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URBAN SYSTEM OF MALWA : AN APPROACH TO STRUCTURE AND ORGANISATION OF URBAN HIERARCHY

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ABSTRACT : The paper presents a methodology for ranking of towns and demarcation of their hinterlands within hierarchical framework of urban system in a region of marked geographical homogenity and uniform distribution of population. After a brief exposition of the spirit and approach of systems holistic perspective of towns of a region, the paper first explicates the problems of hierarchical ranking of towns as central places. A measure of centrality is devised then by reducing the total score of each of the selected central services in inverse proportion to the number of units in them. These reduced values of a function in a town are summed to work out the centrality score, which too is in turn similarly combined with the passanger bus service nodality and population size of towns to arrive at the Composite Centrality Index. On the basis of natural breaks in the array of each of these indices towns are ranked into 5 hierarchical orders. The hinterlands of towns are demarcated on the basis of analysis of passanger bus service linkages amongst the towns. Thus a nested hierarchy of central places is worked out, dividing the region into 2 I–order, 6 II–order and 15 III–order nodal regions.

The paper concludes with a historico–geographical interpretation of the urban system, which is closely tuned to a central place system. The rich, hospitable and congenial geographic personality of Malwa, the location of towns in most excessible central positions, and the virtual absence of highly localised mineral and power resources have conjoined their hand to augment this close consonance between them. However, this study reveals the static nature of central place theory unable to accommodate differential growth rates of towns, and the whole urban system of Malwa is found to be structured on two I–order towns rather than around a single centre of the highest order.

The present paper is essentially methodological in its purport, and seeks to provide a method for an analysis of spatial organisation within the conceptual framework of central place system. It thus attempts at the grouping or ranking of towns as central places and demarcating their hinterlands or areas of their commands; i. e. at defining the central place hierarchy – its structure, organisation, and functioning as a spatial system. Besides, it investigates the structural organisation and functional efficacy of the region under study as a coherent system and interepretes

them in the context of the geographical disposition of the region and recent historical developments. However, in order to avoid the tentalising problem of defining the lower limit of central places, only all the towns of the region, as per 1971 Census, have been reckoned with.

The Region

The Region covers the portion of Malwa Plateau falling under Madhya Pradesh only, for which the simplified name of 'Malwa' is adopted in this paper. It is an extensive plateau surface covering north-western M. P. extending from Narmada riyer in the south to state border with Rajasthan in the north, and from Sagar district in the east to the western border of state with Gujrat and Rajasthan though a little of actual Malwa extends over the adjacent parts of these states also. It covers an area of little below 105,000 Sq. Km. The total population of the region, as per 1971 Census, is 11,045,000, living in 19,304 villages and 84 towns, the latter ranging in size from below half a myriad to well overa half a million and containing approximately 24 per cent of the total regional population. The distribution of rural population as well as the spacing of town is notably even. The region is essentially a somewhat undulated plateau surface (general altitude a little over 500 metres above sea level), covered with thick piles of extrusion lava, upon which developed the typical, rich, black soils, dotted here and there by 'mesa' like flat-topped hill features. It is fairly drained by several north-flowing rivers. For one thing, it is almost devoid of all important mineral and power resources, which cripples all scope of heavy industries in the region. While the region slowly merges into the dissected alluvia on the north and into the forested hills on the west, it is abruptly abutted on the south by the bold Vindhyan scarp overlooking the deep, structural valley of Narmada river, its boundary on east is of course rather vague and debatable.

Introduction : A Holistic Perspective

Geographical studies of individual towns, whatever their depth and detail of treatment, constitute merely a piecemeal treatment, unless they lead to the general picture of urban situation of a region as a whole. This is particularly so because geography seeks to discern regions with an un-mistakable degree of unity and coherence within each region. This intrinsic unity and coherence may relate to 'anatomical homogenity'-as in the case of a formal region characterised by uniformity of basic elements and components that make the geographical personality of the region or much more importantly, it may relate to 'physiolgical wholeness,' i. e. completeness of functional organisation of the region as a spatial system as in the case of what has come to be known as a functional or nodal region. This point of view, a holistic, panoramic perspective of regions, for an urban geographer can be realised only when he can conceive out of the entities of individual towns a fabric of inter-woven components and elements, which together, and through their complementary functioning, comprise an operational entity and functional whole. Set amid the rural populace, these towns of various sizes and orders, make the cordinal points of the functional regional system, where its key functions are discharged so that the whole engine of the regional system keeps rolling. In essence, the towns, in this approach, are looked upon as 'parts of a whole,' as functional centres of a system. It is the way the regional spatial system is organised and keeps its life apace that is emphasized, i. e. its structural and operational aspects. This conceptualisation of regional urban, system or of the spatial organisation of a whole society, takes geography closest to the 'organic theory of society.' No wonder then that although Walter Christaller (1933) is the celebrated pioneer who gave a theory of the organisational structure of such a system with a sound field example (his classical Central

Place Theory), the rudiments of these ideas are traceable in the works of certain sociologists, such as Lalaune (1863), Galpin (1915) and Kolb (1923), much before Christaller.

Though a hierarchical taxonomy can be applied to any type of regions, it is most fruitfully applied to functional or nodal regions. Granting that a higher order town has functional complexes appropriate to all the lower orders also, apart, of course, from that of its own specific order, it is obvious that towns of various of rank orders as well as their hinterlands of various orders should inherently group themselves with or within one or the other of higher order hinterands.

This nesting pattern of hinterlands (nodal regions) and the grouping or alignment pattern of towns with specific size, spacing and functional characteristics comprise the structural elements of central place hierarchy. It is through such an organisation that a set of towns distributed over a certain territory functions as an urban system.

Rank-Size Relationship : A Parallel Approach

In the meanwhile, there has evolved another parallel approach towards discerning a coherent system in an spatial organisation. It is represented by studies on what has popularly come to be known as the ' Rank-Size Relationship.' This is, in fact, a diagnostic analysis which verifies the existence of system of cities in only a very subtle system manner. Vertical distribution of city sizes, forms yet another dimension of an urban system. As obviously derives from fundamental logic, there occur progressively fewer towns of larger size and the vice-versa, so that city size distributions are strongly skewed positively (Richardson, 1978, p239). As later substantiated through the hierarchical analysis of towns the rank size curve for Malwa also clearly attests to the fact that towns of Malwa together comprise an urban system, and the city size curve stands in good harmony with the ' Rank-Size Rule ' of Zipf (1941) as well as the stepped curve of city size distribution postulated by the Christaller-Loschian model of central place theory. It stands, in fact, between these two rather radically different curves of city stze distribution (Jain, 1980).

Defining Urban Hierarchy

The methodological problem is complex and multi-dimensional one aspect is the determination of the centrality status and brea king the array of towns into discrete groups. Another aspect is the delimitation of hinterlands of town of differerent order of central services. Both of them involve further problems. For the first, there is no single yardsick to measure the general or total centrality of places. No single fuction is so all important, and no two functions have perfect correlation between them so that any one of them might be taken. Therefore, one is forced to select a number of significant criteria, which corners the worker to subjective decisions regarding this selection. Then again, there is the fundamental problem of combining them into single index giving the total or general centrality status of towns. Unless the functions are valued in terms of a common unit, they cannot be combined. Also it involves the problem of weighting the functions before they can be rationally combined. To this effect one has first to convert the counts of each function is some index of score points, then give them appropriate relative weightage, before they can finaly be summed up to get total centrality index of each town. Giving proper relative weight to each function in an objective way, is, however, a very tentalising and elluding problem. Deriving from this there appears the problem of hinterland delimitation. Each of the central services selected draws its clientage from territories which coincide with those for other services only very approximately and roughly, and some adjustment of hinterland boundaries becomes an indispensible manipulation, in order to outline a composite or

general hinterland boundary. Moreover, as is implicit in the central place theory, while each high order town has a correspondingly larger hinterland, it also has smaller hinterlands for each successively lower order of function. 'No such thing (hinterland) exists without appropriate qualification as to the level at which it is being considered.' (Carter, 1972, p. 101).

Nevertheless, the rationality of such a hierarchical scheme derives from the general experience which leads to the contention that ' certain functions will become associated in distincive comlexes, each complex in turn associated with a fairly clearly marked grade or rank in the hierarchy ' (Carter, 1972 P· 101). The same contention holds also for the hinterlands of these functional complexes or ' trait complexes '. Related with the problem of adjustment of hinterland boundaries is also, sometimes, the problem of their nesting.

The Present Method of Town Ranking

The method employed for the present study consists of selecting a set of significant criteria of centrality, hereafter called the central functions or services, for all towns of the region, giving them some relative weightages, and summing up these weighted values for all functions for each town the general centrality scope. The towns are then grouped into hierarchical orders of centrality on the basis of this total centrality scope by locating natural breaks in the array of this score. Hinterlands are, however, delimited by single, most significant criterion – the predominent orientation of bus service linkages, the bus service nodality.

Key Criteria: Selected Central Services – Criteria selected for the present study are divisible into 3 groups:–

(1) (a) Administration, (b) Education, (c) Postal services, (d) Hospitals, (e) Hospital beds, (f) Banks and credit societies, (g) Cinemas, (h) Number of telephones.

(2) Bus service nodality–number of total and qualifyng daily bus services.

(3) Population size of towns.

Bus service nodality is treated separately because ;

(1) it is much more important than any other single function ;

(2) whereas other criteria are only institutional symptoms of presence of a function, bus service directly is a flow link between town and country ; and (3) hinterlands are delimited by this criterion ; therefore, it was imperative to work out a separate hierarchy by this criterion alone also.

Population size is first treated as a yard stick against which the total score of central services, and that of bus nodality of towns were examined, and correlated. Then population itself was treated as a third group of traits of centrality, because not only is population size a good indicator of general status of towns, particularly in a region where most of towns are essentially central places such as Malwa is, but also because population–whether in central or non–central sectors–provides market for rural population around through its needs for essential services such as daily supply of milk, vegetables, foodgrains, general labour and other maintainance services etc.

Weighting the Central Services–In order to work out total centrality of towns, centrality values given to a town by each function needed to be summed up. A fundamental pre–requisite of any combination of different functions is that they should be properly weighted and converted into a common unit. In the want of a simple and yet sound method of weighting, a method was devised, partly deriving from Aboidun (1967) and Davies (1967). In the first stage, two sub–groups of central services were recognised :

(a) Those, that were given in the form of total numbers, like telephone connections, banks, cinemas, and number of hospital beds. These numbers are very large.

(b) Those in which certain conventional categories are recognised, and units of each category are separately given, such as

University, College, and schools, or state headquarters, divisional headquarters, district headquarters and tahsil headquar, ters, etc. For this latter class of functions-higher categories were given higher score points, in a geometric progression, such that each higher category was given double the score points than the immediately lower category. Thus, if a town had 1 head post office, 3 sub-post offices, and 7 branch post offices, each of which bore 20, 10 and 5 score points, respectively then the total score in postal services in that town would be

$(1 \times 20) + (3 \times 10) + (7 \times 5) = 20 + 30 + 35) = 85$ points ;

similarly for other towns.

Whereas the common sense rationality of this scoring on the basis of general categorisation of such services, prevalent in the region, recommends itself, the procedure involves some critical decisions, such as follows :

(1) The value of lowest category-there is only a limited danger of subjective arbitration in this, because it would affect all the towns similarly, so that their relative position would not be disturbed. Even if some other value were selected there is no reason, notes Aboidun (1967, p. 181) why same order of hierarchy should not reproduce.

(2) Number of categories recognised-this is an extremely critical decision, and with immense caution the conventional division was followed.

(3) The manner of progression of score points to successively higher categories - a common knowledge of usual relative number of functional units in each category, and their relative status, suggests that this progression should be geometrical. But, again the critical decision was as to the multiplying constant. To avoid amplification of implicit complications, this was kept at the lowest whole number that could give a progression, i. e. 2.

Obviously, the whole procedure involves certain critical decisions. To reduce to the minimum the subjective element, the same score -5- of lowest category and same multiplying constant-2 was adopted for all functions concerned. Number of categories was also kept at 3 for postal and hospital services, and at 4 for educational services.

In the second stage of weighting, these score points for second sub-groups, and original numbers for the first sub-group were arranged in a common table. Now proceeding along the line of Davies (1967, p. 63), these values were weighted in the inverse proportion of the total of respective functions, i. e. larger the total smaller proportionately will be value of its each unit. To effect this; each function was summed up and the mean of the sums worked out as follows :

$$\bar{f} = \frac{f_1 + f_2 + \ldots f/n}{n}$$

Where n is number of functions; f=function; and $\bar{f}$=the mean sum.

Then ratio of mean sum to the total of each function was worked out:

$$Rf_1 = \frac{\bar{f}}{f_1}; \quad Rf_2 = \frac{\bar{f}}{f_2}; \quad Rf_n = \frac{\bar{f}}{fn}$$

Where, Rf is the ratio of corresponding function to the mean sum, $\bar{f}$.

Table : I Ratios of $\frac{\text{Mean sum}}{\text{Actual sum}}$ or $\frac{\bar{f}}{f}$ for various functions

Rf_1	$\frac{\bar{f}}{f_1}$	Administration	5.951
Rf_2	$\frac{\bar{f}}{f_2}$	Education	1.136

Rf_3	$\frac{\bar{f}}{f_3}$	Postal service	0.838
Rf_4	$\frac{\bar{f}}{f_4}$	Hospitals	1.562
Rf_5	$\frac{\bar{f}}{f_5}$	Hospital Beds	0.487
Rf_6	$\frac{\bar{f}}{f_6}$	Banking & Credit service	0.543
Rf_7	$\frac{\bar{f}}{f_7}$	Cinemas	2.160
Rf_8	$\frac{\bar{f}}{f_8}$	Telephones	1.137

These Rf values are the weights of each function relative to the mean sum. The values of all towns for each function were then reduced by the corresponding ratios- lits Rf values- and re-arranged in the fina table.

By summing up these weighted values of all functions for each town, the total centrality score was arrived at. Plotting these values against population size of towns (Plate 1-A) hierarchical orders can be identified easily.

Results of the Analysis

Plate1-A showing centrality score of towns plotted against their population sizes on a log-log scale, clearly reveals 5 discrete hierarchical orders. Of them first two are quite obvious, and the third one also fairly discrete, but the fourth order containing the bulk of small towns, is rather much diffused both in range of central score as well as in the population sizes it covers. The lower-most class with less than 50 score and below 8 thousand population size, and containing only 6 towns, is pretty insignificant. The number of towns in each class, and their progression for the rank orders is as follows:

Table-II

Malwa : Hierarchical Classes of Towns Based on Centrality Scores

Class	I	II	III	IV	V
Number of towns ..	2	3	11	62	6
Co-efficient of progression..					
('K' values)	1.5	4	5.5	0.1	

An important excercise in most of the central place studies has been to show correspondence between centrality and population of centres. In the case of Malwa which has much fewer and lesser cases of non-central place towns, the present study shows a fairly high positive correlation, r = (+) 0.70, between them. Also, there are fairly discrete and diagnostic population ranges corresponding to each rank order of the hierarchy, which are as follows : (barring only 2 or 3 obvious and notable deviants).

Table–III

Malwa : Population Ranges Corresponding to Hierarchical Classes

Class	Population range (Continuous) (in 000)	Population range (Discrete) (in 000)
I	250 and above	385–560
II	100 – 250	120–210
III	30 – 100	25 – 65
IV	6 – 30	6 – 20
V	8 or less	4 – 8

At this juncture, it would be an immensely interesting exercise to compare the characteristic population ranges with those found in other major studies. Davies (1964) has charted out such findings of a few major studies in different parts of the world. Plate 1–F is an adaptation of that chart, to which findings of the present study have been added.

As regards areal distribution of towns by rank orders, there is an almost north-northwest, south- southeast running stretch in the western part of Malwa which has comparatively more frequency of higher ranking towns. It covers western Mandsaur, Ratlam, Ujjain and Indore districts and Dhar, Dewas, Shajapur and Agar tahsils (Plate 1-G). To its south west and east there are quite a few lower ranking towns. In the eastern Malwa, occurrence of higher ranking towns (three upper ranks) is distinctly more spotty and farther apart.

Composite Centrality Index :

A Combination of Key Criteria

Finally, bus service and population size were also combined with the centrality score, and thus the final 'Composite Index' of centrality was worked out. Once again this involved the weighting problem. And even before this, bus service nodality needed to be converted into a single index through some combination of total and qualifying services. The real hitch was that qualifying services were much more important than total services, and total services were seriously boomed in some cases where a town happened to be on thorough fare or very near a big city. Therefore to combine them, with least ambiguity, the total and the qualifying bus services were multiplied and the square root of the product was extracted. But in this, the towns with nil qualifying services and good many total services were drastically belittled as this gave them a zero value. In such cases, therefore, root of half the number of total services was taken. So derived, the bus service nodality index gives a very high direct correlation ($r = +0.97$) with centrality score and with population size of towns.

Now all the three variables were tabulated and bus service index, and centrality score were weighted proportionately by ratio of their respective totals to the total population size. The weighted values, were then combined with population size, which gave the overall or 'Composite Index' of centrality of each town. By plotting these 'Composite Index' values against population size ranks of towns Plate 1-B was obtained, on which again 5 hierarchical rank orders are identified. Here again the orders are quite distinct and discrete at top, and become progressively less so down the hierarchy. Upper three rank orders are almost self–evident. Thence downwards, there is more or less continuous scatter of points, so that the class limit between IV and V class is

weak with only narrow gaps at 30 and 35 on the scale of composite Index. Here 30 has been taken as the limit, though Sonkatown is almost on it (29.8). The upper three classes here again have much the same members as they do in the corresponding classes of centrality score, with only one notable change–Rajgarh from its high position in class III has now fallen to class IV, because not only it is very small (11.5 thousand population) in size, but in bus service nodality also it is quite poor. It is only in services that this town is rather unusually high. Two rather large towns, Bina and Nagda, could not improve their positions here also, because both are poor in bus–service nodality. They are simply special purpose, non–central towns, extremely specialised in single function; but the case of Bina badly exposes a glaring weakness or inadequacy of data–base, as only road passenger traffic was considered and railway service excluded. That is why this solely railway junction town is though extremely specialised in transport, it appears so poor in passenger transport nodality.

Two lower classes are, however, not comparable. On the Centrality Score, IV class has 62 towns, while the V class has only 6, whereas in the Composite Index they have 40 and 30 towns, respectively.

Difference between the Results of the Two Analyses

The overall difference in the results of Centrality Score and Composite Index is that quite a few towns, particularly the smaller ones, have moved a little downwards. This is because many of criteria or central functions are somewhat administration–biased. Not only is administration incorporated directly, but certain services like post offices, colleges, banks etc. also are planned to locate conformally with administrative hierarchy. Thus, many of the small towns have some substantial central functions largely because they are headquarters of a tahsil, or sometimes even of a district. Raisen and Rajgarh are good examples of this situation. It shows that towns below about 20-25 thousand level are mostly incipient and indistinguishable from one another. What matters them most is t (1) whether they are headquarters of atleast a tahsil or not, and (2) whether they stand on an important route or at the junction of a few routes, at least one of them being an important route. An under–current, ubiquitous factor is, of course, the density of rural population.

Thus, there is but a mild change in results of ranking first by Centrality Score and subsequently by Composite Index. As such there is little difference in the distributional pattern of towns resulting from the two indices. Western Malwa, particularly the same tract covering districts of Mandsaur, Ratlam, Ujjain and Indore, and the adjacent tahsils of Dhar and Dewas contnues to have a dominant share in towns of upper three classes, while in eastern Malwa they are fewer and farther apart (Plate 1–E). This difference between eastern and western parts of Malwa has become slightly accentuated from Centrality Score to Composite Index result. This is because in the two indices, bus service nodality is the major differentiating factor, which is usually better developed in the towns of western Malwa than in those of eastern Malwa (Plate 1–A & B).

Nodal Regions of Malwa : Bus Service Hinterland Definition

In order to avoid the tentalisting problem of adjustment of boundaries, noted before, to work out composite hinterlands, the latter were delimited on the basis of the predominent orientation of passanger road transport services only. To a large extent, the method derives from the use of number of public road transport services between town and country and amongst the towns, as applied by Green (1950) and later further accomplished by Carruthers (1957).

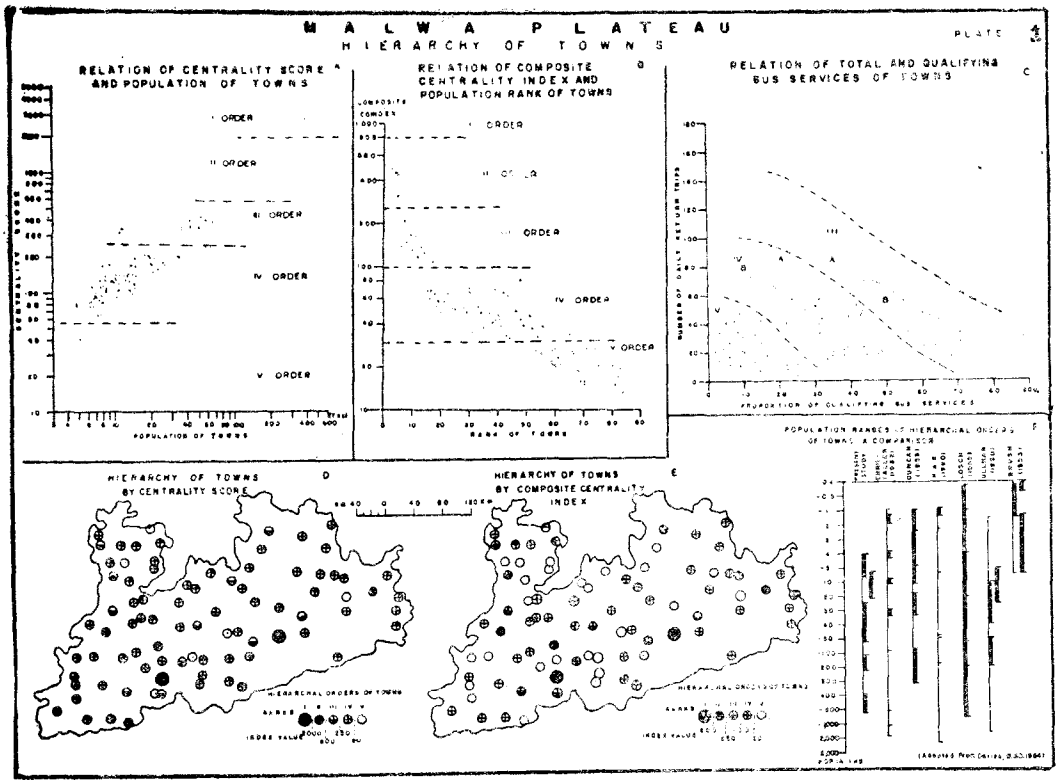

Fig. 1

In such studies the passanger road transport links are employed as ' means defining areas looking to certain places which act as service centres, the assumption here made is that the count of the amount and type of public road transport into any centre, reflecting physical accessibility and the existence of some sort of town-country association, will give a fair indication of status (of towns) (Carruthers, 1957, p. 372), The relevance and significance of bus service nodality may be assessed by the fact that it has a very high positive co-efficient of correlation with Centrality Score (r = 0.97) and with the population size of towns (r = 0.97), while a high value (r = 0.70) obtains between these two latter elements.

To delimit hinterlands of towns at various orders of hierarchy it was inherently imperative to work out a hierarchical ranking of towns also by this criterion solely. Now out of the total number of return bus services issuing from or passing through a town such services were distinguished and counted separately as served no place larger than itself. Thus there were two sets of data-the number of total daily return trips from or through each town, and from amongst them the number of daily return trips serving no place larger than the origin town itself. This is a fundamental distinction recognised by both Green and Carruthers, (Carruthers, 1957, p. 373). Following the logic that a bus service linking a number of towns should be regarded as belonging to the largest of them, they contend, that services issuing from a town serving only smaller places should accrue to the bus service centrality of nodality of the fomers, and remaining, through services, while strengthening its linkages to some other larger town/s, do not add to the centrality of the town in question. Thus

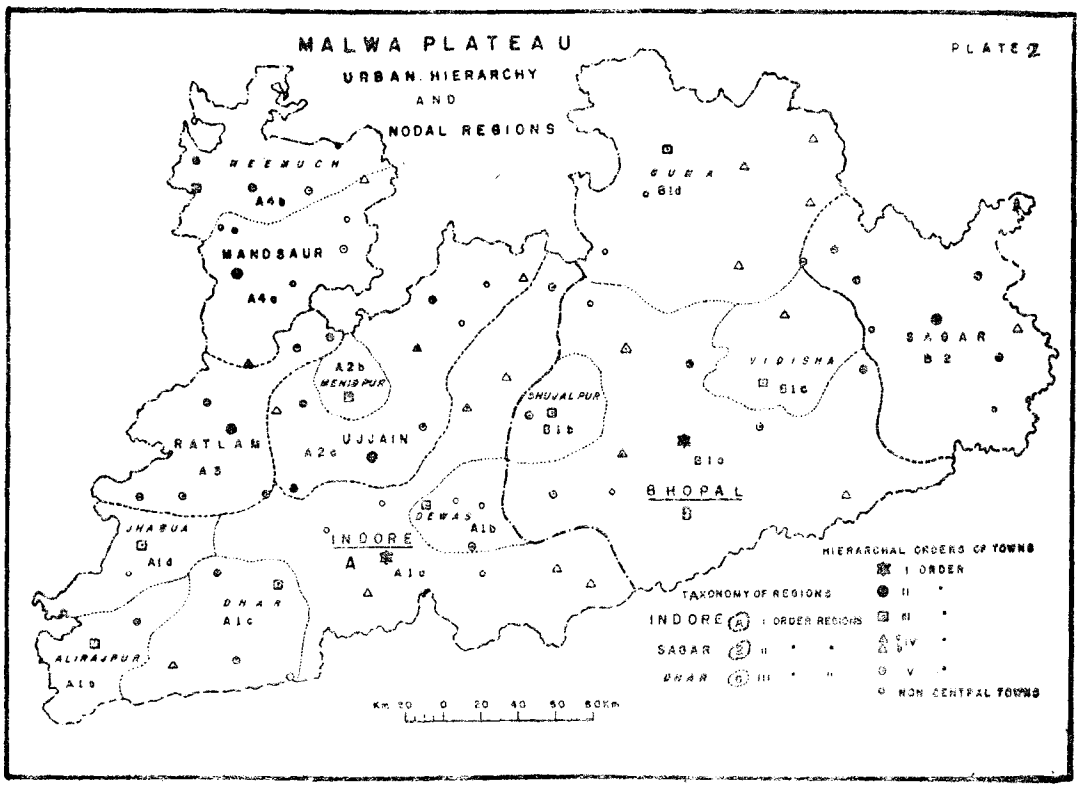

Fig. 2

while the total number of services indicates the strength of functional relationship of a town with both larger and the smaller towns as well as the villages, the number of services to only smaller places signifies the extent to which a town is functioning as an independent centre for other smaller places around. The latter are thus regarded as 'qualifying' services, i. e. services the presence of which qualifies a town to be deemed as a functional centre of an area. To express these latter services relative to the former they are converted as percentage of the former.

Plotting these total daily return bus services on Y-axis against qualifying services expressed as percentage of the former on the X-axis, Plate I-C was obtained. On this scatter plot 5 more or less discrete orders are easily discernible. It should be noted that both the class I towns – Indore and Bhopal – fall outside the graph, so that boundary between I and II classes does not appear on the graph.

Though a sub-class each has been recognised the II, III and IV classes, separate hinterlands for rank orders of these sub-classes has not been attempted. Also, hinterland boundaries have been drawn actually for only upper three rank orders. Grouping or nesting of towns into classes involved an intrinsic combination, with the numerical method indicated, of personal judgement and a knowledge of local conditions in some cases. Now, towns were again grouped into five orders of bus service nodality (which was worked out by multiplying the total and the qualifying services and extracting the root of the product, as explained in the preceeding pages).

To delimit the hinterlands, also rcalled

nodal regions, the number of daily return bus services from each town to all other towns of the region were noted in the form of a matrix, on the basis of which a linkages map was prepared in the form of a topological graph, showing bus linkages as direct radial lines from each town to all those towns with which it has bus connections and to the country-side. These radial lines were grouped, or quantified, according to the number of daily return bus trips they represented. This map portays the relative nodal status as well as the orientation of towns (i. e. the volume, range, and direction of nodality). On the basis of this linkage map hinterland boundaries were drawn as noted before, also keeping in view, where necessary, terrain conditions, route orientation, administrative boundaries, and physical accessibility of local areas. Thus, nodal regions were obtained showing boundaries of hinterlands of upper three rank orders only, to which the towns classified by ranks of bus service nodality were also added, so that the map provides a complete picture of bus service hierarchy and nodal regions. This map has also facilitated the association or nesting of lower order towns to the appropriate higher order towns.

Regional Taxonomy and Nested Urban Hierarchy of Malwa

On the basis of bus service linkages amongst towns and from towns to the countryside, Malwa is divided into 2 I-order regions western and eastern Malwa, commanded respectively by Indore and

Table IV
Malwa: Taxonomy of Nodal Regions

	MALWA				
I Order	A WESTERN MALWA (INDORE)		B EASTERN MALWA (BHOPAL)		
			B1		B2
			BHOPAL		SAGAR
II Order			B1a Bhopal		B2a Sagar
			B1b Shujalpur		
III Order			B1c Vidisha		
			B1d Guna		
	A1	A2	A3	A4	
	INDORE	UJJAIN	RATLAM	MANDSAUR	
	A1a Indore	A2a Ujjain	A3a Ratlam	A4a Mandsaur	
	A1b Dewas	A2b Mehidpur		A4b Neemuch	
	A1c Dhar				
	A1d Jhabua				
	A1e Alirajpur				

Table V

Malwa : Nested Hierarchy of Smaller Towns

III Order Centres	Nested IV order towns		Nested V order and other non-central towns
A1a INDORE	A1ai	Indore	Susner*, Depalpur*, Bagli*
	A1aii	Mhow	Mhowgaon*
	A1aiii	Kannod	—
	A1aiv	Khategaon	—
	A1av	Shajapur	—
	A1avi	Sarangpur	Biora
A1b DEWAS	A1bi	Dewas	Hatpipalya, Sonkatch, Bhaurasa*
A1c DHAR	A1ci	Dhar	Sardarpur, Manawar, Dharampuri*
	A1cii	Kukshi	—
A1d JHABUA	A1di	Jhabua	Ranapur*, Thandla
A1e ALIRAJPUR	A1ei	Alirajpur	Jobat
A2a UJJAIN	A2ai	Ujjain	Badnagar, Tarana
	A2aii	Rajgarh	Khilchipur*
	A2aiii	Agar	Susner, Nalkhera*
	A2aiv	Khachrod	Nagda
A2b MEHIDPUR	A2bi	Mehidpur	—
A3ai RATLAM	A3ai	Ratlam	Sailana, Badnawar, Petlawad
	A3aii	Jaora	Tal, Alot
A4a MANDSAUR	A4ai	Mandsaur	Sitamau*, Narayangarh,* Malhargarh*
	A4aii	Bhanpura	Garoth*, Shamgarh
A4b NEEMUCH	A4bi	Neemuch	Jawad, Manasa. Rampura, Gandhisagar*
B1a BHOPAL	B1ai	Bhopal	Berasia, Raisen, Begumganj
	B1aii	Sehore	Ashta, Ichhawar*
	B1aiii	Baraily	—
	B1aiv	Narsingarh	—
B1b SHUJALPUR	B1bi	Shujalpur	Akodia
B1c VIDISHA	B1ci	Vidisha	—
	B1cii	Basoda	—
B1d GUNA	B1di	Guna	Raghogarh,* Chachaura*
	B1dii	Mungaoli	—
	B1diii	Sironj	—
	B1div	Ashoknagar	Chanderi
B2a SAGAR	B2ai	Sagar	Rahatgarh*, Bina, Khurai, Kurwai, Banda, Deori*
	B2aii	Garhakota	Rehli

Note : Towns marked with * are non-central towns, i. e. devoid of any 'qualifying' bus service.

Bhopal cities. Western Malwa is further sub-divided into 4 II-order and 10 III-order -regions, while the eastern Malwa is sub divided into 2 II-order and 5 III-order regions. Thus there are 2 I-order 6 II-order and 15 III-order regions, each commanded by an urban centre of corresponding order of hierarchy.

Besides the centres of the upper echelons of nodal regions, other humbler places-of IV - and the V order-are nested with appropriate III order centres on the basis of relative distance, connectivity, route orientation and other local geographical conditions.

It is worth noting that an important class IV order town-Jaora in Ratlam district is extremely marginal between the hinterlands of Ratlam and Mandsaur. Class IV towns of Alot and Tal of the same district are also nested with it. Thus through its orientation with other towns, Jaora should nest with Ratlam, even though it has a comparable number of bus connections with Mandsaur also. Badnawar town in western Malwa is again situated on the very margin between Indore and Ratlam hinterlands, whereas in the eastern Malwa, Kurwai town stands on the junction of Sagar, Vidisha and Guna hinterlands.

A Geographical Interpretation of Spatial Organisation

This study bears ample testimony to the fact that almost all towns of Malwa are essentially only central places, which in their entirity make an urban system in close harmony with the central place theory. Notwithstanding this close harmony between the actual urban system of Malwa and the theoretical central place system, the region furnishes an excellent example of the static, and, therefore inadequate nature of the Christaller-Losch model of central place system, as it does not incorporate dynamic factors like the differential growth of towns. Thus, due to the very fast growth of Bhopal into a major city recently, the whole regional urban system has come to be structured about two cities-Indore and Bhopal-rather than around a single first order centre. These two cities command the western and the eastern parts of Malwa, respectivey.

In the operational structural organisation of spatial system, the western and the eastern parts show some notable differences, with a much greater degree of overlapping or intermixing and competition among hinterlands in the western part. This is, to a great extent, the legacy of the peculiar recent history of that part, resulting in a highly intricate and intertwined territorial organisation of the numerous petty states in that part of the region. The same part also displays a larger degree of attenuating effects of major route orientations upon the size and shape of hinterlands, exemplified by the second and third order hinterlands of Indore.

The development of this urban system of Malwa in close consonance with the parameters of the central place theory was augmented and facilitated in a large measure by the fact that (1) Malwa has a notably hospitable geographical background, highly congenial to the flourishment of agriculture, trade and related central services; and (2) that the towns are located essentially on the most accessible, central locations; rather than at strategic locations with restricted approach, which was made feasible through peculiar historic processes and situations obtaining in Malwa over the last two centuries [Jain, 1979, Chapter 2 - History and Its Imprints on Evolution 'of Towns' and Chapter 5 - 'Locational Analysis of Towns' Singh (1968) p. 204-9].

This system was remarkably saved from the distorting impacts of industrialization because of the conspicuous feature of Malwa that it has a virtual lack of all major localised industrial raw materials and inanimate power resources whose inherently fortuitous occurrence bears heavy constraints upon a central place system, and renders the growth and distribu-

tional pattern of towns notably erratic.

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