31.	Chandigram	25.60
14.	Aurangabad	26.86	32.	Kulu	24.60
15.	Ahmedabad	26.36	33.	Amritsar	24.60
16.	Nagpur	26.36	34.	Jammu	25.10
17.	Coimbatore	22.66	35.	Srinagar	25.10
18.	Madurai	21.44	36.	Agra	25.60

S.N.	Air Ports	Connectivity Index	S.N.	Air Ports	Connectivity Index
37.	Khajuraho	25.10	48.	Bagdagra	23.50
38.	Pune	22.63	49.	Agartala	23.50
39.	Belgaon	22.63	50.	Silchar	25.50
40.	Porbander	22.63	51.	Imphal	18.00
41.	Baroda	22.63	52.	Dimapur	26.50
42.	Bhavnagar	22.63	53.	Tezpur	26.50
43.	Rajkot	22.63	54.	Jorhat	26.50
44.	Jamnagar	23.13	55.	Lkabari	26.50
45.	Bhuj	23.13	56.	Dibrugarh	25.50
46.	Keshod	22.63	57.	Ranchi	23.50
47.	Gauhati	27.00	58.	Port Blair	22.88

Source : Indian Airlines Schedules.

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WEIGTAGES AND COMPOSITE SCORE OF AIRWAYS

S.N.	Airports	Latent Vectors	Factor Scores	S.N.	Airports	Latent Vectors	Factor Scores
1.	Delhi	0.966	7.163	19.	Tiruchirapalli	0.063	0.467
2.	Calcutta	0.716	5.311	20.	Trivandrum	0.144	1.068
3.	Bombay	0.601	4.458	21.	Tirupati	0.127	0.939
4.	Madras	8.467	3.463	22.	Visakhapatnam	0.189	1.400
5.	Bangalore	0.350	2.595	23.	Vijaywada	0.089	0.661
6.	Hyderabad	0.473	3.504	24.	Dabolim	0.211	1.567
7.	Cochin	0.230	1.703	25.	Kanpur	0.248	1.842
8.	Jaipur	0.337	2.498	26.	Varanasi	0.160	1.186
9.	Jodhpur	0.297	2.200	27.	Lucknow	0.113	0.841
10.	Udaipur	0.297	2.200	28.	Patna	0.125	0.926
11.	Gwalior	0.283	2.099	29.	Bhubaneshwar	0.122	0.905
12.	Bhopal	0.283	2.099	30.	Mangalore	0.191	1.408
13.	Indore	0.249	1.850	31.	Chandigarh	0.200	1.482
14.	Aurangabad	0.257	1.903	32.	Kulu	0.157	1.166
15.	Ahmedabad	0.211	1.567	33.	Amritsar	0.154	1.144
16.	Nagpur	0.211	1.567	34.	Jammu	0.181	1.344
17.	Coimbatore	0.141	1.046	35.	Srinagar	0.178	1.320
18.	Madurai	0.063	0.467	36.	Agra	0.222	1.644

S.N.	Airports	Latent Vectors	Factor Scores	S.N.	Airports	Latent Vectors	Factor Scores
37.	Khajuraho	0.182	1.347	48.	Bagdagra	0.097	0.716
38.	Pune	0.081	0.601	49.	Agartala	0.097	0.716
39.	Belgaon	0.081	0.601	50.	Silchar	0.140	1.036
40.	Porbander	0.081	0.601	51.	Imphal	0.055	0.405
41.	Baroda	0.081	0.601	52.	Dimador	0.216	1.605
42.	Bhavnagar	0.081	0.601	53.	Tezpur	0.216	1.605
43.	Rajkot	0.081	0.601	54.	Jorhat	0.216	1.605
44.	Jamnagar	0.094	0.695	55.	Lilabari	0.216	1.605
45.	Bhuj	0.094	0.695	56.	Dibrugarh	0.191	1.414
46.	Keshod	0.081	0.601	57.	Ranchi	0.097	0.716
47.	Gauhari	0.265	1.967	58.	Port Blair	0.097	0.716

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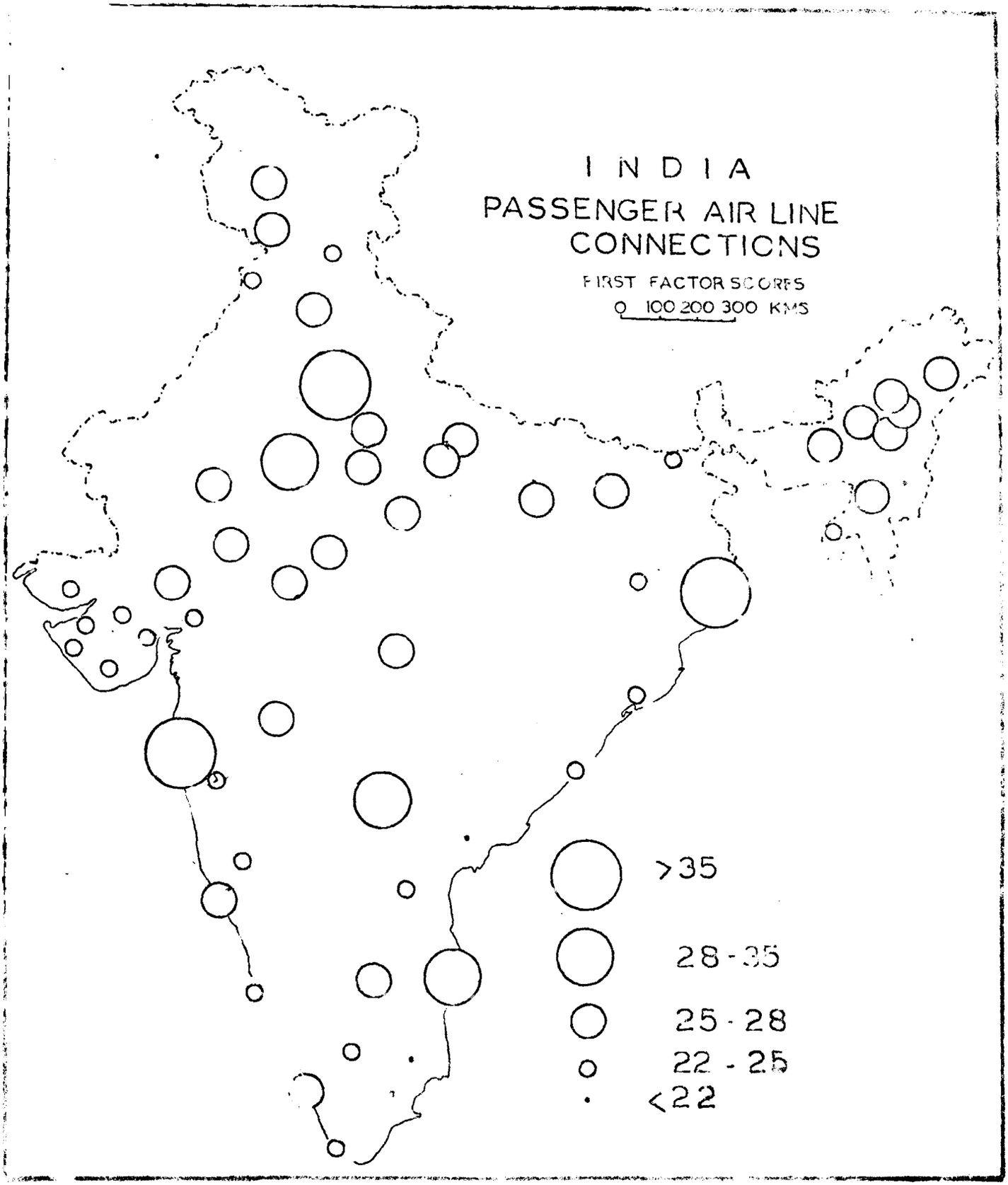
INDIA
PASSENGER AIR LINE CONNECTIONS
FIRST FACTOR SCORES
0 100 200 300 KMS
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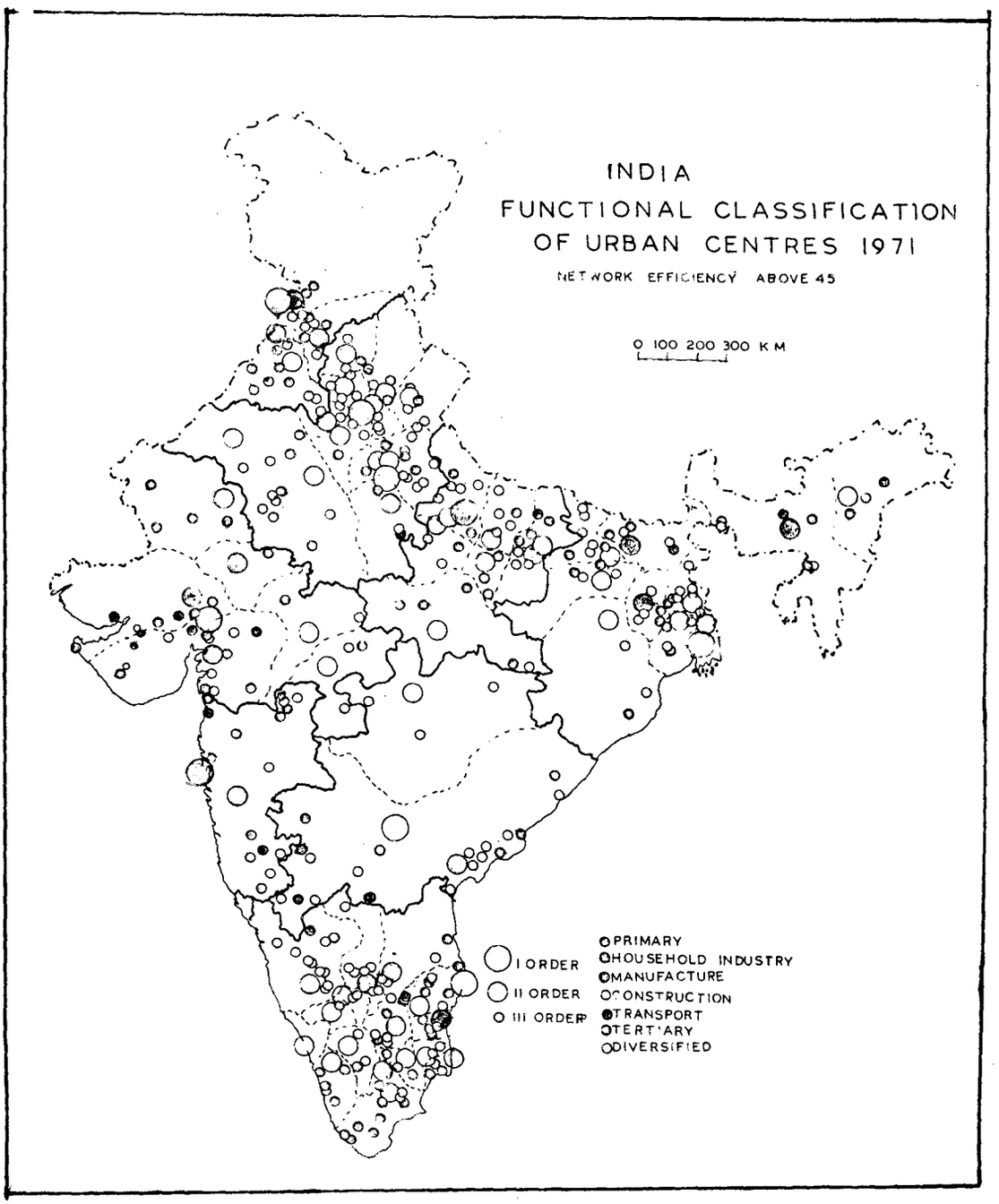
28-35
25-28
22-25
<22


INDIA
FUNCTIONAL CLASSIFICATION
OF URBAN CENTRES 1971
NETWORK EFFICIENCY ABOVE 45
0 100 200 300 KM
I ORDER
II ORDER
III ORDER
PRIMARY
HOUSEHOLD INDUSTRY
MANUFACTURE
CONSTRUCTION
TRANSPORT
TERT'ARY
DIVERSIFIED

A FUNCTIONAL CLASSIFICATION OF URBAN CENTRES KEY

	PLUS 1S.D	PLUS 2S.D	PLUS 3S.D.
HOUSEHOLD INDUSTRIES	Ho1	Ho2	Ho3
MANUFACTURING	Mf1	Mf2	Mf3
CONSTRUCTION	Co1	Co2	Co3
TRANSPORT STORAGE & COMMUNICATION	Tr1	Tr2	Tr3
TERTIARY (TRADE,COMMERCE & OTHER SERVICES)	Tert 1	Tert 2	Tert 3
PRIMARY	Pr 1	Pr 2	Pr 3
DIVERSIFIED ---- D			

31.
MADHYA PRADESH

1. Gwalior	Mf 1
2. Datia	Ho 1 Co 1
3. Matihar	Mf 1
4. Rewa	D
5. Bedhair	Pr 3
6. Jaona	D
7. Ujjain	Mf 1
8. Indore	Mf 1
9. Mhow	Tert 2
10. Dewas	D
11. Khandwa	D
12. Nepanagar	Mf 3
13. Bhopal	D
14. Morda	D
15. Seoni-Malwa	Pr1
16. Sagar	Ho3
17. Damoh	Ho3
18. Jabalpur	D
19. Sihora	Ho1 Pr1
20. Gardarwara	D
21. Bilaspur	Tr1
22. Champa	Ho2 Pr1
23. Raipur	D

WEST BENGAL

24. Siliguri	Tr2

25.	Jalpaiguri	Tert1	UTTAR PRADESH		
26.	Cooch Behar	Tert1	46.	Kashipur	Co3
27.	Dinhata	Tert2	47.	Bijnor	Co1
28.	Banrampur	Tert1	48.	Najidabad	Co1
29.	Jigjang-Azimganj	D	49.	Chandpur	Pr1
30.	Kishnagar	Con1	50.	Moradabad	D
31.	Ranaghat	D	51.	Bilari	D
32.	Calcutta	Mf2	52.	Budaun	D
33.	Burdwan	D	53.	Rampur	Mf1
34.	Katwa	D	54.	Bareilly	D
35.	Ondal	Tr3	55.	Pilibhit	D
36.	Memari	Pr1	56.	Shahjahanpur	D
37.	Suri	Trt1	57.	Saharanpur	Mf1
38.	Rampurhat	Tr1	58.	Muzaffarnagar	D
39.	Jainthia	D	59.	Meerut	D
40.	Pubrajpur	D	60.	Hapur	D
41.	Bankura	Ho1	61.	Bulandshahr	D
42.	Bishnupur	Ho2	62.	Khurja	D
43.	Kharagpur	D	63.	Aligarh	Mf1
44.	Purulia	D	64.	Hathras	D
45.	Adra	D	65.	Mathura	D

66. Agra	D	87. Lucknow	Tert1
67. Kasganj	D	88. Raebareli	Tert1
68. Etah	Tert1	89. Bahraich	D
69. Mainpuri	Tert1	90. Balrampur	D
70. Shikohabad	D	91. Faizabad	D
71. Sirsaganj	D	92. Akbarpur	D
72. Farukhabad	D	93. Sultanpur	Tert1
73. Etawah	Mo1 Tert1	94. Bela-Pratapgarh	Tert1
74. Kanpur	Mf1	95. Basti	Tert1
75. Fatehpur	Pr1	96. Gorakhpur	Tert2
76. Allahabad	Tert1	97. Deoria	Tert1
77. Phulpur	Pr1	98. Azamgarh	Tert1
78. Jhansi	Tr2	99. Jaunpur	D
79. Mauranipur	D	100. Shahganj	Tert1
80. Orai	Tert1	101. Ghazipur	Tert1
81. Banda	D	102. Saidpur	Pr1
82. Lakhimpur	Tert1	103. Varanasi	Mo2
83. Sitapur	Tert1	104. Chandauli	D
84. Biswan	D	105. Mirzapur	D
85. Hardoz	D	106. Chunar	D
86. Unnao	Tert1		

HARYANA

107.	Ambala	D
108.	Jagadhari	Mf2
109.	Karnal	Tert1
110.	Panipat	D
111.	Thanesar	Co2 Tert1
112.	Rohtak	Tert1
113.	Sonepat	Mf1
114.	Jhaggar	D
115.	Goharia	D
116.	Gurgaon	Tert1
117.	Rewari	D
118.	Palwal	D
119.	Charki-Dadri	D
120.	Hissar	D
121.	Bhiwani	Mf2
122.	Sirsa	Tert1
123.	Hansi	Co1
124.	Mandi-Dabwali	Tert1
125.	Jakhal Mandi	Tert2
126.	Jind	D

Karnataka

127.	Hassan	D
128.	Arsikere	Tr2
129.	Holenarasipur	Pr1
130.	Channagapatna	D
131.	Shimoga	Co2
132.	Sagar	D
133.	Birur	Pr2
134.	Kadur	Co2
135.	Mandya	Co1
136.	Maddur	Pr1
137.	Srirangapatna	Pr1
138.	Belgaum	D
139.	Athani	Pr1
140.	Kannur	Pr1
141.	Bijapur	D
142.	Barawariabagwadi	Pr3
143.	Bharwar	D
144.	Godag-Betgeri	Ho1
146.	Rani Bennor	Ho1
146.	Raichur	Co1 Tr1

147. Koppal	Pr1	167. Tiruvannamalai	Co1
148. Bangalore	Mf1	168. Tirupattur	Tert1
149. Doddabalapur	Ho2 Mf2	169. Arvi	Ho2
150. Channapatna	Co1	170. Jolarpet	Tr1
151. Rnekal	Ho3 Pr1	171. Sholingur	Ho2 Pr1
152. Tumkur	D	172. Viclupuram	Tr1
153. Tiptur	Co1	173. Tindivanam	D
154. Daranagere	Mf1 Co1	174. Panruti	Tert1
155. Chitradurga	Co2	175. Vriddachalam	D
156. Kolar	Pr2	176. Tirukoilur	Tert1
157. Chikabullapur	Co1 Pr1	177. Dharmaovri	H o1
158. Bangarpet	D	178. Krishnagiri	D
159. Malur	Pr2	179. Masur	D
160. Bellary	Co1	180. Salem	Ho3
161. Horpet	Pr2	181. Tiruchengode	Ho3
162. Mysore	Co1	182. Namakkal	D
		183. Rasipuram	Ho3
TAMIL - NADU		184. Sankaridry	Ho3 Pr1
163. Madras	D	185. Coimbatore	Mf1 Co1
164. Chingleput	Tert1	186. Udumalpet	Mf1
165. Ponneri	Pr1	187. Dharapuram	Tert1
166. Walajbad	Ho1	188. Sathiyamangalam	D

189. Anamalai	Pr1	210. Terikari	Ho3
190. Madurai	Ho1 Mf1		
191. Dindigul	D	RAJASTHAN :	
192. Vsilampatti	Pr1		
193. Tiruchirapalli	D	211. Jhunjhunu	Co3
194. Padu Kottai	Co1	212. Alwar	Pr3
195. Karur	Mf1	213. Bharatpur	D
196. Manaparai	D	214. Dholpur	D
197. Thanjavur	D	215. Jaipur	D
198. Kumbakonam	Ho1	216. Sikar	Co3
199. Mayuram	Co1	217. Ajmer	D
200. Mannargudi	Co1	218. Kishanagarh	Mf1
201. Puttukkotai	D	219. Nasirabad	Tert1
202. Tiruvarur	D	220. Bijainagar	D
203. Thiruthurai Pundi	Pr1	221. Jodhpur	Pr3
204. Virudhunagar	Mf1	222. Pali	Mf2
205. Paramakudi	Ho3	223. Barmer	Tert1
206. Sivaganga	Co1 Tet1	224. Balotra	Ho1
207. Monamadurai	D	225. Udaipur	Tert1
208. Tirunelveli	Ho1	226. Chittorgarh	Pr3
209. Kovil Patty	Mf3	227. Kota	Co1

228. Jaiselmer	Tert2	247. Anand	D
229. Ganganagar	Co1	248. Godhra	D
230. Hanumangarh	Co3 Tr1	249. Dohad	Tr2
231. Bikaner	Co3	250. Vadadra	Mf1
		251. Dabhoi	Co1
GUJARAT :-		252. Ankleswar	D
		253. Surat	Mf3
232. Dwarka	Mf1	254. Bardoli	Co1 Pr1
233. Rajkot	Mf1	255. Navrasi	Mf2
234. Wankaner	Mf1	256. Valsad	Tr1
235. Jetalsar	Tr3 Pr1		
236. Dhrangadhara	Mf1		
237. Limbdi	D	ORISSA :-	
238. Junagadh	Tert1	257. Bhadrak	D
239. Gandhidham	Tr3	258. Cuttack	Tert1
240. Himatnagar	Co1		
241. Mahesana	Tr1	MAHARASHTRA :-	
242. Kalol	Mf3		
243. Ahmadabad	Mf3	259. Bombay	Mf2
244. Viramgram	Tr1	260. Thana	Mf3
245. Dholka	Mo1	261. Pannel	D
246. Nadiad	Mf1	262. Nasik	D

263.	Nandurbar	Co1	282.	Taran Taran	D
264.	Jalagaon	D	283.	Firospur	Tert1
265.	Amalner	Mf1	284.	Muktsar	D
266.	Chalisgaon	Pr1	285.	Ludhiana	Mf2
267.	Pachora	Pr1	286.	Khanna	D
268.	Parola	Mo1 Pr2	287.	Jagraon	D
269.	Akola	D	288.	Jullundur	Mf1
270.	Ahmednagar	D	289.	Nakodar	D
271.	Kasad	Co1	290.	Nawashahr	D
272.	Sangli	D	291.	Phagwara	Mf2
273.	Sholapur	Mf3	292.	Kapurthala	Mf1
274.	Kolhapur	D	293.	Patiala	Tert1
275.	Amravati	D	294.	Dhuri	D
276.	Nagpur	D	295.	Bhatinda	D
277.	Chandrapur	D	296.	Kot Kapura	D

PUNJAB :-

278.	Pathankot	Tert1	297.	Calicut	D
279.	Batala	Mf1	298.	Palghat	D
280.	Gurdaspur	Tert2	299.	Trichur	Tert1
281.	Amritsar	Mf1	300.	Cochin	D

KERALA :-

301. Alwaye	Mf1	317. Gaya	D
302. Muvattupola	D	318. Jehanabad	Pr1
303. Kottayam	D	319. Nawada	D
304. Ettumanoor	Pr1	320. Aurangabad	Co1 Tert1
305. Trivandrum	Tert1	321. Arrah	D
306. Attingal	Pr1	322. Sasaram	Mo1
		323. Buxur	Mo2
A S S A M :-		324. Chapra	D
		325. Siwan	D
307. Gavhati	Tr1	326. Bettia	D
308. Rangia	Tr1	327. Narkatiaganj	D
309. Nowgong	Tert1	328. Muzaffarpur	Tert1
310. Jorhat	D	329. Hajipur	Pr1
311. Sibsagar	Co1 Pr1	330. Darbhanga	D
312. Golaghat	Tert1	331. Madhubani	Mo3
313. Tinsukia	Tr1	332. Samastipur	Tr2
314. Karimgang	Tert1	333. Katihar	Tr2
315. Badarpur	Col Tr3	334. Purnea	D
		335. Madhopur	D
B I H A R :-		336. Ranchi	D
316. Patna	D	337. Dhanbad	Tr1
		338. Chaibasa	D

ANDHRA PRADESH :-

339. V.Bobbili	Pr1	350. Gudur	Pr1
340. Vizianagram	D	351. Renigunta	Co1 Tr3
341. Samalkot	Pr2	352. Gooty	Tr2
342. Rajahmundry	D	353. Mahbubnagar	Co1
343. Eluru	D	354. Hyderabad	D
344. Bheemavaram	Pr1		
345. Vijayawada	Co1 Tr1		
346. Gudivada	D	355. Delhi	Co1
347. Guntur	Mf1	356. Pondicherry	Mf1
348. Tenali	D	357. Chandigarh	Co1 Tert2
349. Ongole	Co3	358. Poona	Mf1

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RESIDUALS OF URBAN CENTERS WITH EFFICIENCY INDEX GREATER THAN 45.

S.No.	Name Of Urban Centre	Basic Residual	Relative Residual
1.	Gwalior	18.33	0.24
2.	Datia	- 0.09	0.00
3.	Matinar	-4.92	-0.11
4.	Rewa	-1.28	-0.03
5.	Beohair	1.38	0.03
6.	Jaona	-5.68	-0.13
7.	Ujjain	-9.68	-0.21
8.	Indore	-0.53	-0.01
9.	Mhow	-8.72	-0.19
10.	Dewas	-6.67	-0.15
11.	Khandwa	9.00	0.14
12.	Nepanagar	12.39	0.19
13.	Bhopal	-2.90	-0.05
14.	Hoshangabad	-7.22	-0.16
15.	Seoni-Malwa	-3.92	-0.09
16.	Sagar	-3.01	-0.06
17.	Damon	-1.49	-0.03
18.	Jabalpur	4.15	0.06
19.	Sinora	-1.64	-0.04
20.	Gardarwara	-6.53	-0.14

Contd...

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
21.	Bilaspur	-7.84	-0.17
22.	Champa	-2.07	-0.04
23.	Raipur	-4.50	-0.09
24.	Siliguri	1.13	0.02
25.	Jalpaiguri	0.21	0.00
26.	Cooch Bihar	3.29	0.06
27.	Dinhata	-7.76	-0.17
28.	Bauarampur	-0.97	-0.02
29.	Jiggjanj-Azimganj	3.09	0.06
30.	Krishnagar	3.05	0,05
31.	Ranaghat	7.04	0.12
32.	Calcutta	-25.73	-0.19
33.	Burdwan	8.41	0.13
34.	Katwa	12.60	0.19
35.	Ondal	-8.83	-0.19
36.	Memari	-2.38	- 0.05
37.	Suri	4.50	0.08
38.	Tampurhat	1.36	0.03
39.	Saiuthia	-6.32	-0.14
40.	Dubrajpur	-4.35	-0.10
41.	Bankura	0.11	0.00
42.	Bisnnupur	-2.91	-0.06

Contd....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
43.	Kharagpur	-4.82	-0.09
44.	Purulia	-7.91	-0.17
45.	Adra	-3.22	-0.06
46.	Kashipur	-7.39	-0.16
47.	Bijnor	16.09	0.23
48.	Najibabad	-7.25	-0.16
49.	Chandpur	-2.51	-0.05
50.	Moradabad	6.54	0.10
51.	Bilari	-5.40	-0.12
52.	Budaun	-1.87	-0.04
53.	Rampur	-9.40	-0.21
54.	Bareilly	-6.25	-0.12
55.	Pilibhit	3.31	0.06
56.	Shahjahanpur	3.67	0.06
57.	Saharanpur	-5.08	-0.10
58.	Muzaffarnagar	-3.83	-0.07
59.	Meerut	9.80	0.14
60.	Hapur	-0.52	-0.01
61.	Bulandshahr	-2.71	-0.05
62.	Khurja	-6.37	-0.14
63.	Aligarh	0.59	0.01
64.	Mathura	9.48	0.15

Contd.....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
65.	Mathura	19.33	0.26
66.	Agra	25.59	0.29
67.	Kasganj	3.66	0.06
68.	Etah	-2.13	-0.04
69.	Mainpuri	-7.51	-0.16
70.	Shikohabad	-0.71	-0.01
71.	Sirsaganj	0.25	0.00
72.	Farukhabad	-7.92	-0.17
73.	Etawah	-8.10	-0.18
74.	Kanpur	3.88	0.05
75.	Fatehpur	-2.90	-0.06
76.	Allahabad	11.50	0.16
77.	Phulpur	-2.76	-0.06
78.	Jhansi	1.35	0.02
79.	Maauranipur	-5.68	-0.12
80.	Orai	-0.65	-0.01
81.	Banda	-0.98	-0.02
82.	Lakhimpur	3.35	0.06
83.	Sitapur	-1.28	-0.02
84.	Biswan	-4.72	-0.10
85.	Hardoi	-1.25	-0.02
86.	Unnao	10.75	0.17

Contd....

S.No.	Name of Urban Centres	Basic Residual	Relative Residual
87.	Lucknow	20.86	0.24
88.	Raebareli	-1.69	-0.03
89.	Bahraich	-0.91	-0.02
90.	Balrampur	-5.25	-0.11
91.	Faizabad	-4.68	-0.10
92.	Akbarpur	7.89	0.14
93.	Sultanpur	5.42	0.09
94.	Bela-Pratapgarh	10.07	0.16
95.	Basti	-5.35	-0.12
96.	Gorakhpur	2.48	0.04
97.	Deoria	-5.94	-0.13
98.	Azamgarh	-7.41	-0.16
99.	Jaunpur	7.37	0.12
100.	Shahganj	-6.17	-0.13
101.	Ghazipur	6.29	0.11
102.	Saidpur	17.29	0.27
103	Varanasi	12.76	0.17
104.	Chandauli	-3.59	-0.08
105.	Mirzapur	-5.50	-0.12
106.	Chunar	-2.58	-0.05
107.	Ambala	12.70	0.18
108.	Jagadhari	-1.24	-0.02

Contd.....

SL. NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
109.	Karnal	-1.86	-0.04
110.	Panipat	9.54	0.15
111.	Thanesar	-6.91	-0.15
112.	Rohtak	2.40	0.04
113.	Sonepat	-7.50	-0.16
114.	Jhaggar	-4.27	-0.09
115.	Goharia	-5.76	-0.13
116.	Gurgaon	-3.12	-0.06
117.	Rewari	14.85	0.22
118.	Palwal	-0.49	-0.01
119.	Charknidadri	14.85	0.22
120.	Hissar	3.79	0.07
121.	Bhiwani	-7.70	-0.17
122.	Sirsa	-7.44	.0.16
123.	Hansi	-0.60	-0.01
124.	Mandi-Dabwali	3.26	0.06
125.	Jauhal Mandi	-7.00	-0.15
126.	Jind	-1.32	-0.03
127.	Hassan	8.73	0.14
128.	Arsikore	-2.75	-0.05
129.	Nolenarasipur	-3.66	-0.08
130.	Channargapatna	-4.70	-0.10

Contd....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
131.	Shimoga	-8.30	-0.18
132.	Sagar	-8.30	-0.18
133.	Birur	-1.64	-0.04
134.	Kadur	-5.10	-0.11
135.	Mandya	9.76	0.16
136.	Maddur	3.72	0.07
137.	Srirangapatna	-2.62	-0.06
138.	Belgaum	-1.87	-0.03
139.	Athani	2.32	0.05
140.	Kannur	-1.54	-0.03
141.	Bijapur	1.92	0.03
142.	Barawariabagwadi	9.03	0.18
143.	Dharwar	-6.37	-0.12
144.	Godag•Betgeri	-6.84	-0.15
145.	Ranibennur	1.34	0.03
146.	Raichur	-3.11	-0.06
147.	Koppal	2.65	0.05
148.	Bangalore	25.23	0.25
149.	Doddabalapur	-6.50	-0.14
150.	Channapatna	-6.73	-0.15
151.	Aneual	-2.91	-0.06
152.	Tumkur	3.28	0.06

Contd.....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
153.	Tiptur	-8.25	-0.18
154.	Daranagere	-3.82	-0.07
155.	Chitradurga	-8.19	-0.18
156.	Kolar	10.26	0.17
157.	Chikaballapur	-3.83	-0.08
158.	Bangarpet	-2.21	-0.04
159.	Malur	-1.23	-0.03
160.	Bellary	1.44	0.03
161	Korpet	-2.15	-0.05
162.	Mysore	3.80	0.06
163.	Madras	-2.96	-0.03
164.	Chingleput	-2.59	-0.05
165.	Ponneri	2.12	0.04
166.	Walajbad	-4.99	-0.11
167.	Tiruvannamali	9.03	0.15
168.	Tirupattur	-2.46	-0.05
169.	Arvi	4.58	0.08
170.	Jolarpet	-3.77	-0.08
171.	Sholingur	-2.13	-0.05
172.	Villvpuram	21.07	0.28
173.	Tindivanam	-5.76	-0.13
174.	Panruti	-7.18	-0.16

Contd....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
175.	Vriddachalam	6.01	0.11
176.	Tirukoilur	-0.55	-0.01
177.	Dharmapuri	-5.93	-0.13
178.	Krishnagiri	-6.92	-0.15
179.	Hosur	-3.84	-0.08
180.	Salem	12.31	0.18
181.	Tiruchengode	-6.43	-0.14
182.	Namakkal	-8.26	-0.18
183.	Rasipuram	-5.02	-0.11
184.	Sankariory	-1.58	-0.03
185.	Coimbatore	10.84	0.14
186.	Udumalpet	-1.96	-0.04
187.	Dharapuram	-1.74	-0.03
188.	Sathiyamangalam	-4.64	-0.10
189.	Anamalai	-2.73	-0.06
190.	Madurai	29.30	0.31
191.	Dindigul	7.95	0.13
192.	Vellampatti	-2.33	-0.05
193.	Tiruchirapalli	29.54	0.33
194.	Pudukottai	2.57	0.05
195.	Karur	-1.74	-0.03
196.	Manaparai	-5.14	-0.11

Contd....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
197.	Thanjavur	13.60	0.20
198.	Kumbaonam	2.18	0.04
199.	Mayuram	3.19	0.06
200.	Mannargudi	-1.52	-0.03
201.	Puttvuuotai	0.42	0.01
202.	Tiruvarur	12.69	0.20
203.	Thirutnuraipundi	-3.04	-0.07
204.	Virudhunagar	3.40	0.06
205.	Paramakudi	-7.04	-0.15
206.	Sivaganga	-7.21	-0.16
207.	Monamadurai	0.27	0.01
208.	Tirunelveli	-4.37	-0.08
209.	Kovilpatty	-2.14	-0.04
210.	Terikari	0.55	0.01
211.	Jhunjhunu	3.90	0.07
212.	Alwar	8.26	0.16
213.	Bharatpur	-2.84	-0.06
214.	Dholpur	-0.62	-0.01
215.	Jaipur	23.27	0.27
216.	Sikar	2.28	0.04
217.	Ajmer	-4.85	-0.10
218.	Kishanagarh	-7.03	-0.15

Contd.....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
219.	Nasirabad	3.69	0.07
220.	Bijainagar	-6.61	-0.15
221.	Jodhpur	10.02	0.20
222.	Pali	.7.71	-0.17
223.	Barmer	-6.92	-0.15
224.	Balotra	6.84	0.12
225.	Udaipur	8.30	0.13
226.	Chittorgarh	5.58	0.12
227.	Kota	-0.56	0.01
228.	Jaiselmer	-7.31	-0.16
229.	Ganganagar	-2.79	-0.05
230.	Hanumangarh	-2.22	-0.04
231.	Bikaner	-10.83	0.16
232.	Dwarka	-4.50	-0.10
233.	Rajkot	-3.79	-0.07
234.	Jamkaner	-7.33	-0.16
235.	Jetalser	-2.16	0.04
236.	Dhrangadhara	-6.24	-0.13
237.	Limbdi	-0.68	-0.01
238.	Junagadh	-3.80	-0.07
239.	Gandhidham	-8.94	-0.19
240.	Himatnagar	-2.50	-0.05

Contd.....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
241.	Mahesane	15.90	0.23
242.	Kalol	-6.80	-0.15
243.	Ahmadabad	16.23	0.17
244.	Viramgram	-1.11	-0.02
245.	Dholka	-4.50	-0.10
246.	Nadiad	-3.64	-0.07
247.	Anand	-0.57	-0.01
248.	Godhra	3.41	0.06
249.	Dohad	-6.05	-0.13
250.	Vadadara	17.78	0.23
251.	Dabhoi	-3.43	-0.07
252.	Anklesvar	2.68	0.05
253.	Surat	-8.45	-0.16
254.	Bardoli	2.49	0.05
255.	Navrasi	3.69	0.06
256.	Valsad	-7.85	-0.17
257.	Bhadrak	-4.63	-0.10
258.	Cuttack	-2.80	-0.05
259.	Bombay	-10.74	-0.08
260.	Thana	-2.18	-0.04
261.	Pannel	4.84	0.08
262.	Nasik	-2.73	-0.05

Contd.....

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
263.	Nandurbar	-6.33	-0.14
264.	Jalagaon	-1.01	-0.02
265.	Amalner	-5.15	-0.11
266.	Chalisgaon	-3.78	-0.08
267.	Pachora	-3.38	-0.07
268.	Parola	0.09	0.00
269.	Akola	2.51	0.04
270.	Ahmednagar	-9.60	-0.21
271.	Kasad	-7.25	-0.16
272.	Sangli	-8.73	-0.19
273.	Sholapur	-1.54	-0.03
274.	Kolhapur	-5.43	-0.11
275.	Amaravati	-9.54	-0.21
276.	Nagpur	1.69	0.02
277.	Chandrapur	-3.34	-0.07
278.	Pathankot	2.00	0.04
279.	Batala	15.75	0.23
280.	Gurdaspur	-1.89	-0.04
281.	Amritsar	42.00	0.41
282.	Taran Taran	-7.34	-0.16
283.	Firozpur	13.27	0.20
284.	Muktsar	-4.76	-0.10

Contd...

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
285.	Ludhiana	-25.83	-0.77
286.	Khanna	-7.32	-0.16
287.	Jagraon	-5.11	-0.11
288.	Jullundur	0.30	0.01
289.	Nakodar	0.37	0.01
290.	Nawashanr	-6.26	-0.14
291.	Phgwara	-6.62	-0.14
292.	Kapurthala	-7.87	-0.17
293.	Patiala	-9.90	-0.22
294.	Dhuri	4.85	0.08
295.	Bhatinda	16.14	0.23
296.	Kotkapura	1.48	0.03
297.	Calicut	3.56	0.06
298.	Palghat	10.53	0.17
299.	Trichur	-8.31	-0.18
300	Cochin	-14.46	-0.32
301.	Alwaye	-7.56	-0.17
302.	Muvattupula	-6.38	-0.14
303.	Kottayam	-4.32	-0.09
304.	Ettumanoor	-2.26	-0.05
305.	Trivandrum	-8.51	-0.17
306.	Attingal	-3.45	-0.08

Contd...

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
307.	Gauhati	8.58	0.13
308.	Rangia	-2.29	-0.04
309.	Nowgong	-2.11	-0.04
310.	Jurhat	18.89	0.26
311.	Sibsagar	7.60	0.13
312.	Golaghat	-1.43	-0.03
313.	Tinsukia	-8.40	-0.18
314.	Karimganj	-5.63	-0.12
315.	Badarpur	-4.81	-0.10
316.	Patna	8.94	0.13
317.	Gaya	23.97	0.30
318.	Jehanabad	-3.09	-0.07
319.	Nawada	-6.17	-0.13
320.	Aurangabad	-2.21	-0.04
321.	Arrah	3.55	0.06
322.	Sasaram	4.02	0.07
323.	Buxur	-6.90	-0.15
324.	Chapra	1.05	0.02
325.	Siwan	4.34	0.08
326.	Bettiah	-1.39	-0.03
327.	Narkatiaganj	0.08	0.00
328.	Muzaffarpur	2.81	0.05

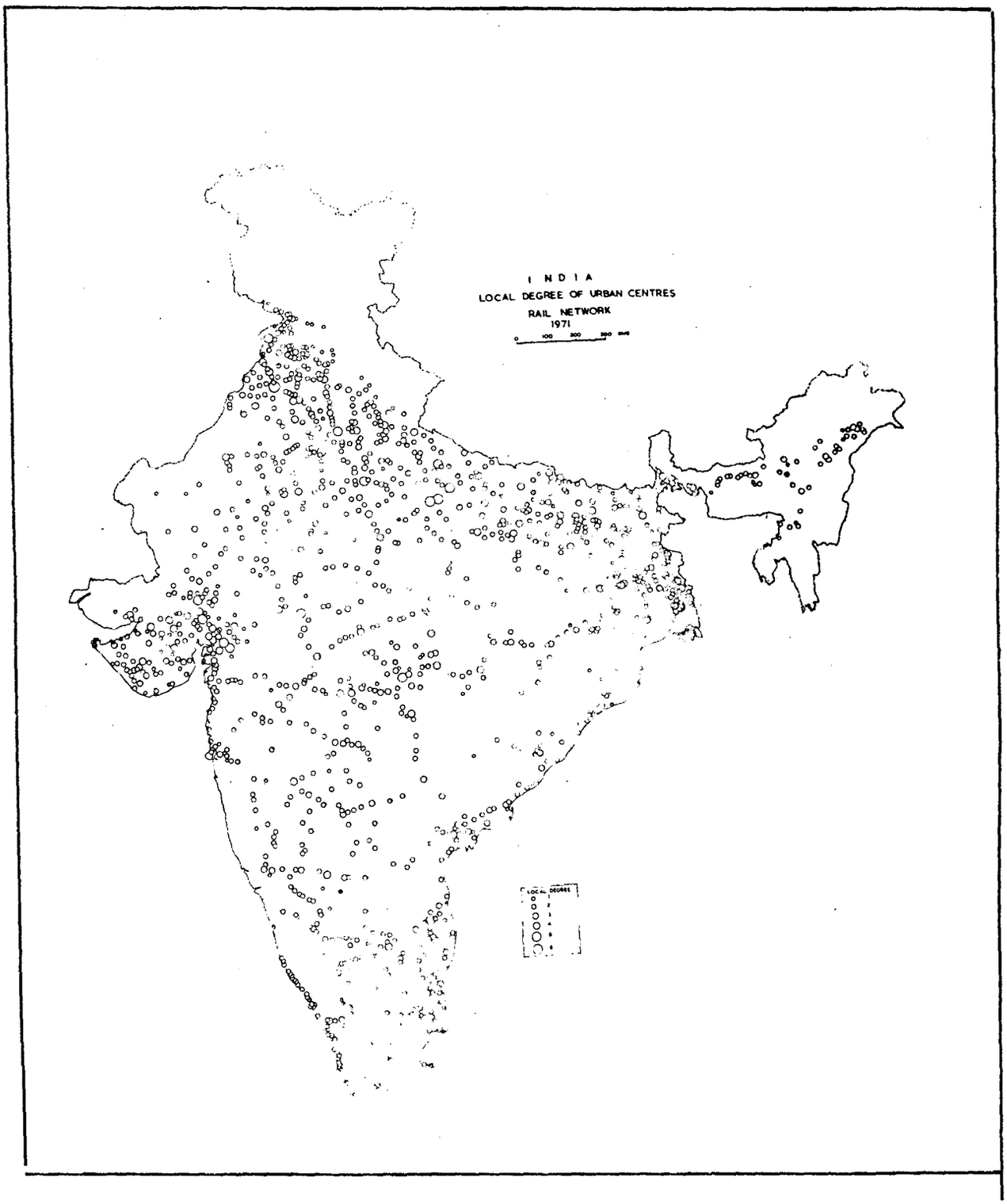
Contd...

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
329.	Hajipur	8.98	0.15
330.	Darbhanga8	-3.02	-0.06
331.	Madhubani	-0.75	-0.01
332.	Samastipur	10.48	0.16
333.	Katihar	-7.94	-0.17
334	Purnea	-4.52	-0.10
335.	Madhupur	-4.85	-0.11
336.	Ranchi	10.48	,0.16
337	Dhanbad	6.72	0.10
338.	Chaibasa	-8.00	-0.18
339.	V. Bobbili	-1.61	-0.04
340.	Vizianagram	-2.59	-0.05
341.	Jamalkot	1.19	0.02
342.	Rajammundry	-2.31	-0.04
343.	Eluru	-2.11	-0.04
344.	Bheemavaram	-4.07	-0.09
345.	Vijayawada	-4.66	-0.09
346.	Gudivada	-5.18	-0.11
347.	Guntur	11.79	0.17
348.	Tenali	2.00	0.04

Contd..

S.NO.	NAME OF URBAN CENTRE	BASIC RESIDUAL	RELATIVE RESIDUAL
349.	Ongole	-7.80	-0.17
350.	Gudur	-3.31	-0.07
351.	Renigunta	-0.60	-0.01
352.	Gooty	0.77	0.02
353.	Mahbubnagar	-6.18	-0.14
354.	Hyderabad	40.09	0.34
355.	Delhi	-0.61	-0.01
356.	Pondicherry	-9.27	-0.21
357.	Chandigarh	-9.04	-0.19
358.	Poona	-8.54	-0.14

Contd...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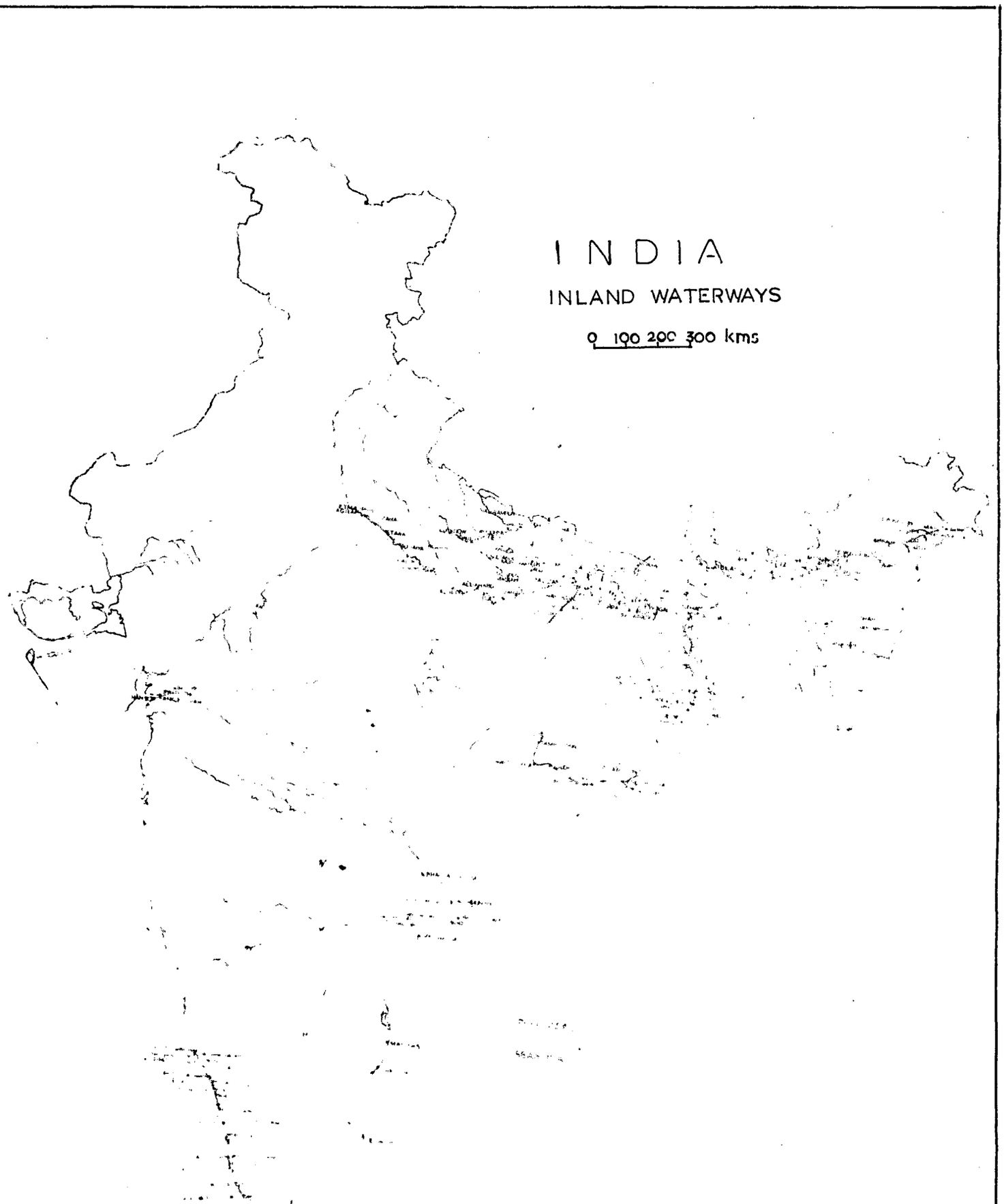
LOCAL DEGREE OF URBAN CENTRES
RAIL NETWORK
1971
0 100 200 300 KMS
LOCAL DEGREE


INDIA
INLAND WATERWAYS
0 100 200 300 kms

ANNEXURE

CONNECTIVITY INDEX OF URBAN CENTRES

S.No.	Urban Centres	Connectivity Index	S.No.	Urban Centres	Connectivity Index
1.	Ganganagar	57.2	20	Rajgarh	40.1
2.	Hanumangarh	51.6	21.	Sunargarh	40.0
3.	Suratgarh	51.5	22.	Rajaldesar	23.2
4.	Nohar	39.8	23.	Taranagar	17.4
5.	Bhadra	39.8	24.	Bidasar	1.0
6.	Sargaria	34.2	25.	Chhapar	17.8
7.	Karanpur	23.0	26.	Ratannagar	11.8
8.	Raisingnagar	39.8	27.	Jhunjhunu	51.6
9.	Sadulshahar	23.0	28.	Nawalgarh	34.2
10.	Mandi Adampur	23.0	29.	Chirawa	28.6
11.	Gajsingh Pura	28.6	30.	Udaipur	22.9
12.	Bikaner	28.7	31.	Bissau	23.0
13.	Noah Mandi	11.8	32.	Mukendgarh	23.0
14.	Napasar	23.0	33.	Mandawa	34.1
15.	Lasnoka	23.0	34.	Surajgarh	11.8
16.	Churu	40.1	35.	Khetri	22.9
17.	Sriyangarh	28.6	36.	Bagra	5.6
18.	Sardarshahar	28.3	37.	Alwar	51.0
19.	Ratangarh	40.1	38.	Rajgarh	39.9

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
39.	Khairthal	23.0	61.	Kotputli	17.1
40.	Kherli	28.6	62.	Chatsu	34.2
41.	Bharatpur	51.2	63.	Jabner	11.8
42.	Dholpur	51.0	64.	Sikar	57.1
43.	Deef	22.8	65.	Fatehpur	28.8
44.	Bari	38.4	66.	Lachhamangarh	23.2
45.	Kaman	22.6	67.	Ramgarh	22.6
46.	Bayana	40.4	68.	Khndela	17.8
47.	Raja Khera	11.8	69.	Neem-Ka-Thana	22.8
48.	Weir	12.5	70.	Sri Madhopur	23.0
49.	Nadbai	16.8	71.	Ajmer	51.5
50.	Gangapur	40.0	72.	Bewar	51.2
51.	Karauli	22.9	73.	Kishngarh	45.6
52.	Sawai Madhopur	45.9	74.	Nasirabad	56.8
53.	Tadabhum	11.6	75.	Kekri	28.4
54.	Hindaun	34.4	76.	Bijainagar	45.4
55.	Jaipur	85.9	77.	Sareni	28.6
56.	Chamun	40.0	78.	Pushkar	24.2
57.	Daura	40.0	79.	Jaiselmer	45.3
58.	Sambhar	23.0	80.	Pokaran	28.5
59.	Bandikui	28.9	81.	Tonk	22.9
60.	Phulera	40.4	82.	Malpura	34.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
83.	Devli	28.4	104.	Sojat Road	23.0
84.	Todaraising	28.3	105.	Barmer	45.6
85.	Nawai	11.8	106.	Balotra	56.9
86.	Uniara	11.7	107.	Jalor	28.6
87.	Jodhpur	61.5	108.	Bhinmal	34.2
88.	Bilara	22.7	109.	Abu Road	34.2
89.	Phalodi	40.0	110.	Sirohi	22.9
90.	Pipar	23.0	111.	SheoGanj	11.8
91.	Nagaur	51.0	112.	Mount Abu	12.1
92.	Ladau	28.6	113.	Pindwara	34.2
93.	Makrana	34.5	114.	Bhilwara	39.8
94.	Didwana	45.4	115.	Shahpura	28.3
95.	Kuchaman	18.0	116.	Gangapur	17.1
96.	Merda	39.5	117.	Jahazpur	17.0
97.	Nokha	28.6	118.	Udaipur	63.7
98.	Parbatsar	22.7	119.	Nathwara	40.4
99.	Pali	45.4	120.	Rajsamand	12.4
100.	Sojat	23.6	121.	Bhindor	23.0
101.	Sadri	22.4	122.	Salumbar	33.8
102.	Bali	23.5	123.	Deogarh	28.8
103.	Sumerpur	N.A.	124.	Chihosgarh	45.7

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
125.	Pratapgarh	22.6	138.	Keshoraipatan	1.8
126.	Nimbatera	34.2	139.	Kota	57.2
127.	Kapasam	34.7	140.	Basan	40.0
128.	Chhoti Sadri	16.8	141.	Ramganj Mandi	23.2
129.	Bari Sadri	17.1	142.	Chhabra	12.0
130.	Begun	6.1	143.	Chhipabasod	5.6
131.	Dungarpur	22.4	144.	Indergarh	28.8
132.	Sagwara	17.1	145.	Jhalwara	17.0
133.	Banswara	28.2	146.	Jhalrapatan	11.4
134.	Kushal Garh	16.9	147.	Bhawani Mandi	17.6
135.	Bundi	22.9	148.	Sovel	11.2
136.	Lakheri	28.8	149.	Pirawa	11.6
137.	Nainwa	12.0			

Contd...

U T T A R P R A D E S H

CONNECTIVITY INDEX OF URBAN CENTRES

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
150.	Uttar Kashi	5.71	169.	Kashipur	45.7
151.	Chamoli	14.20	170.	Jaspur	34.0
152.	Joshimath	5.65	171.	Nainital	17.3
153.	Badrinathpuri	.05	172.	Ramnagar	33.9
154.	Tehri	11.36	173.	Bazpur	28.9
155.	Narendra Nagar	23.2	174.	Tanakpur	17.0
156.	Rudraprayag	16.9	175.	Bhowali	11.7
157.	Muni-Ki-Reti	23.0	176.	Bijnor	68.5
158.	Kotowara	23.0	177.	Najibabad	46.0
159.	Pausi	11.36	178.	Nagina	34.4
160.	Lansdowne	17.28	179.	Chandpur	33.6
161.	Srinagar	16.96	180.	Kiratpur	11.2
162.	Dogadda	11.5	181.	Seohara	22.4
163.	Bah Bazar	7.2	182.	Dhampur	28.0
164.	Pithogarh	22.5	183.	Nehtapur	11.2
165.	Almora	28.3	184.	Afzalgarh	16.8
166.	Ranikhet	22.5	185.	Kotdwara	15.8
167.	Bageshwar	22.5	186.	Najpur	11.2
168.	Kadwani	39.8	187.	Moradabad	28.0

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
188.	Sambhal	22.4	210.	Nawabganj	34.5
189.	Amroha	28.0	211.	Pilibhit	57.2
190.	Chandausi	22.4	212.	Biralpur	34.2
191.	Hakimpur	5.6	213.	Puranpur	34.2
192.	Kanth	11.2	214.	Shahjahanpur	57.4
193.	Bilari	28.0	215.	Tilhar	29.0
194.	Bahjoi	16.8	216.	Jalalabad	22.9
195.	Thakurdwara	22.4	217.	Powayan	28.5
196.	Dhanari	11.2	218.	Roza	35.2
197.	Rustamnagar	11.2	219.	Dehradun	32.0
198.	Sahaspur	N.A.	220.	Mussorie	11.5
199.	Budaun	39.2	221.	Rishikesh	28.4
200.	Sahaswan	11.2	222.	Vikasnagar	11.4
201.	Uzhani	16.8	223.	Chakrata-Cantt.	17.0
202.	Bitrai	16.8	224.	Raipur	11.68
203.	Dataganj	16.8	225.	Landour	11.8
204.	Rampur	45.8	226.	Saharanpur	51.6
205.	Tanda	17.8	227.	Hardwar	40.0
206.	Bareilly	52.1	228.	Roorkee	28.8
207.	Aonir	23.2	229.	Deoband	34.4
208.	Baheri	34.2	230.	Gangoh	17.3
209.	Faridpur	29.0	231.	Mangloor	11.7

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
232.	Rampur-Saniharan	12.6	254.	Kaila	5.6
233.	Raipur	12.4	255.	Hastinapur	5.6
234.	Nakur	12.4	256.	Faridnagar	11.68
235.	Muzaffarnagar	51.2	257.	Aminagar Sarai	5.6
236.	Shamli	34.0	258.	Rusulpur	N.A.
237.	Kairana	22.7	259.	Bulandshahr	51.2
238.	Khatauli	40.0	260.	Khurja	4.6
239.	Kandhla	22.7	261.	Sikandra Rao	34.4
240.	Miranpur	29.6	262.	Jahangirabad	22.4
241.	Jansath	23.1	263.	Gulaothi	23.2
242.	Meerut	68.4	264.	Debai	11.2
243.	Hapur	52.2	265.	Shikarpur	16.8
244.	Modinagar	34.3	266.	Siana	17.6
245.	Baraut	34.0	267.	Dadri	12.0
246.	Mawana	28.4	268.	Anupshahar	11.2
247.	Pilkuwa	29.0	269.	Bujrasi	11.6
248.	Sardhana	22.9	270.	Dankaur	23.2
249.	Kankerkera	23.2	271.	Panasu	13.6
250.	Muradnagar	28.8	272.	Aligarh	57.2
251.	Baghpat	28.7	273.	Mathras	63.4
252.	Malyana	12.16	274.	Atrauli	34.4
253.	Garh-Mak-Teshwar	12.16	275.	Sikandrarao	34.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
276.	Jasni	23.2	298.	Aliganj	28.7
277.	Mursan	23.0	299.	Mainpuri	45.7
278.	Mathura	74.8	300.	Shikohabad	51.8
279.	Virandaban	28.8	301.	Sirsaganj	51.4
280.	Korikalan	29.0	302.	Bhangaon	23.2
281.	Govardhan	11.2	303.	Kuraoli	28.6
282.	Jadabad	29.0	304.	Kashal	28.8
283.	Baldeo	29.0	305.	Bewar	29.0
284.	Agra	88.6	306.	Faruknabad	45.8
285.	Ferozabad	40.2	307.	Kannauj	39.8
286.	Fatehpursikri	34.4	308.	Chhibramau	11.9
287.	Achhnera	23.2	309.	Kamganj	34.2
288.	Shamsabad	22.4	310.	Etawah	45.8
289.	Etmadpur	23.4	311.	Auraiya	29.7
290.	Fatehbad	18.5	312.	Bharthana	23.2
291.	Bah	29.7	313.	Jaswantnagar	34.6
292.	Kasganj	56.9	314.	Lakshora	N.A.
293.	Etah	50.8	315.	Kanpur	76.3
294.	Jalesar	40.0	316.	Pukhrayan	35.6
295.	Ganjdundwana	39.8	317.	Fatehpur	45.8
296.	Sarora	23.0	318.	Binoki	40.2
297.	Marehra	17.6	319.	Allahabad	72.1

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
320.	Phulpur	45.6	342.	Maudapa	40.0
321.	Manura	34.6	343.	Banda	51.2
322.	Bharatganj	25.2	344.	Chikrutdham	28.8
323.	Sirsa	25.2	345.	Atarra	23.2
324.	Jhansi	57.9	346.	Manikpur	34.8
325.	Lalitpur	40.2	347.	Rajapur	19.3
326.	Mauranipur	45.6	348.	Lakhimpur	56.6
327.	Babina Cantt.	34.6	349.	Gola Gokarannath	39.8
328.	Samthar	28.5	350.	Mohammadi	22.8
329.	Gursarai	33.8	351.	Kheri	28.6
330.	Chirgaon	23.4	352.	Sitapur	52.3
331.	Ranipur	28.8	353.	Laharpur	29.4
332.	Talbehat	34.6	354.	Biswan	45.4
333.	Mansarigird	12.2	355.	Khairabad	34.4
334.	Orai	51.4	356.	Mahmudabad	17.4
335.	Kanch	39.6	357.	Neemsar-Misrikh	23.2
336.	Kalpi	41.2	358.	Hardoi	51.2
337.	Jalaun	44.8	359.	Shahabad	28.8
338.	Mahoba	40.0	360.	Sandila	34.4
339.	Rath	22.6	361.	Dihari	17.6
340.	Charkhari	28.7	362.	Bilgram	23.4
341.	Hamirpur	35.4	363.	Sandi	11.3

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
364.	Madhoganj	23.2	387.	Gorainganj	28.8
365.	Unnao	64.0	388.	Sultanpur	59.6
366.	Lucknow	86.6	389.	Bela Pratapgarh	62.8
367.	Malihabad	28.0	390.	Basti	45.6
368.	Raebareli	51.6	391.	Khalilabad	N.A.
369.	Jais	40.0	392.	Bansi	28.3
370.	Bahraich	51.0	393.	Gorakhpur	59.4
371.	Nanpara	40.1	394.	Barhalganj	11.3
372.	Bangain	35.2	395.	Deoria	45.6
373.	Gonda	40.4	396.	Padrauna	28.6
374.	Balrampur	46.4	397.	Gansa Barhaj	24.7
375.	Utraula	29.5	398.	Siwarhi	12.2
376.	Colonelganj	34.2	399.	Maunath Bhanyan	40.3
377.	Tulsipur	34.2	400.	Azamgarh	45.4
378.	Nawabganj	34.2	401.	Mubarakpur	23.4
379.	Rudauli	31.0	402.	Kopaganj	40.0
380.	Taidpur	23.4	403.	Muhammadebad	39.8
381.	Fatehpur	34.2	404.	Jaunpur	59.1
382.	Rampur	12.2	405.	Shahganj	45.9
383.	Faizabad	48.2	406.	Mogra Badshahpur	N.A.
384.	Tonda	30.4	407.	Machhlishahr	23.2
385.	Jalalpur	23.1	408.	Mariahu	14.0
386.	Akbarpur	57.2	409.	Kerakat	23.0

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
410.	Ballia	36.2	424.	Gyanpur	11.3
411.	Rasra	39.8	425.	Mirzapur	47.8
412.	Reoti	23.0	426.	Obra	11.3
413.	Ghazipur	58.8	427.	Ahraura	23.0
414.	Muhammadabad	23.0	428.	Renukoot	23.2
415.	Saidpur	65.0	429.	Chundar	48.2
416.	Varanasi	74.6	430.	Churkghurma	28.8
417.	Bhadohi	34.4	431.	Kahhwa	34.6
418.	Ramnagar	26.2	432.	Robertsganj	40.0
419.	Maruadih	23.4	433.	Pipri	11.7
420.	Goriganj	34.6	434.	Dudhi	17.5
421.	Chakia	34.2	435.	Chopan	23.2
422.	Lohta	N.A.	436.	Markundi	N.A.
423.	Chandauli	45.8			

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CONNECTIVITY INDEX OF URBAN CENTRES

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
437.	Tellichery	36.3	458.	Mokkam	N.A.
438.	Cannandre	44.1	459.	Ponnani	15.7
439.	Kasargod	42.1	460.	Tirur	28.8
440.	Kanhangab	23.4	461.	Malappuram	34.2
441.	Payyannur	36.6	462.	Mangeri	39.6
442.	Nileshwar	31.0	463.	Perintalamanna	34.6
443.	Pāppinisseri	31.0	464.	Palghat	62.9
444.	Taliparamba	34.6	465.	Chittur-Thath-Amangalam	34.2
445.	Mangesawar	29.0			
446.	Kuttuparamba	15.7	466.	Ottapalam	28.8
447.	Kumbla	29.0	467.	Shoranur	40.8
448.	Valapattanam	25.4	468.	Nemmara	28.7
449.	Calicut	60.9	469.	Kanharghat	17.2
450.	Badagara	44.1	470.	Pattambi	34.4
451.	Feroke	34.6	471.	Trkhur	45.9
452.	Beypore	25.4	472.	Chalakudy	40.2
453.	Patalayani	25.4	473.	Chowghat	19.6
454.	Cherurannur	25.4	474.	Ollur	19.6
455.	Kunnamangalam	N.A.	475.	Irinjalekuda	36.4
456.	Kadalundi	34.6	476.	Kunnal-Kulam	2 .9
457.	Elatnur	29.0	477.	Guruvayur	19.8

Sl. No.	Urban Centers	Connectivity Index
478.	Pazhanhi	23.4
479.	Vadakkancherry	28.8
480.	Cochin	45.8
481.	Trippunithura	23.0
482.	Parur	25.6
483.	Alwaye	45.8
484.	Muvattupula	45.3
485.	Perambavour	40.2
486.	Thodupuzha	23.0
487.	Eloor	19.6
488.	Njarakkal	14.2
489.	Angamaly	40.2
490.	Kathemangalam	N.A.
491.	Kottayam	47.4
492.	Changanachery	34.2
493.	Palai	34.3
494.	Vaikom	34.2
495.	Ettumanoor	45.4
496.	Ponkumnam	17.2
497.	Munnar	21.4
498.	Alleppey	21.4
499.	Kayankulam	42.0
500.	Mosipad	25.2
501.	Thiruvalla	23.0
502.	Manclikkora	39.8
503.	Chengunnur	28.6
504.	Pandalam	23.0
505.	Quilon	44.2
506.	Punalur	34.2
507.	Kundara	39.8
508.	Trivandrum	49.2
509.	Attingal	45.6
510.	Nemom	25.8
511.	Neyyattinkara	34.8
512.	Varkala	30.6
513.	Nedumangad	25.8
514.	Kovalam	21.4
515.	Kazhakkuttam	36.4
516.	Chirayamkil	25.0

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CONNECTIVITY INDEX OF URBAN CENTRES

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
517.	Pathankot	56.7	539.	Malout	40.3
518.	Batala	68.6	540.	Giddarbata	34.6
519.	Gurdaspur	51.4	541.	Jalalabad	34.4
520.	Qadian	18.2	542.	Zira	28.7
521.	Sujanpur	40.2	543.	Dharamkot	22.9
522.	Dina Nagar	34.6	544.	Talwandi Bhai	6.1
523.	Dharival	23.0	545.	Tankonwali	23.2
524.	Fatehgarh Chaurian	22.9	546.	Ludhina	63.4
525.	Dera Babananak	34.0	547.	Khanna	45.8
526.	Sri Hargovindpur	17.2	548.	Jagraon	45.6
527.	Amritsar	102.2	549.	Raikot	34.8
528.	Taranteran	45.8	550.	Jamrola	40.4
529.	Kharkaran	11.6	551.	Doraha	29.0
530.	Patti	34.4	552.	Jullundur	57.9
531.	Jandiala	34.6	553.	Nakodar	51.6
532.	Nagitua	18.3	554.	Nawashahr	46.0
533.	Nandas	12.0	555.	Kartarpur	34.6
534.	Mona	40.0	556.	Banga	34.4
535.	Abohar	40.3	557.	Phillaur	40.6
536.	Firozpur	65.2	558.	Nurmahal	34.4
537.	Muktsar	45.4	559.	Adampur	23.2
538.	Fazilka	28.9	560.	Rahori	34.0

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
561.	Goraga	23.2	585.	Sirnind	40.6
562.	Alwalpur	23.2	586.	Bassi	34.6
563.	Phagwara	46.2	587.	Jenaur	11.8
564.	Kapurthala	45.9	588.	Gobindgarh	29.0
565.	Sultanpur	40.4	589.	Dera Bassi	NA
566.	Hoshiarpur	39.6	590.	Banur	34.6
567.	Talwara	12.16	591.	Amloh	18.0
568.	Urmarlande	12.1	592.	Malerkotla	40.0
569.	Mukerian	34.6	593.	Sangrur	40.0
570.	Daruya	29.0	594.	Barnala	40.0
571.	Garh Shanker	34.4	595.	Sunam	28.8
572.	Haryana	18.0	596.	Dhuri	57.6
573.	Gardhiwala	11.6	597.	Ahmedgarh	23.2
574.	Shamchaurasi	17.6	598.	Dhanaula	17.6
575.	Nangal	24.8	599.	Longawal	11.8
576.	Ropar	29.0	600.	Bhadaur	28.4
577.	Kharar	28.9	601.	Lehragaga	23.2
578.	Kurali	34.6	602.	Tapa	23.2
579.	Murinda	40.0	603.	Bhawanigarh	28.7
580.	Anandpur Sahib	17.6	604.	Bhatinda	69.0
581.	Patiala	45.6	605.	Kotkapura	52.0
582.	Nabha	40.0	606.	Mansa	23.2
583.	Rajpura	40.6	607.	Faridkot	40.0
584.	Samana	6. 8	608.	Rampuraphul	34.4

Sl. No.	Urban Centers	Connectivity Index
609.	Jaitumandi	44.2
610.	Maurmandi	12.0
611.	Budhlada	28.8
612.	Ramarimandi	12.4
613.	Daretamandi	23.2
614.	Gonianamandi	34.6
615.	Kot Fateh	28.8
616.	Bangot	28.8
617.	Bhuchomandi	34.6

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G U J A R A T

CONNECTIVITY INDEX OF URBAN CENTRES

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
618.	Jamnagar	44.4	636.	Jasdan	22.7
619.	Khambhaliya	34.5	637.	Jetalser	51.8
620.	Dwarka	47.3	638.	Vinchhiya	23.0
621.	Jamjodpur	28.0	639.	Paddhasi	23.0
622.	Mithapur	23.0	640.	Tankara	10.8
623.	Bhanvad	23.0	641.	Surendranagar	40.4
624.	Sikka	7.8	642.	Dharangdhara	46.2
625.	Jalaya	7.8	643.	Limbdi	51.2
626.	Kalavad	17.28	644.	Thangadh	40.1
627.	Dhrol	34.2	645.	Halvad	23.2
628.	Okha Post	19.0	646.	Patdi	28.6
629.	Jodiya	7.8	647.	Lakhtor	34.2
630.	Lalpur	23.0	648.	Sayla	28.8
631.	Bept	2.5	649.	Chotila	22.9
632.	Rajkot	54.0	650.	Khraghoda	5.9
633.	Mosbi	50.4	651.	Bhavnagar	32.1
634.	Upeleta	40.0	652.	Botad	34.8
635.	Wankaner	45.9	653.	Polistara	22.7

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
654.	Sihor	28.9	674.	Porbandar	36.0
655.	Gadhade	22.7	675.	Junagadh	51.3
656.	Garidnor	17.3	676.	Veraval	30.5
657.	Talaja	30.1	677.	Una	34.2
658.	Vallbhipur	17.7	678.	Keshod	28.6
659.	Ghogha	13.8	679.	Bantwa	28.6
660.	Vartej	13.8	680.	Vanthali	23.0
661.	Paliyad	30.4	681.	Manavadar	23.0
662.	Umrale	23.0	682.	Kutiyana	23.0
663.	Bagasa	33.9	683.	Ranavar	28.8
664.	Kodinar	28.3	684.	Viravadar	28.9
665.	Rajula	33.9	685.	Jhapur	17.7
666.	Dhasi	28.6	686.	Bilkha	11.8
667.	Lathi	23.0	687.	Adityana	N.A.
668.	Babre	24.8	688.	Merdarda	17.7
669.	Chalala	34.2	689.	Malia	17.4
670.	Jafrabad	17.2	690.	Talala	34.5
671.	Damnagar	34.2	691.	Delvoda	22.7
672.	Vadia	23.0	692.	Bhuj	36.2
673.	Dungar	28.9	693.	Gandhidham	46.4

Sl. No.	Urban Centres	Connectivity Index	Sl. No.	Urban Centres	Connectivity Index
694.	Mandvi	18.82	715.	Talod	12.2
695.	Anjar	39.8	716.	Khedbrahma	17.1
696.	Kandla	25.1	717.	Dhanera	23.0
697.	Bhactau	28.8	718.	Patan	34.2
698.	Madhapar	N.A.	719.	Mahasane	68.7
699.	Mundra	17.28	720.	Kalol	46.0
700.	Ropar	11.36	721.	Visnagar	34.5
701.	Nakhatrava	11.36	722.	Unjha	23.0
702.	Naliya	22.47	723.	Vadnagar	23.0
703.	Palanpur	40.1	724.	Mansa	35.01
704.	Disa	39.8	725.	Vijapur	34.5
705.	Radhanpur	28.8	726.	Charasma	34.5
706.	Tharod	17.4	727.	Kheralu	23.0
707.	Junadeera	17.4	728.	Hasij	34.5
708.	Bhabharnava	28.8	729.	Gandhinagar	40.4
709.	Vasahi	23.2	730.	Ahmedabad	96.3
710.	Kanodar	23.2	731.	Viramgram	51.9
711.	Himatnagar	51.5	732.	Dholka	45.4
712.	Moda	28.0	733.	Sanand	34.4
713.	Idar	28.6	734.	Dhandhuka	39.8
714.	Prantij	28.8	735.	Dihgram	5.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
736.	Bavla	34.4	756.	Vaso	N.A.
737.	Barwala	34.2	757.	Pali	21.6
738.	Nandal	23.0	758.	Thasra	N.A.
739.	Ranipur	34.2	759.	Vasad	40.6
740.	Sarkhej	28.6	760.	Godhra	56.8
741.	Nikol	28.8	761.	Dohad	45.6
742.	Nandy	12.2	762.	Lunavad	16.4
743.	Mansol	17.1	763.	Malol	16.4
744.	Nadiad	50.6	764.	Devgad Bara	27.6
745.	Cambay	28.8	765.	Kalol	34.4
746.	Anand	52.2	766.	Santrampur	17.0
747.	Petlad	32.8	767.	Shivrajpur	27.2
748.	Kapadvanj	27.6	768.	Vadadara	78.0
749.	Borsad	39.2	769.	Dabha	48.4
750.	Umreth	40.0	770.	Chhota Udaipur	27.6
751.	Balasinor	11.68	771.	Karjan	39.4
752.	Mehmedabad	28.8	772.	Sinor	20.3
753.	Vallabh Vidyanagar	34.4	773.	Sankheda	12.2
754.	Kheda	35.17	774.	Vanghodia	12.2
755.	Sojitra	18.72	775.	Bodeli	32.8
			776.	Atul	22.6

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index.
777.	Bahadarpur	11.89	792.	Kosamba	34.2
778.	Jawahar Nagar	11.9	793.	Sangadh	28.8
779.	Bharuch	41.8	794.	Olpad	23.43
780.	Anklesvar	53.0	795.	Navsari	57.0
781.	Rajpipla	22.0	796.	Valsad	45.8
782.	Jambusar	38.0	797.	Vapi	34.6
783.	Amod	27.2	798.	Parodi	40.2
784.	Hansot	19.8	799.	Gandevi	33.0
785.	Dahej	10.8	800.	Dharampur	22.9
786.	Surat	51.6	801.	Umberagaon	30.7
787.	Ukai	36.3	802.	Bansda	22.6
788.	Bardohi	51.2	803.	Chilkhli	25.4
789.	Uyara	40.0	804.	Udwada	11.2
790.	Mandvi	28.7			
791.	Kathar	34.6			

M A D H Y A P R A D E S H

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
805.	Morena	34.4	823.	Guna	40.2
806.	Sheopur	33.2	824.	Ashok Nagar	34.4
807.	Sabalgarh	38.4	825.	Mungaoli	28.8
808.	Ambah	17.1	826.	Raghogarh	00.5
809.	Joura	27.8	827.	Tikamgarh	33.9
810.	Bijeypur	11.2	828.	Chhatarpur	28.1
811.	Bhind	28.3	829.	Maharajpur	22.8
812.	Gohad	17.1	830.	Nowgong	34.0
813.	Lahar	11.2	831.	Bijavoar	28.2
814.	Mehgaon	32.8	832.	Sarsed	22.7
815.	Gwalior	77.2	833.	Garhi Malehara	22.8
816.	Dabra	40.0	834.	Khajuraho	17.04
817.	Bhander	34.08	835.	Panna	28.2
818.	Datia	51.2	836.	Ajaigarh	28.2
819.	Shirpuri	28.9	837.	Satna	40.0
820.	Karera	17.34	838.	Maihar	45.8
821.	Kolaras	11.64	839.	Unehahara	23.2
822.	Pichhore	17.01	840.	Nagod	34.1

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
841.	Rewa	50.6	861.	Waragangarh	11.6
842.	Shahdol	34.4	862.	Malahrgarh	17.3
843.	Nargoda Hasi Dafai	34.4	863.	Gandhisagar Hydel City	11.5
844.	Umaria	40.0			
845.	Khodargama	11.8	864.	Ratlam	40.1
846.	Johilla Colliery	11.8	865.	Jaora	45.4
847.	Amlai	23.2	866.	Sailana	17.8
848.	Kotma	23.2	867.	Tal	22.9
849.	Beohair	45.6	868.	Ujjain	45.9
850.	Paran	23.2	869.	Nagda	11.5
851.	Sidhi	22.6	870.	Badnagar	22.9
852.	Mandsaur	34.2	871.	Khachrod	17.6
853.	Neemuch	39.8	872.	Manidpur	28.4
854.	Rampura	11.7	873.	Tarana	12.0
855.	Manasa	17.3	874.	Jhabua	22.7
856.	Bhnpura	17.8	875.	Thandla	11.3
857.	Jawad	29.0	876.	Ranapur	11.5
858.	Shamgarh	23.2	877.	Petlawad	23.0
859.	Sitamau	11.6	878.	Jobat	28.2
860.	Garoth	44.4	879.	Dhar	22.7

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
880.	Kukshi	28.1	900.	Sanawad	39.8
881.	Manawar	17.0	901.	Rajpur	33.7
882.	Sardarpur Rajgarh	28.2	902.	Maheswar	17.1
883.	Badnawar	17.0	903.	Khetia	11.4
884.	Dharampuri	17.3	904.	Kasrawad	28.2
885.	Indore	61.3	905.	Bhikangaon	17.4
886.	Mhow	45.6	906.	Mandleshwar	11.5
887.	Sawar	17.2	907.	Gogaon	17.1
888.	Depalpur	22.9	908.	Burhanpur	34.4
889.	Mhowgaon	22.9	909.	Khandwa	63.0
890.	Dewas	45.8	910.	Nepanagar	00.7
891.	Kannod	17.0	911.	Shajapur	23.0
892.	Sankatch	22.9	912.	Sujalpur	28.8
893.	Khategaon	22.8	913.	Agar	27.6
894.	Matpiplaya	17.1	914.	Susner	4.54
895.	Bhaurasa	11.8	915.	Nalkhera	6.0
896.	Bagli	11.6	916.	Akodia	28.8
897.	Khrgora	22.7	917.	Sarangpur	23.0
898.	Barwani	33.7	918.	Narsingarh	22.8
899.	Sendhiva	28.4	919.	Biaora	28.5

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
920.	Rajgarh	17.0	940.	Babai	12.0
921.	Khilchipur	22.6	941.	Betul	34.4
922.	Vidisha	23.2	942.	Amla	23.6
923.	Sironj	17.0	943.	Multai	34.4
924.	Kurwai	34.4	944.	Sagar	51.4
925.	Bhopal	56.4	945.	Khurai	28.8
926.	Sehore	40.0	946.	Garhakota	12.1
927.	Asuta	22.6	947.	Deori	11.6
928.	Beraria	28.5	948.	Henli	22.8
929.	Khnawar	11.2	949.	Ranatgarh	22.9
930.	Raisur	23.0	950.	Bonda	28.4
931.	Baraily	17.6	951.	Damoh	51.2
932.	Itarli	40.8	952.	Matta	22.8
933.	Hoshangabad	40.0	953.	Patteria Kalan	28.8
934.	Narde	45.6	954.	Jabalpur	65.1
935.	Piparia	28.8	955.	Khamaria	23.2
936.	Sonagpur	28.8	956.	Sinora	45.8
937.	Seoni-Malwe	45.6	957.	Kaymore	23.2
938.	Timarni	23.2	958.	Panagar	34.6
939.	Khirkiya	12.0	959.	Katangi	22.7

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
960.	Patan	22.9	980.	Ambikapur	33.7
961.	Narsimhapur	40.2	981.	Manendragarh	40.0
962.	Gardarwara	45.6	982.	Jhagrakhond	5.6
963.	Kherli	29.0	983.	Surajpur	N.A.
964.	Chhoppa Chhindwara	34.4	984.	Ramanujganj	28.2
965.	Mandla	23.0	985.	Bilaspur	46.0
966.	Nainpur	37.6	986.	Korba	34.4
967.	Chhindwara	43.6	987.	Champa	46.0
968.	Pandhura	23.2	988.	Mungeli	17.2
969.	Dongar Pararia	28.4	989.	Nailajasygir	17.2
970.	Jamai	11.8	990.	Jakti	23.2
971.	Sausar	10.4	991.	Takhatpur	11.2
972.	Lorhi Khera	10.6	992.	Akaltara	23.2
973.	Pandra	11.8	993.	Akota	23.2
974.	Seoni	38.6	994.	Garvella	11.4
975.	Dunganiachhaparia	23.0	995.	Sirgiti	23.2
976.	Balaghat	43.6	996.	Raigarh	40.0
977.	Waraseoni	43.6	997.	Sarangarh	11.6
978.	Tirodi	22.8	998.	Khrsia	40.0
979.	Katangi	27.6	999.	Jashpur	22.5

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1000.	Durg	40.2			
1001.	Rajnand Gaon	40.2			
1002.	Rajhara Jharan-Dalli	6.0			
1003.	Dongargarh	23.2			
1004.	Kawardha	17.0			
1005.	Balod	34.4			
1006.	Khairagarh	28.3			
1007.	Chhuikhadan	11.4			
1008.	Raipur	51.5			
1009.	Maharamund	11.3			
1010.	Gobranawapara	21.8			
1011.	Newara	23.2			
1012.	Baloda Bazar	28.2			
1013.	Sarai Pali	28.8			
1014.	Jagdalpur	34.6			
1015.	Kanker	11.4			
1016.	Kirandul	17.2			

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W E S T B E N G A L

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1017.	Siliguri	56.3	1035.	Kaliaganj	11.8
1018.	Darjeeling	27.6	1036.	Islampur	35.0
1019.	Kalimpong	17.7	1037.	Gangarampur	11.5
1020.	Kurseong	32.8	1038.	Hilz	11.4
1021.	Jalpriguri	53.6	1039.	Dalkhola	28.9
1022.	Dhupgiri	40.2	1040.	Old Malda	48.0
1023.	Mainagiri	23.4	1041.	Bahrampur	52.4
1024.	Mal	17.7	1042.	Jangipur	41.2
1025.	Domohani	35.0	1043.	Jigganj-Azimganj	53.4
1026.	Falakata	23.9	1044.	Kandi	41.0
1027.	Coochbehar	57.4	1045.	Dhulian	31.0
1028.	Dinhata	45.4	1046.	Murshidabad	41.0
1029.	Mathabanga	29.0	1047.	Aurangabad	35.6
1030.	Haldibari	23.2	1048.	Lalgola	12.6
1031.	Tufanganj	1.9	1049.	Beldange	24.2
1032.	Mekliganj	12.4	1050.	Farakka	2.0
1033.	Balurgat	17.1	1051.	Nabadwip	17.4
1034.	Mayganj	28.8	1052.	Krishna Nagar	57.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1053.	Santipur	24.6	1073.	Jaynagar-Mazilpur	23.2
1054.	Ranaghat	60.2	1074.	Diamond Mardour	19.2
1055.	Chakdapa	23.4	1075.	Baranagar	34.4
1056.	Tahespur	23.2	1076.	Nebadhai	34.7
1057.	Gaveshpur	25.2	1077.	Kavyanagar	11.7
1058.	Birnagar	23.2	1078.	Chengail	23.3
1059.	Kataganj	25.2	1079.	Domjur	11.2
1060.	Jagadaman Dupur	12.0	1080.	Amta	23.2
1061.	Bagula	23.2	1081.	Panchla	12.1
1062.	Dhulia	11.2	1082.	Dakshinjhapardha	1312
1063.	Basirhat	36.4	1083.	Jagdishpur	28.8
1064.	Bungaon	36.5	1084.	Calcutta	136.3
1065.	Rajpur	23.4	1085.	Arambagh	29.5
1066.	New Barrackpur	34.6	1086.	Pandua	34.6
1067.	Baduria	11.2	1087.	Tarakeshwar	17.2
1068.	Taki	23.2	1088.	Singur	23.4
1069.	Baruipur	34.8	1089.	Hosipal	23.2
1070.	Gobaroanga	25.2	1090.	Durgapur	23.2
1071.	Canning	28.4	1091.	Burdwan	62.9
1072.	Birlapur	14.4	1092.	Chittaranjan	40.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1093.	Raniganj	40.0	1113.	Bishnupur	48.6
1094.	Katwa	65.2	1114.	Sonamukhi	34.4
1095.	Kalna	34.4	1115.	Khatra	28.2
1096.	Andal	46.6	1116.	Patrasaer	28.8
1097.	Dainhat	34.4	1117.	Kharagpur	52.2
1098.	Nimatpur	29.4	1118.	Midnapore	45.6
1099.	Memari	45.8	1119.	Ghatal	25.9
1100.	Ukhra	34.4	1120.	Contai	22.7
1101.	Dishsagarh	12.4	1121.	Tomluk	27.2
1102.	Guskara	40.0	1122.	Jhargram	28.8
1103.	Jamuria	23.2	1123.	Kolaghat	40.3
1104.	Jimari	23.4	1124.	Ramjibanpur	17.3
1105.	Sarakdi	24.0	1125.	Haldia	15.7
1106.	Suri	56.8	1126.	Mahesbadalo	4.3
1107.	Bolpur	40.0	1127.	Chandrakona	34.4
1108.	Rampurhat	51.2	1128.	Amlagera	11.2
1109.	Sainthia	46.0	1129.	Gashbeta	34.4
1110.	Dubrajpur	45.6	1130.	Balichak	23.2
1111.	Nalhati	40.4	1131.	Kharar	11.6
1112.	Bankura	53.8	1132.	Kshirpai	22.8

Sl. No.	Urban Centers	Connectivity Index
1133.	Durulia	45.3
1134.	Ardra	35.2
1135.	Balrampur	34.6
1136.	Rajahunathpur	19.2
1137.	Adra	52.0
1138.	Jhalda	34.4
1139.	Chapasz	23.2

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MAHARASHTRA

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1140.	Bombay	96.8	1158.	Kargat	28.8
1141.	Thana	53.4	1159.	Matheram	16.6
1142.	Bhivandi	23.6	1160.	Rasayani	16. 6
1143.	Shirgaon	23.2	1161.	Ratnagiri	19.0
1144.	Vasar	30.9	1162.	Chipkum	28.4
1145.	Bhavandar	42.2	1163.	Malwan	7.6
1146.	Palghar	40.2	1164.	Sawantwadi	28.3
1147.	Pannel	57.5	1165.	Vengurla	18.9
1148.	Knopoli	23.0	1166.	Rajapur	17.1
1149.	Mahad	22.8	1167.	Khed	33.9
1150.	Vran	8.7	1168.	Aernai	7.6
1151.	Shriwardhan	13.4	1169.	Nati	7.6
1152.	Alibag	18.9	1170.	Poppali	17.0
1153.	Pen	22.9	1171.	Dapoli Camp	33.7
1154.	Mvrud	13.3	1172.	Redi	13.4
1155.	Roha Ashtami	22.9	1173.	Dabhol	7.6
1156.	Nerai	34.4	1174.	Alore	13.4
1157.	Revdande	17.0	1175.	Shirgaon	28.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1176.	Malegaon	28.2	1196.	Jalagaon	51.8
1177.	Nasik	53.4	1197.	Amalner	45.6
1178.	Yeola	40.0	1198.	Chalisgaon	46.0
1179.	Ozar	28.2	1199.	Chopda	17.2
1180.	Sinnar	11.5	1200.	Dharangaon	34.4
1181.	Igatpuri	29.0	1201.	Pachora	45.2
1182.	Satana	22.6	1202.	Yawal	23.1
1183.	Pimpalgaon Barvant	23.1	1203.	Parola	45.8
1184.	Revalgaon	11.4	1204.	Erandol	34.8
1185.	Chandrad	28.5	1205.	Raver	28.8
1186.	Lasalgaon	11.2	1206.	Faizpur	12.0
1187.	Vani	17.1	1207.	Savoa	28.8
1188.	Trimbak	11.7	1208.	Verangaon	12.0
1189.	Dhulia	34.2	1209.	Khamgaon	39.8
1190.	Nandurbar	45.6	1210.	Malkapur	29.0
1191.	Shivpur	28.5	1211.	Shegaon	28.8
1192.	Dondaicha	34.4	1212.	Buldhana	28.3
1193.	Shahada	39.6	1213.	Nandura	34.6
1194.	Taloda	17.1	1214.	Chikhli	28.1
1195.	Nawapur	23.2	1215.	Mehkar	28.3

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1216.	Jalgaon	11.7	1236.	Sasvad	17.3
1217.	Devlgaon Raja	17.3	1237.	Sirur	22.6
1218.	Akola	57.6	1238.	Indalpur	23.2
1219.	Akot	39.8	1239.	Alandi	17.3
1220.	Washim	39.8	1240.	Jeguri	22.2
1221.	Karanja	22.4	1241.	Kurankh	19.2
1222.	Murtazapur	40.2	1242.	Satara	40.4
1223.	Balalpur	23.6	1243.	Kasad	45.8
1224.	Ahmadnagar	45.6	1244.	Dhaltan	39.5
1225.	Shrivampur	22.8	1245.	Wai	22.7
1226.	Jangamner	28.5	1246.	Mhasvad	22.6
1227.	Koapargaon	23.2	1247.	Satara Rd.	23.2
1228.	Nari	17.3	1248.	Rahimatpur	23.2
1229.	Baramati	33.2	1249.	Sadashivgad	N.A.
1230.	Poona	62.2	1250.	Mahableshwar	22.59
1231.	Lonavala	23.4	1251.	Panchgani	11.4
1232.	Kolvan	11.8	1252.	Patan	11.6
1233.	Talegaon	23.4	1253.	Humbralz	23.2
1234.	Junnar	28.2	1254.	Bhade	34.3
1235.	Bohar	17.1	1255.	Sangli	45.6

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1256.	Uran Islampur	43.3	1276.	Jalna	39.8
1257.	Tasgaon	23.0	1277.	Vijapur	28.6
1258.	Vita	34.0	1278.	Paithan	11.5
1259.	Ashta	28.5	1279.	Kannad	28.6
1260.	Sholapur	57.3	1280.	Ambad	17.1
1261.	Barsi	32.8	1281.	Gangapur	17.1
1262.	Pandharpur	32.8	1282.	Bhokardan	11.4
1263.	Akkalkot	40.0	1283.	Parbhani	30.1
1264.	Kurdvvaoi	44.8	1284.	Hingoli	23.0
1265.	Mangalvedha	34.3	1285.	Basmath	28.6
1266.	Karmala	17.4	1286.	Selu	23.0
1267.	Sangole	27.2	1287.	Mantha	11.2
1268.	Mundhewadi	23.4	1288.	Purna	23.3
1269.	Dudhani	17.6	1289.	Gangakhed.	28.6
1270.	Kolhapur	51.0	1290.	Jintur	22.9
1271.	Ichalkaranj	23.0	1291.	Partur	28.6
1272.	Murgud	22.6	1292.	Pathri	17.3
1273.	Malkapur	11.4	1293.	Kalamneri	11.8
1274.	Amboli	16.9	1294.	Sonpeth	0.5
1275.	Aurangabad	34.2	1295.	Bhir.	17.0

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1296.	Parli	23.1	1316.	Moram	12.2
1297.	Ambejogai	17.8	1317.	Nilanga	11.4
1298.	Manjlegaon	11.5	1318.	Tuljapur	22.7
1299.	Dharor	0.4	1319.	Ahmadpur	17.3
1300.	Gevai	17.0	1320.	Umarja	12.8
1301.	Ashti	11.2	1321.	Kallam	44.2
1302.	Mandeo	26.6	1322.	Parenda	23.4
1303.	Delgur	17.1	1323.	Bhum	11.8
1304.	Dharmabad	11.8	1324.	Naldurg	17.4
1305.	Kinwat	23.0	1325.	Amravati	45.4
1306.	Kundalwadi	12.4	1326.	Anjangaon	27.2
1307.	Mudkhed	11.9	1327.	Badnera	31.6
1308.	Kandhar	6.0	1328.	Narud	21.6
1309.	Hadgaon	17.2	1329.	Daryapur	44.0
1310.	Biloli	12.2	1330.	Marsi	11.4
1311.	Pethumri	35.8	1331.	Daltapur	23.2
1312.	Latur	27.4	1332.	Jandurgana	12.8
1313.	Udgir	26.8	1333.	Chandur	26.8
1314.	Osmanabad	23.2	1334.	Chandur Bazar	22.9
1315.	Aurad	11.5	1335.	Chikalde	6.1

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1336.	Veotmal	38.8	1353.	Ramtek	17.2
1337.	Pusad	22.7	1354.	Saoner	32.4
1338.	Wani	40.0	1355.	Khapa	16.4
1339.	Digras	23.4	1356.	Kanhan	35.0
1340.	Umarkhed	22.6	1357.	Mowar	6.1
1341.	Darwha	21.6	1358.	Gondia	44.8
1342.	Dandharkoda	24.8	1359.	Bhandara	34. 6
1343.	Ghatanji	22.8	1360.	Tumsar	40.0
1344.	Wardha	40.4	1361.	Pavni	21.6
1345.	Hinjanghat	29.0	1362.	Tirora	12.0
1346.	Phulgaon	34.0	1363.	Chandrapur	49.2
1347.	Arvi	22.0	1364.	Ballarshah	23.2
1348.	Deoli	22.4	1365.	Warora	28.8
1349.	Sinoi	12.0	1366.	Ghugur	17.6
1350.	Nagpur	68.8	1367.	Rajur	11.2
1351.	Umrer	37.8	1368.	Ashti	17.1
1352.	Katol	34.4			

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HIMACHAL PRADESH

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Conectivity Index
1369.	Chamba	16.9	1387.	Bilaspur	17.4
1370.	Dalhousie	16.9	1388.	Ghamarwin	11.6
1371.	Balloh	16.9	1389.	Shri Naina Deviji	11.4
1372.	Dharamsala	17.3	1390.	Solan	27.6
1373.	Yol	11.2	1391.	Rampur	5.8
1374.	Una	28.4	1392.	Arki	16.8
1375.	Kangra	16.2	1393.	Theog	16.5
1376.	Nurpur	21.8	1394.	Dhalli	0.2
1377.	Santokhgarh	28.4	1395.	Simla	22.2
1378.	Hamirpur	22.5	1396.	Kasauli	5.9
1379.	Nagrota Bagwan	21.8	1397.	Nalogarh	22.7
1380.	Dalampur	22.8	1398.	Subathu	6.0
1381.	Sunder Nagar	11.6	1399.	Dagshai	22.2
1382.	Mandi	22.8	1400.	Jutogh	16.4
1383.	Pandoh	11.5	1401.	Nahan	16.9
1384.	Jogindernagar	16.2	1402.	Paonta Sahib	5. 2
1385.	Sultanpur	11.3	1403.	Sarahan	11.3
1386.	Manali	11.4			

Contd.....

JAMMU AND KASHMIR

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1404.	Anantnag	22.7	1422.	Kargil	-
1405.	Pampore	22.7	1423.	Kishtwar	5.7
1406.	Bijbehara	28.2	1424.	Bhaderwah	5.7
1407.	Shupujan	26.1	1425.	Doda	.07
1408.	Tral	11.3	1426.	Batola	11.5
1409.	Khuljam	22.5	1427.	Ramban	17.1
1410.	Mattan	-	1428.	Banihal	11.5
1411.	Pahalgam	5.7	1429.	Udhampur	17.2
1412.	Kukernag	-	1430.	Riasi	5.8
1413.	Srinagar	27.2	1431.	Ramnagar	11.6
1414.	Badamebagh	22.6	1432.	Katra	17.2
1415.	Sopera	22.4	1433.	Chenani	-
1416,	Baramula	17.0	1434.	Jammu	42.3
1417.	Bandipore	11. 2	1435.	Ranbir Singh Para	23.2
1418.	Hardwara	-	1436.	Samba	29.0
1419.	Gulmarg	5.7	1437.	Arvia	17.8
1420.	Uri	17.0	1438.	Akhnoor	12.2
1421.	Leh	-	1439.	Bishna	11.9

Sl. No.	Urban Centers	Connectivity Index
1440.	Kathua	29.6
1441.	Hiranagar	23.4
1442.	Bashohli	11.2
1443.	Lakhempur	23.4
1444.	Rajauri	11.3
1445.	Nowshehra	11.3
1446.	Punch	-
1447.	Surankote	11.3

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HARYANA

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1448.	Ambala	69.1	1466.	Rohtak	57.4
1449.	Yamuna Nagar	34.4	1467.	Sonepat	45.8
1450.	Jagadhari	51.2	1468.	Bahadurgarh	40.2
1451.	Kalka	34.5	1469.	Jhaggar	45.4
1452.	Sadaura	22.9	1470.	Coharia	45.2
1453.	Naraingarh	23.0	1471.	Beri	17.7
1454.	Chhechhrauli	23.0	1472.	Moham	28.7
1455.	Baurie	18.0	1473.	Ganaur	29.0
1456.	Karnal	51.4	1474.	Gharaunda	23. 4
1457.	Panipat	63.0	1475.	Gurgaon	51.2
1458.	Kotihal	40.0	1476.	Rewari	68.7
1459.	Thanesar	46.2	1477.	Palwal	51.4
1460.	Shahabad	34.6	1478.	Faridabad	29.0
1461.	Pehowa	28. 2	1479.	Ballabgarh	40.2
1462.	Ladwa	17.2	1480.	Hodal	40.2
1463.	Nilokheri	29.0	1481.	Johna	34.1
1464.	Pundri	23.1	1482.	Ferozpur	23.0
1465.	Rajaurid	17.2	1483.	Bawal	28.0

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1484.	Pataudi	23.0	1497.	Mani Dabwali	56.8
1485.	Farukhnagar	22.7	1498.	Tohana	34.2
1486.	Nuh	22.8	1499.	Kolanwali	34.2
1487.	Hailey Mandi	22.8	1500.	Oklanmandi	23.2
1488.	Narnaul	39.8	1501.	Laharu	40.1
1489.	Charkhi Dadri	66.6	1502.	Tasham	28.4
1490.	Mahendra Garh	34.2	1503.	Jakhal Mandi	46.4
1491.	Kanina	34.2	1504.	Jind	51.6
1492.	Ateli	28.6	1505.	Narwana	40.4
1493.	Hissar	57.5	1506.	Safidon	34.4
1494.	Bhiwani	45.4	1507.	Julana	34.4
1495.	Sirsa	45.6	1508.	Uchana	12.0
1496.	Fatehabad	28.8	1509.	Hansi	51.2

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BIHAR

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1510.	Patna	69.0	1528.	Hisua	34.4
1511.	Bihar	40.2	1529.	Rafiganj	23.2
1512.	Mohamah	37.0	1530.	Tikari	17.4
1513.	Khagul	12.0	1531.	Bodhgaya	35.5
1514.	Bast	28.3	1532.	Nabi Nagar	22.7
1515.	Masaurhi	28.3	1533.	Arrah	56.6
1516.	Fatwah	25.4	1534.	Sasaram	56.2
1517.	Rajgir	28.4	1535.	Dehri	40.2
1518.	Hilsa	27.2	1536.	Buxur	45.6
1519.	Bihta	23.2	1537.	Dumraon	23.2
1520.	Bakhtiarpur	37.1	1538.	Jgdishpur	33.6
1521.	Gaya	79.4	1539.	Bikramganj	44. 2
1522.	Jehanabad	45.6	1540.	Bhabua	17.6
1523.	Nawada	45.8	1541.	Nasriganj	11.7
1524.	Aurangabad	51.1	1542.	Koath	17.6
1525.	Dand Nagar	28.4	1543.	Mohania	40.3
1526.	Sherghati	34.3	1544.	Behea	28.8
1527.	Narsaliganj	23.2	1545.	Chapra	53.6

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1546.	Siwan	56.9	1566.	Darbhnga	51.3
1547.	Copalganj	36.4	1567.	Madhubani	51.0
1548.	Revalganj	17.2	1568.	Samastipur	64.2
1549.	Mirganj	29.0	1569.	Rusera	30.0
1550.	Maharajganj	22.7	1570.	Dalsing Sarai	25.2
1551.	Mairwa	28.6	1571.	Jainagar	22.3
1552.	Bettiah	51.0	1572.	Monghyr	19.2
1553.	Bagaha	30.3	1573.	Jamalpur	20.0
1554.	Naskatiaganj	51.0	1574.	Barauni	37.1
1555.	Ramnagar	35.8	1575.	Jamui	34.4
1556.	Chanpatia	23.0	1576.	Lakhisarai	34.8
1557.	Sugauli	29.1	1577.	Baraliya	23.2
1558.	Raxaul Bazar	28.6	1578.	Sheikhpura	23.2
1559.	Chakia	23.2	1579.	Teghra	25.4
1560.	Muzzaffapur	58.1	1580.	Jhajha	34.4
1561.	Magipur	58.5	1581.	Gogri	25.4
1562.	Mahner Bazar	13.8	1582.	Barbigha	29.2
1563.	Lalganj	13.9	1583.	Kharafpur	17.7
1564.	Bair Garia	23.0	1584.	Bariarpur	25.2
1565.	Pupra	23.2	1585.	Bhagalpur	42.7

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1586.	Banka	23.2	1606.	Dumka	24.0
1587.	Sultanganj	14.0	1607.	Madhopur	46.0
1588.	Calgong	25.2	1608.	Pakaur	28.8
1589.	Naugachhia	24.4	1609.	Godda	28.0
1590.	Sahrsa	40.1	1610.	Jamtare	40.0
1591.	Supaul	35.4	1611.	Mihijam	11.7
1592.	Biharganj	28.3	1612.	Rajmahal	23.8
1593.	Madhepura	35.4	1613.	Barharwe	-
1594.	Murliganj	34.2	1614.	Daltonganj	35.6
1595.	Birpur	11.4	1615.	Garnwa	34.4
1596.	Nirmali	23.7	1616.	Hussainabad	11.7
1597.	Katihar	46.4	1617.	Lotehar	28.8
1598.	Purnea	45.9	1618.	Netarnat	17.1
1599.	Kishnganj	40.0	1619.	Hazaribagh	34.0
1600.	Araria	23.0	1620.	Giridh	34.2
1601.	Forbesganj	23.0	1621.	Jhumri Tilaiya	00.2
1602.	Banmankhi Barer	34.5	1622.	Chatra	22.8
1603.	Jogbani	28.3	1623.	Barki Saraiya	11.6
1604.	Deoghar	34.0	1624.	Barughuto	29.0
1605.	Sahibganj	29.8	1625.	Kodarna	29.0

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1626.	Domcharch	27.6	1644.	Jamshedpur	28.9
1627.	Ranchi	66.8	1645.	Chaibara	45.6
1628.	Lohar Daga	27.6	1646.	Chakra-Dharpur	34.4
1629.	Gumla	23.1	1647.	Musabani	28.8
1630.	Suindegar	18.0	1648.	Ghatsila	34.6
1631.	Khunte	28.6	1649.	Noamundi	12.0
1632.	Bundu	12.1	1650.	Gua	6.0
1633.	Kanke	12.1	1651.	Manotarpur	23.2
1634.	Khetari	12.C	1652.	Jhinkpani	23.2
1635.	Muri	40.8	1653.	Chakulia	23.2
1636.	Namkum	N.A.	1654.	Jodugera	23.2
1637.	Dhanbad	65.3	1655.	Seraikela	17.6
1638.	Bakaro	23.2	1656.	Sini	23.2
1639.	Jharia	23.2	1657.	Kharsuwan	17.4
1640.	Comoh	40.6	1658.	Kiriburu	6.0
1641.	Maithan	17.8	1659.	Barajamda	40.4
1642.	Panchet	12.6			
1643.	Chaitudih	17.5			

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ORISSA

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1660.	Sambapur	35.6	1678.	Rairangpur	34.4
1661.	Bajrajnagar	23.2	1679.	Balasore	34.6
1662.	Jharsuguda	34.8	1680.	Bhadrak	45.8
1663.	Bargarh	34.6	1681.	Chandbali	6.9
1664.	Barpali	28.8	1682.	Jaleswar	28.8
1665.	Deogarh	17.1	1683.	Cuttach	53.5
1666.	Padampur	22.6	1684.	Kondrapara	30.5
1667.	Kuchinda	22.9	1685.	Jajpur	22.9
1668.	Govindpur	28.8	1686.	Jagpur Road	28.8
1669.	Rourkela	40.4	1687.	Bankigarh	19.5
1670.	Birmitrapur	22.8	1688.	Athgarh	28.8
1671.	Ratganjpur	23.2	1689.	Paradip	13.44
1672.	Sundragarh	17.4	1690.	Dhenkanal	40.2
1673.	Barbil	23.2	1691.	Talchar	26.8
1674.	Keonghar	28.4	1692.	Bhuben	22.8
1675.	Jamda	34.4	1693.	Angul	28.9
1676.	Anandpur	17.1	1694.	Pulbhani	16.9
1677.	Basipadu	34.4	1695.	Boudh	12.3

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1696.	Bolangir	34.4	1716.	Parlaklomundi	39.8
1697.	Kantabangi	17.6	1717.	Aska	28.3
1698.	Patnagarh	11.9	1718.	Bhanganangar	22.6
1699.	Sonepur	28.3	1719.	Chatrapur	29.0
1700.	Bhawani Patna	29.4	1720.	Hindoli	17.1
1701.	Khriar Road	17.6	1721.	Polasara	17.1
1702.	Kesinga	23.2	1722.	Surada	22.6
1703.	Junagarh	-	1723.	Kavisur Dyanagar	22.6
1704.	Khariar	6.0	1724.	Purushottampur	18.0
1705.	Jey Pore	29.0	1725.	Bellaguntha	22.6
1706.	Sunabede	23.8	1726.	Khalikota	29.6
1707.	Rayagada	23.2	1727.	Rambha	29.0
1708.	Koraput	40.2	1728.	Baliguda	22.6
1709.	Nowrangapur	22.7	1729.	Gunulpur	22. 7
1710.	Gonupur	11.4	1730.	Bhubaneswar	44.8
1711.	Kotpad	28.5	1731.	Puri	19.1
1712.	Umarkot	22.5	1732.	Jatni	23.2
1713.	Malkangiri	16.9	1733.	Khurda	40.2
1714.	Guderi	17.6	1734.	Nayagarh	22.6
1715.	Berhampur	34.6			

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ANDHRA PRADESH

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1735.	Srikakulam	40.20	1753.	Kakinada	35.9
1736.	Babbili	46.0	1754.	Samalkot	48.0
1737.	Cheepurupalle	28.8	1755.	Amalapuram	28.4
1738.	Salur	28.6	1756.	Machavaram	13.9
1739.	Paruathipuram	28.8	1757.	Razole	22.9
1740.	Palakonda	22.7	1758.	Ramachadrapuram	22.5
1741.	Rajam	34.1	1759.	Rajahmundry	53.4
1742.	Tekkoli	28.7	1760.	Dowlerhwaram	36.6
1743.	Mardam	17.2	1761.	Peddapuram	33.6
1744.	Ichchapuram	29.0	1762.	Tuni	34.6
1745.	Visakhapatnm	23.9	1763.	Pithapuram	40.0
1746.	Anakapalle	40.2	1764.	Eluru	51.4
1747.	Yellamanchili	29.0	1765.	Nidadavole	42.4
1748.	Narasapatnam	12.0	1766.	Penugonda	17.5
1749.	Chodararam	17.1	1767.	Narsapur	25.4
1750.	Madugula	11.5	1768.	Bheemararam	46.0
1751.	Vizianagaram	51.8	1769.	Bandar	30.3
1752.	Bheemunipatnam	17.7	1770.	Pedana	28.8

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1771.	Avanigodda	19.4	1791.	Kandukur	11.6
1772.	Gannavaram	23.2	1792.	Giddalur	23.0
1773.	Vuyyur	11.9	1793.	Cumbum	39.8
1774.	Vijayawada	54.3	1794.	Markapur	17.3
1775.	Nandigama	17.6	1795.	Addanki	11.7
1776.	Jaggayyapet	23.0	1796.	Chirala	34.4
1777.	Tiruvur	11.5	1797.	Vetapalem	12.0
1778.	Nuzvio	17.6	1798.	Gudur	46.2
1779.	Gudivada	46.0	1799.	Sullurpet	29.0
1780.	Kaikalur	34.4	1800.	Naidupet	40.2
1781.	Guntur	68.7	1801.	Ventakagiri	34.4
1782.	Tadepalle	5.9	1802.	Kavali	34.6
1783.	Mangalagiri	25.2	1803.	Kodur	28.8
1784.	Tevali	54.0	1804.	Palmaner	29.6
1785.	Ponnur	40.0	1805.	Kuppam	34.4
1786.	Vinukonda	39.8	1806.	Madanapalle	28.3
1787.	Macherla	28.3	1807.	Tirupati	39.8
1788.	Phirangipuram	23.0	1808.	Tirumalai	8.0
1789.	Sattenapalle	34.2	1809.	Renigunta	52.0
1790.	Ongole	45.8	1810.	Pokala	34.5

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1811.	Sirika	40.0	1831.	Kdsigi	23. 2
1812.	Puttur	34.4	1832.	Shamshabad	34.6
1813.	Nagari	12.0	1833.	Tandur	23.2
1814.	Rayachoti	39.4	1834.	Vicarabad	34.8
1815.	Jammalamaouju	22.6	1835.	Sangareddy	17.0
1816.	Badnel	11.4	1836.	Sadasivpet	17.0
1817.	Kalyandruy	39.4	1837.	Andole	11.2
1818.	Rayadny	23.3	1838.	Armur	22.8
1819.	Uravakonda	34.1	1839.	Banswada	19.4
1820.	Gooty	51.4	1840.	Bodhan	22.7
1821.	Penukonda	34.4	1841.	Asfibad	17.6
1822.	Nandikotkur	33.6	1842.	Kagaznagar	12.0
1823.	Nandyal	28.0	1843.	Mancherriyal	34.4
1824.	Banganapalla	33.6	1844.	Nirmal	22.7
1825.	Yemmiganur	39.5	1845.	Bhainsa	22.8
1826.	Mahbubnagar	45.7	1846.	Sirsilla	11.4
1827.	Kolhapur	22.4	1847.	Vemulwada	17.1
1828.	Alampur	23.0	1848.	Petpalli	34.4
1829.	Gadwal	39.8	1849.	Koratla	22.6
1830.	Naraganpet	17.0	1850.	Manthari	22.8

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1811.	Sirika	40.0	1831.	Kdsigi	23. 2
1812.	Puttur	34.4	1832.	Shamshabad	34.6
1813.	Nagari	12.0	1833.	Tandur	23.2
1814.	Rayachoti	39.4	1834.	Vicarabad	34.8
1815.	Jammalamadugu	22.6	1835.	Sangareddy	17.0
1816.	Badnel	11.4	1836.	Sadasivpet	17.0
1817.	Kalyandruy	39.4	1837.	Andole	11.2
1818.	Rayadny	28.3	1838.	Armur	22.8
1819.	Uravakonda	34.1	1839.	Banswada	19.4
1820.	Gooty	51.4	1840.	Bodhan	22.7
1821.	Penukonda	34.4	1841.	Asifbad	17.8
1822.	Nandikotkur	33.6	1842.	Nagaznagar	12.0
1823.	Nandyal	28.0	1843.	Mancherriyal	34.4
1824.	Banganapalle	33.6	1844.	Nirmal	22.7
1825.	Yemmiganur	39.5	1845.	Bhainsa	22.8
1826.	Mahbubnagar	45.7	1846.	Sirsilla	11.4
1827.	Kolhapur	22.4	1847.	Vemulwada	17.1
1828.	Alampur	23.0	1848.	Petpalli	34.4
1829.	Gadwal	39.8	1849.	Koratla	22.6
1830.	Narayanpet	17.0	1850.	Mantheri	22.8

Sl. No.	Urban Centers	Connectivity Index
1851.	Warangal	40.4
1852.	Dornakal	29.2
1853.	Yellandu	22.8
1854.	Bhadrachalam	19.2
1855.	Kothagudem	17.2
1856.	Nalgonda	39.4
1857.	Mirzalguda	17.0
1858.	Vijapuri North	5.8
1859.	Bhongir	28.8

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TAMILNADU

CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Ceonnectivity Index
1860.	Lalgudi	23.0	1878.	Kumbakanam	56.6
1861.	Pallapatti	28. 6	1879.	Mayuram	57. 2
1862.	Perambalu	34.3	1880.	Mannargudi	50.7
1863.	Musiri	25.2	1881.	Pattukkotai	51.0
1864.	Manachanallur	17.3	1882.	Tiruvarur	62.8
1865.	Pungai Pugalur	23.3	1883.	Sirkali	39.8
1866.	Kallakerdi	34.2	1884.	Vedaranyam	24.0
1867.	Thathayya Nagar Pet	11.7	1885.	Adirampattiram	28.6
1868.	Poonamararathai	22.4	1886.	Tranguebar	28.3
1869.	Kattuputhur	17.3	1887.	Thiruthurai Pundi	45.7
1870.	Mettaapalwam	22.8	1888.	Arantangi	39.8
1871.	Siruganavi	22.8	1889.	Kuthanallur	34.2
1872.	Iluppor	00.8	1890.	Muthopet	16.8
1873.	Pooralur	34.2	1891.	Tiruvaiyaru	24.8
1874.	Alargodi	34.1	1892.	Ammapetai	28.6
1875.	Kadiapatti	34.1	1893.	Paparasam	28.6
1876.	Alagapuri	12.0	1894.	Ayyampet	34.2
1877.	Thanja vur	68.1	1895.	Thiruvidamarudur	28.6

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1896.	Tir-ukkattupalli	11.8	1916.	Tiruppathur	39.9
1897.	Kuttalam	23.0	1917.	Rameshwaram	13.5
1898.	Adutnurai	23.0	1918.	Manamadurai	51.8
1899.	Tirunagarhwaram	23.0	1919.	Thirupuuanam	34.4
1900.	Thirumullaivasal	18.4	1920.	Kamuthi	-
1901.	Orathand	16.8	1921.	Mudukalathur	00.4
1902.	Valaygiman	11.2	1922.	Mandapam	23.2
1903.	Nidamangalam	40.1	1923.	Sirgampurai	16.8
1904.	Vaitheeswarankoit	39.8	1924.	Chettiorapatti	16.8
1905.	Rajapalayam	28.6	1925.	Samsikapuram	23.2
1906.	Arupukkottai	39.8	1926.	Nathrasankottai	28.6
1907.	Virudhunagar	57.4	1927.	Dhalaripuram	11.7
1908.	Srivilliputhur	16.8	1928.	Tutecoin	30.3
1909.	Paramakudi	45.6	1929.	Tiruneludi	51.5
1910.	Ramanathapuram	40.0	1930.	Kodayanallur	28.6
1911.	Devakottai	28.4	1931.	Kovilpatly	51.2
1912.	Kilakarai	14.1	1932.	Tenkasi	51.3
1913.	Sattur	34.4	1933.	Vikramaringapuram	11.7
1914.	Sivaganga	45.9	1934.	Pulianfudi	12.2
1915.	I-lyamkudi	11.2	1935.	Sankaranayanarkoil	28.5

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1936.	Shencottah	23.0	1956.	Nagercoil	39.6
1937.	Udangudi	23.0	1957.	Colachel	18.9
1938.	Srivaikuntam	39.8	1958.	Padmanabhapuram	28.4
1939.	Veeravanallur	28.6	1959.	Kuzhithurai	23.0
1940.	Thirayanvilai	22.9	1960.	Kanyakumarai	22.8
1941.	Sattankulam	12.4	1961.	Madras	89.0
1942.	Kulasekaraputtinam	28.6	1962.	Chingleput	51.5
1943.	Sawyerpuram	12.2	1963.	Maduranthakam	34.4
1944.	Mani Muthar	N.A.	1964.	Tirukkalikundram	29.0
1945.	Eruvadi	28.6	1965.	Tiruttani	29.2
1946.	Nazreth	39.8	1966.	Uthiramenor	17.2
1947.	Ettaiyapuram	40.1	1967.	Poneri	51.6
1948.	Kalyumalai	11.2	1968.	Proddatuspet	23.2
1949.	Poramankurichi	28.6	1969.	Nalejpet	46.0
1950.	Alwarthirunagari	17.2	1970.	Sriperom Budur	34.4
1951.	Aral	11.6	1971.	Ami	17.8
1952.	Kayathar	17.5	1972.	Cheyyur	8.1
1953.	Mudalur	18.6	1973.	Pvlicat	5.7
1954.	Vilathikulum	22.7	1974.	Vellore	40.0
1955.	Cortallam	7.2	1975.	Tiruvannamdi	62.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
1976.	Arkonam	35.0	1996.	Uriddacnalam	57.2
1977.	Tirupattur	51.2	1997.	Kallakurichi	22.7
1978.	Arni	56.6	1998.	Tirukoilur	51.4
1979.	Pernambut	11.7	1999.	Port Novo	30.5
1980.	Jolarpet	46.2	2000.	Kurinjipadi	23.0
1981.	Tiruvattipuram	34.0	2001.	Bhuvanagiri	16.8
1982.	Polur	40.0	2002.	Dharmpuri	45.6
1983.	Melvisharam	28.4	2003.	Krishnagiri	45.6
1984.	Nandiwash	28.4	2004.	Harur	28.3
1985.	Sholingur	46.0	2005.	Denkani Kottai	23.0
1986.	Pallikonda	35.4	2006.	Kaveripathnam	12.1
1987.	Kaveri Pakkam	23.4	2007.	Hasur	45.6
1988.	Udayendram	29.6	2008.	Palacode	34.2
1989.	Panapakkam	23.5	2009.	Salem	69.3
1990.	Cuddalore	42.0	2010.	Attur	34.2
1991.	Villupuram	74.6	2011.	Mettur	17.2
1992.	Neyveli	34.2	2012.	Tiruchengode	46.0
1993.	Tindivanam	45.6	2013.	Edapadi	28.8
1994.	Nellikkupam	23.0	2014.	Namakkal	45.4
1995.	Panruti	45.4	2015.	Rasipuram	47.0

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2016.	Velur	16.8	2036.	Palladam	39.7
2017.	Taramangalam	11.9	2037.	Sirumugai	33.7
2018.	Sankaridny	45.8	2038.	Annur	39.6
2019.	Talakantapuram	23.6	2039.	Pungai Puliam Patti	28.0
2020.	Omalur	29.4	2040.	Pungai Vthukuli	28.0
2021.	Vennandur	20.0	2041.	Bhavani Sagar	00.2
2022.	Elampillai	28.6	2042.	Morattupalayam	22.6
2023.	Pillanallur	29.5	2043.	Ootacamund	44.8
2024.	Ammapalayam	N.A.	2044.	Gudalur	22.6
2025.	Coimbatore	75.5	2045.	O'Vallery	00.4
2026.	Valparai	11.7	2046.	Ithalar	22.6
2027.	Mettupalayam	28.3	2047.	Mulligoor	33.7
2028.	Vdumalpet	51.0	2048.	Madurai	93.4
2029.	Gobichttipalyam	17.0	2049.	Dindigul	62.8
2030.	Dharapuram	50.8	2050.	Bodinayakanur	28.3
2031.	Sathiyamangalam	45.0	2051.	Periyakulum	28.7
2032.	Karamadai	23.4	2052.	Cumbum	17.1
2033.	Aremalai	45.3	2053.	Theriatinagaram	34.2
2034.	Vellakoil	N.A.	2054.	Gudalur	17.3
2035.	Kangeyam	33.7	2055.	Chinnamanur	11.6

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2056.	Chinalapetti	23.0	2067.	Hylisway	23.0
2057.	Tirumangalam	35.2	2068.	Keeranyur	35.0
2058.	Vsilampatti	45.4	2069.	T.Kallupatty	35.0
2059.	Melur	34.0	2070.	Tiruchirapalli	90.4
2060.	Uthamapalayam	34.0	2071.	Pudukottai	56.6
2061.	Natham	23.0	2072.	Karur	51.4
2062.	Kudaikanal	17.3	2073.	Manaparai	45.6
2063.	Battagundu	17.3	2074.	Thuraiyur	28.7
2064.	Avdipatti Jakkampatti	23.0	2075.	Ariyalur	34.2
2065.	Nilakottai	17.5	2076.	Kulittalai	28.0
2066.	Peraiyur	11.8			

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CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2077.	Hassan	62.4	2095.	Nyamti	17.3
2078.	Ariskore	51.3	2096.	Sorab	28.5
2079.	Holendarasipur	45.4	2097.	Hosanagar	28.5
2080.	Sakleshpur	34.2	2098.	Chikmagulur	34.1
2081.	Belur	34.1	2099.	Tarikore	39.8
2082.	Channaraga Patna	45.1	2100.	Birur	45.7
2083.	Arkalgud	22.4	2101.	Kadur	45.4
2084.	Konanur	17.5	2102.	Ajjampur	23.0
2085.	Banavasa	23.6	2103.	Narasimharajapura	12.0
2086.	Alur	24.2	2104.	Mudigere	22.6
2087.	Sravanabelgole	17.12	2105.	Koppa	28.3
2088.	Shimoga	45.4	2106.	Sringeri	22.6
2089.	Sagar	45.4	2107.	Manoya	62.2
2090.	Shikaripur	28.5	2108.	Malowalli	18.3
2091.	Tirthapalli	22.7	2109.	Maddur	51.0
2092.	Channagiri	28.5	2110.	Srirangapatna	45.4
2093.	Siralkoppa	28.0	2111.	Pandarapura	34.2
2094.	Honnali	34.0	2112.	Krishnapajpet	39.57

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2113.	Najamangala	39.45	2133.	Gokak Falls	11.44
2114.	Belak Avadi	11.54	2134.	Londa	40.1
2115.	Bellur	34.29	2135.	Bijapur	55.8
2116.	Melkote	22.77	2136.	Bagalkot	28.6
2117.	Belgaum	53.6	2137.	Ilkal	28.5
2118.	Nippani	28.5	2138.	Jamkhandi	39.4
2119.	Gokak	44.2	2139.	Guledda	28.6
2120.	Athani	50.8	2140.	Mudhot	33.9
2121.	Ramdurg	17.07	2141.	Tendal	17.2
2122.	Banhatti	22.74	2142.	Talikot	17.1
2123.	Sankeshwar	28.6	2143.	Basawanabawadi	51.2
2124.	Chikodi	33.61	2144.	Indi	39.8
2125.	Saundattiyelloma	17.14	2145.	Husgurd	22.99
2126.	Kannaur	45.4	2146.	Mahal Ingapur	28.0
2127.	Kudachi	34.2	2147.	Badami	39.8
2128.	Sadaya	28.34	2148.	Kannur	11.6
2129.	Hukkeri	28.00	2149.	Muddibihal	28.6
2130.	Raibag	23.00	2150.	Sindgi	39.5
2131.	Mudhal	34.4	2151.	Sirsi	33.8
2132.	Khanapur	34.4	2152.	Karwar	7.7

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2153.	Dandeli	22.7	2173.	Shiggaon	11.7
2154.	Kumta	30.3	2174.	Kundagol	11.8
2155.	Bhatkal	19.1	2175.	Alnavar	28.9
2156.	Hanonur	13.5	2176.	Sherahatti	23.12
2157.	Haliyal	35.0	2177.	Gulbarga	40.0
2158.	Yellapur	28.2	2178.	Yadgir	40.0
2159.	Hubli-Dharwar	51.2	2179.	Shahabad	23.2
2160.	Godag-Betgeri	45.7	2180.	Aland	28.3
2161.	Ranibennur	51.2	2181.	Shorapur	28.3
2162.	Haveri	34.4.	2182.	Chitapur	23.2
2163.	Lakshemeshdar	11.21	2183.	Sedam	28.8
2164.	Savanur	39.8	2184.	Gurmatkal	17.1
2165.	Naregal	11.2	2185.	Chincaoli	17.1
2166.	Gagendragad	11.5	2186.	Nadi	29.2
2167.	Annigeri	34.2	2187.	Bidar	40.0
2168.	Byadgi	34.4	2188.	Basarkalyan	N.A.
2169.	Hanagal	17.4	2189.	Hummabad	28.5
2170.	Ron	22.9	2190.	Chijaguppa	17.5
2171.	Naralgund	12.4	2191.	Bhalki	28.8
2172.	Nargund	17.2	2192.	Raichur	51.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2193.	Gangavathi	28.96	2213.	Nagamargale	34.4
2194.	Koppal	51.2	2214.	Thyamagondhu	45.6
2195.	Sindhanur	28.34	2215.	Sangapura	17.28
2196.	Manri	12.00	2216.	Tumkur	56.8
2197.	Lingrugur	28.13	2217.	Tiptur	45.4
2198.	Mudgal	28.13	2218.	Sira	34.04
2199.	Deodurg	17.10	2219.	Madhugiri	28.37
2200.	Kushtagi	28.6	2220.	Kunigal	23.6
2201.	Munirabad	11.45	2221.	Chikangakanapalli	34.2
2202.	Bangalore	102.7	2222.	Gubb	23.0
2203.	Doddaballapur	45.4	2223.	Bavagada	39.2
2204.	Chanapatna	45.4	2224.	Thurunekore	11.7
2205.	Ramanagram	39.8	2225.	Koratagore	34.1
2206.	Kanakapura	34.08	2226.	Davanagore	51.2
2207.	Magadi	17.3	2227.	Chitradurga	45.3
2208.	Anekal	45.4	2228.	Harihar	34.4
2209.	Haskote	35.0	2229.	Hariyur	34.0
2210.	Devanahalli	23.4	2230.	Challakore	33.9
2211.	Vyazapura	12.4	2231.	Hesdurga	34.0
2212.	Yelahanka	22.3	2232.	Halakore	34.2

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2233.	Jagalur	39.6	2253.	Kamalpur	12.8
2234.	Turuvanor	17.0	2254.	Kottur	33.9
2235.	Nayakonda	23.0	2255.	Amaravathi	28.8
2236.	Nayakonahatti	22.6	2256.	Tekkalkota	14.4
2237.	Kolar	61.0	2257.	Hagasi	28.6
2238.	Chikabullapur	49.8	2258.	Hampi	14.4
2239.	Chintamani	44.0	2259.	Mysore	62.5
2240.	Mulbagal	39.4	2260.	Chamarai Nagar	39.5
2241.	Siddleghatta	32.8	2261.	Kollegal	33.8
2242.	Bangarpet	51.2	2262.	Nangangund	34.2
2243.	Gausibidanur	34.2	2263.	Hunsur	39.7
2244.	Malur	45.6	2264.	Krishnaraja Nagar	39.8
2245.	Srinivaspur	44.0	2265.	Gudlupet	28.2
2246.	Pagepalli	22.7	2266.	Bannur	22.9
2247.	Manchenapalli	17.8	2267.	Periyapatna	17.3
2248.	Bellary	56.9	2268.	Thirumakudlu Nasanpur	28.5
2249.	Hospet	46.2	2269.	Sargur	17.5
2250.	Kampli	11.9	2270.	Yelandur	11.4
2251.	Hospanapalli	28.2	2271.	Udipi	35.8
2252.	Siruguppa	22.7	2272.	Coondapur	30.22

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2273.	Karkal	28.1	2284.	Mercara	39.4
2274.	Puttur	22.5	2285.	Virajpet	28.2
2275.	Malpe	13.4	2286.	Samwarpet	28.2
2276.	Mulki	22.7	2287.	Kushalanagar	33.8
2277.	Shivalli	N.A.	2288.	Uluguli	22.6
2278.	Shirna	N.A.	2289.	Ponnampet	22.6
2279.	Vdyavar	N.A.	2290.	Genikoppal	22.6
2280.	Gangolli	N.A.	2291.	Hebbale	22.6
2281.	Someswar	22.5	2292.	Kodlipet	17.1
2282.	Tonsewest	22.5	2293.	Saviraranthe	17.1
2283.	Pranthya	28.5	2294.	Suntikopper	11.4

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CONNECTIVITY INDEX OF URBAN CENTERS

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2295.	Dhubri	30.5	2315.	Howli	11.7
2296.	Kokrajhar	28.6	2316.	Sartnebari	16.8
2297.	Goalpara	19.3	2317.	Kamakkhya	6.2
2298.	Bonjaigaon	29.8	2318.	Sorbhog	17.4
2299.	Gausipur	34.4	2319.	Pathsala	N.A.
2300.	Bkasipara	14.2	2320.	Amingaon	19.3
2301.	Mankachar	17.5	2321.	Palasbari	25.4
2302.	New Bongaigaon	28.8	2322.	Tihu	28.8
2303.	Sapatgram	12.0	2323.	Tejpur	40.5
2304.	Bijni	40.0	2324.	Mangaloai	36.0
2305.	Abnayapuri	23.8	2325.	Rangapara	28.9
2306.	Laknipur	34.1	2326.	Kharupatia	12.1
2307.	Gauhati	65.8	2327.	Dikiajuli	29.0
2308.	Pandu	24.9	2328.	Tangla	39.8
2309.	Barpeta	24.6	2329.	Biswanathcharali	52.3
2310.	Barpeta Road	23.0	2330.	Nowgong	52.3
2311.	Guakuchi	11.7	2331.	Lumbding	28.9
2312.	Nalbari	34.4	2332.	Hojai	23.0
2313.	Mir Hagu	11.7	2333.	Dhing	36.2
2314.	Rangia	51.5	2334.	Jorhat	71.9

Sl. No.	Urban Centers	Connectivity Index	Sl. No.	Urban Centers	Connectivity Index
2335.	Sibsagar	57.8	2351.	Namrup	24.0
2336.	Golaghat	52.1	2352.	Makum	40.4
2337.	Mariani	40.1	2353.	Bihpuria	28.6
2338.	Dergaon	17.5	2354.	Chabua	29.8
2339.	Nazira	29.6	2355.	Diphu	28.6
2340.	Morannat	22.9	2356.	Haflong	28.6
2341.	Amguri	40.0	2357.	Silichar	41.5
2342.	Senari	17.2	2358.	Karimganj	47.9
2343.	Dibrugarh	24.9	2359.	Hailakandi	44.4
2344.	Tinsukia	45.9	2360.	Badarpur	47.9
2345.	N. Lakhimpur	39.8	2361.	Ramkrishnanagar	23.0
2346.	Digboi	34.4	2362.	Latu	25.0
2347.	Duliagaon	13.0	2363.	Lakhimpur	25.0
2348.	Naharkatiya	12.8	2364.	Aijal	16.9
2349.	Doomdooma	40.0	2365.	Lungleh	16.9
2350.	Margherita	29.8			

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CONNECTIVITY INDEX OF URBAN CENTERS

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Sl. No.	Urban Centers	Connectivity Index
2366.	Agartala	16.98
2367.	Knowai	5.72
2368.	Dharmanagar	17.3
2369.	Kakasahar	6.8
2370.	Tirupura	17.3
2371.	Jadnakishorepur	16.9
2372.	Beloia	5.7

M A N I P U R

2373.	Churachandpur	11.3
2374.	Imphal	39.5
2375.	Khabuching	5.8
2376.	Moirang	22.5
2377.	Tadubi	17.1
2378.	Bishenpur	17.0
2379.	Nambol	N.A.
2380.	Lamlai	N.A.

M E G H A L A Y A

2381.	Shillong	17.3
2382.	Jowai	11.5
2383.	Mawlai	N.A.
2384.	Tura	16.9

N A G A L A N D

2385.	Kohima	17.17
2386.	Dimapur	34.3
2387.	Mokokchung	0.1

2388.	DELHI	109.7
2389.	CHANDIGARH	48.4
2390.	PONDICHERRY	45.1

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