METROPOLIS AND THE HINTERLAND : A SPATIAL ANALYSIS OF COMMODITY FLOWS IN INDIA

SUBMITTED IN PARTIAL FULFILMENT
OF THE DEGREE OF
MASTER OF PHILOSOPHY

by
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I certify that the dissertation entitled "Metropolis and the Hinterland : A Spatial analysis of Commodity flows in India" submitted by Miss Nandini Dutta in partial fulfilment of the Degree of Doctor of Philosophy (M.Phil.) of the University is a bonafide work, to the best of my knowledge and may be placed before the examiners for their consideration.

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Mondira Dutta

(MONDIRA DUTTA)

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INTRODUCTION

1.1 The development of transportation is closely related to economic development and the formation of economic regions in this process. Transport is the most widely pervasive service within the economy. Production of goods cannot be considered as a completed process unless these goods have been delivered to the consumer. The territorial division of labour is also not possible without transport development. Transport network provides the channels through which economic links are formed in space. The transport system is, therefore, a necessary condition for regional specialization, and developing inter-regional dependencies leading to region formation.

1.2 Earlier Studies:

It is, however, unfortunate that scientific studies in transportation are of recent origin. Studies of commodity flows in relation to the regional structure have been particularly scanty. It is only in the last two decades that significant contributions have been made to the study of this important aspect.

1.2.1 The work of Ullman[1] on American Commodity

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1. Ullman E.L., American Commodity flow, University of Washington Press, 1957

flows may be considered to be a pioneering effort in this neglected field of research. He has focussed attention on commodity traffic by rail and waterways for the year 1948. He has brought out the dominant role of the industrial belt of the north-east in the flow pattern of various manufactured commodities in the United States; he has identified the gross features of those linkages, that hold the United States economy together, in terms of a series of inter-state commodity flow maps.

1.2.2 Duncan[2] and his associates describe the U.S. economy as comprising a set of metropolitan regions within which the exchange of commodities is dominated by flows to and from the metropolitan centres. They also bring out the fact that exclusive regional specialities in production result in the integration of the national market, although a preponderance of flows are routed between the metropolitan centres themselves.

1.2.3 In Germany, significant studies regarding transportation are presented in the "Raum and Verkher" Series. The first volume examines the role of railroads

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2. Duncan O.D., et. al., Metropolis and the Region, Johns Hopkins Press, 1960

in the economic development of Germany; the second is concerned with the movement of commodities; and the third presents five essays dealing with the relationships between economy, circulation and transportation.[3] Theoretical as well as empirical studies related to the flow of commodities and the formation of economic regions are numerous in Soviet Regional economic literature but only a few are available in English — Probst, Alampiev, Bedenkova and Kistanov.

1.2.4 It is obvious from the above that transport geography is relatively underdeveloped. Commodity

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3. A review of the German series is available in Berry B.J.L., Recent Studies concerning the Role of Transportation in the space economy, A.A.A.G., Vol. 49, No.3, 1959, pp. 328; and the following working of Soviet scholars are referred to:-

   A. Probst A.E., Location of Industry Under Socialism (Theoretical essays). EKONOMIZ AT MOSCOW, 1962

   B. Alampiev P.M., Economic Regionalisation of USSR, Economic Literature, Moscow, 1959

   C. Bedenkova M.D., Rational Transport - Economic Link in the process of development of territorial division of Labour in USSR, Locations of productive Forces and Development of Economic Regions, Moscow, 1964

   D. Kistanov V.V., Complex Development and Specialization of the Economics of the economic Regions, EKONOMIKA, Moscow, 1965

flow studies are scanty and commodity flows of ex-colonial countries are conspicuous by their almost complete absence.

1.3 Historical Background

Most of the work contributed by the Indian geographers in this field so far has been narrative in nature, having very little analytical content. There has been a lack of organised effort to study transportation geography in our country. An amazing fact is that India provides a rich and reliable body of data on commodity movements in annual series which can provide an adequate base for analysis. In India, as in other ex-colonial countries, however, 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. The transport network of that period was formed not so much in the interest of territorial division of Labour within the country, but to promote geographical division of labour between India and Great Britain[4] - with India serving as raw material supplier and market for good ; and

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4. Sen Gupta P., Galina Sdasyuk, "Economic Regionalization of India - Problems and Approaches" (Census of India - 1961), p. 173

Britain specializing in industrial production. This distortion resulted in a 'one-line economy' - an axis based on a port on one end and the axis characterised by an ascending current of imported goods and by a descending current of exported products.[5] The transport development of the pre-independent era thus effected the growth and nature of formation of economic regions of the country. A model[6] of the spatial structure of the

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5. Suret-Canale J. French Colonialism in Tropical Africa 1900-45, London, 1971, p.190

6. Chattopadhyay B., and Moonis Raza, "Regional Development: Analytical Framework and Indicators." Indian Journal of Regional Science, Vol. VII, No.1, 1975

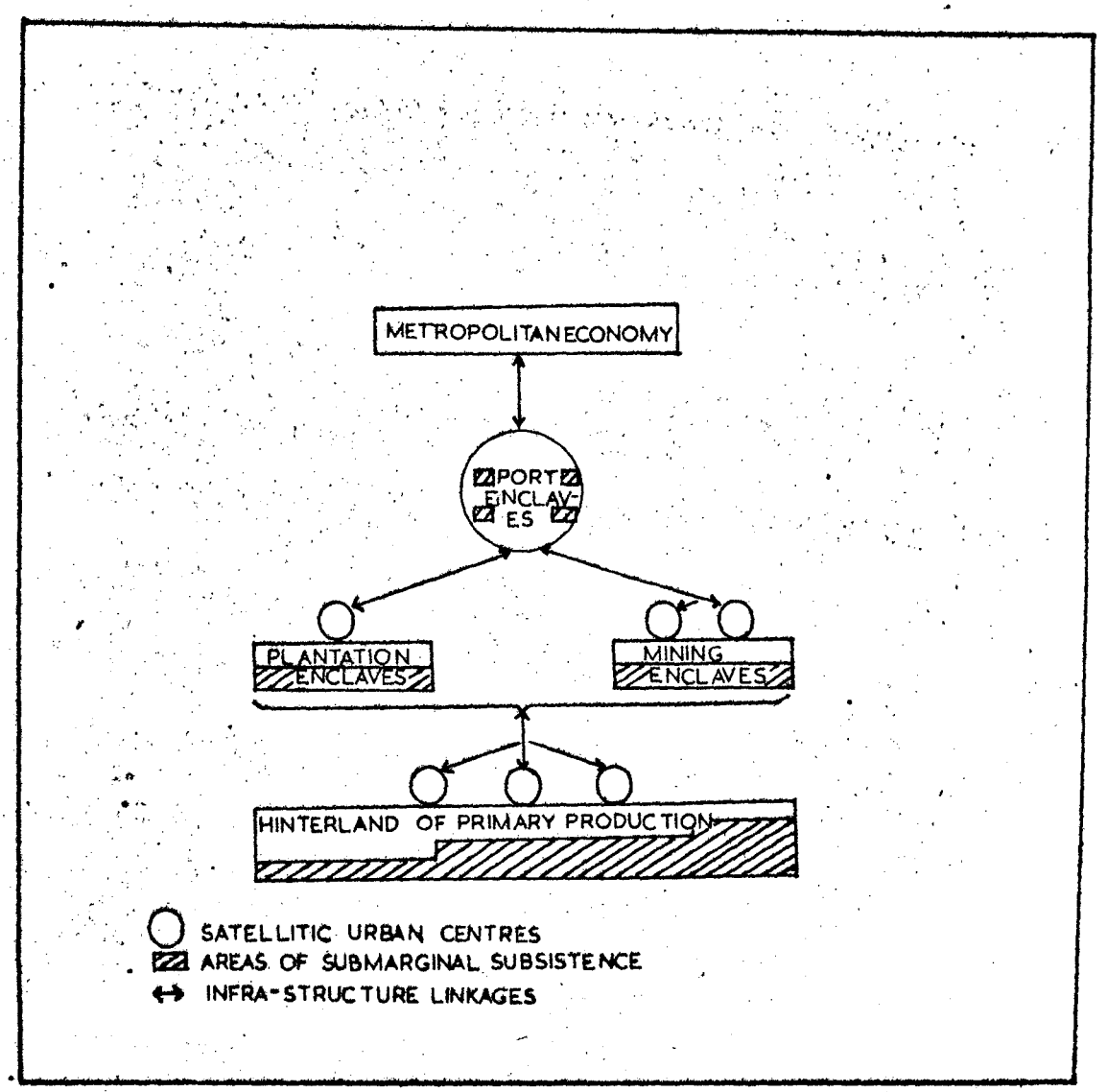
METROPOLITAN ECONOMY
PORT ENCLAVES
PLANTATION ENCLAVES
MINING ENCLAVES
HINTERLAND OF PRIMARY PRODUCTION
SATELLITIC URBAN CENTRES
AREAS OF SUBMARGINAL SUBSISTENCE
INFRA-STRUCTURE LINKAGES

Fig.1.1

colonial economy was developed by Chattopadhyay and Rasa. The transport netwrok of colonial India was developed to ~~kint~~ Knit together the elements of the above model.

1.3.1 In the light of the specificities of the Indian situation which it shares, in its essential features, with the entire under-developed world, it is worthwhile to study in some depth the exogenous as well as endogenous forces which moulded the railway policy of the colonial state.

1.3.2 The process of railway expansion in India was distinctly different from that of the advanced countries of the West in two important respects. Firstly, it did not develop as a result of indegenous enterprise or capital investment; and secondly, it was not preceeded by an industrial revolution. The British government devoted considerable attention to the military, political and strategic objectives of developing the railway network in India.

1.3.3 Railway construction in India began during the middle of the nineteenth century. The interests of the metropolitan country had a dominant influence on the transport development in pre-independent India. The location and expansion of railway network was governed by the demands of the suction mechanism of colonial

exploitation rather than the internal requirements of the Indian economy.

1.3.4 Since India was a colony of an island power situated across the seas, it was determined that the network should project to the interior from the sea board. 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 quite weak. Relatively little attention was paid to construction of branch lines from the main lines.

1.3.5 The main objective of railway construction in India was to connect ports with the tracts producing raw materials needed in British mills and food for its people as also with the main population centres in India, which could absorb maximum amount of English manufactures. The first railway line was constructed by men interested in the cotton trade from India to England. Indian cotton received a tremendous demand in the English market during the American Civil War, which almost cut off the supply of American cotton to Great Britain paralysing her textile industry.

1.3.6 The railway network spread like the branches of a tree from the major seaports of Bombay, Calcutta, Madras and Karachi. A contributory factor during the period 1874-79 was the succession of most serious

and widespread famines in the country resulting in appalling loss of life. The railway network was partly intended to ameléorate the condition of the famine hit regions so as to save the "goose that lays the golden eggs."

1.3.7 Between 1853 to 1880, the major trunk routes were laid to connect the major ports of the country with Delhi. The main feature of the network expansion during this period was that the railway lines started from port towns and penetrated in the interiors as explorers from outlet to source.

1.3.8 Between 1869 - 1882, the construction of feeder lines on the metre gauge were vigorously started. Thus the railway network started expanding in the shape of 'tree-like structures'. Although all the port towns got linked by railway lines, each railway system had its own hinterland to operate without any competition from other railway systems.

1.3.9 By the end of the first world war, the Indian railway network definitely exhibited a colonial pattern. There emerged on the scene a system of alignment which was dominated by a small number of core nodes and failed to create healthy linkages as between different regions of the country. Each railway network had its own territory with a port as its 'core node'. The

railway companies wanted to earn maximum with the minimum rather than the maximum of traffic. The traffic flow was comparatively light and the direction was from the interior to the ports for raw materials like cotton, jute, and coal. From the ports to the interior came manufactured goods, the significant of them being cotton textiles, railway materials, sugar etc. The main bulk of the Indian railway traffic consisted of coal, iron ore, ferrous metal and cement. There is no doubt that the general development of railways during the colonial period favoured the port metropolitan centres, as apexes of the suction mechanism.

Regional Structure of Independent India

1.4 The inability of the economic structure and the associated transport network inherited from the colonial past to cope with the demands of development of an independent economy has resulted in acute transport problems in the post independent period. During the short span of independent existence, a new spatial organisation of productive force in ex-colonial countries, consequent upon structural changes, has not been fully "formed". This inadequacy and distortion is sometimes reflected in the nature of transport network and in the functions of transport. The model[7] (Refer fig 1.2) of the

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7. op. cit.

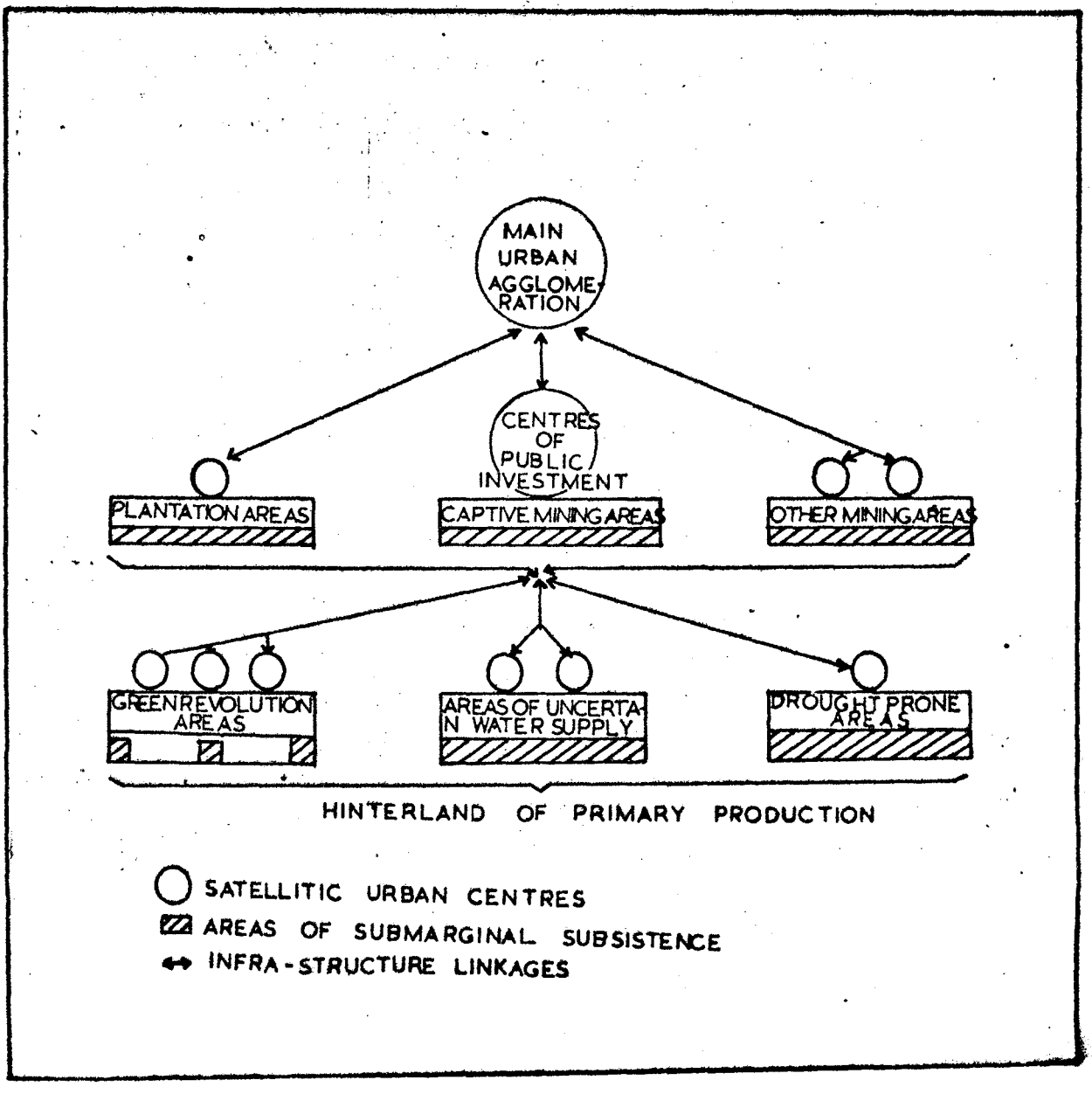
MAIN URBAN AGGLOMERATION
CENTRES OF PUBLIC INVESTMENT
PLANTATION AREAS
CAPTIVE MINING AREAS
OTHER MINING AREAS
GREEN REVOLUTION AREAS
AREAS OF UNCERTAIN WATER SUPPLY
DROUGHT PRONE AREAS
HINTERLAND OF PRIMARY PRODUCTION
SATELLITIC URBAN CENTRES
AREAS OF SUBMARGINAL SUBSISTENCE
INFRA-STRUCTURE LINKAGES

Fig.1.2

independent economy clearly shows that the situation has changed only marginally. The infrastructural network ties up, so to speak, the various components of the space economy leading to an all round accentuation of vertical and horizontal disparities and associated social tensions. The transport network integrates the regional structure of modified underdevelopment.

1.5 This point has also been proved by Berry in his study on commodity flows which reveals some of the basic attributes of the spatial structure of the Indian economy.[8]

1.5.1 Berry was the first to make an attempt to study the Indian commodity flow pattern and their relations to the spatial structure of the country's economy. His work was based on the data on inland coastal and foreign trade movements published in annual series. His study mainly comprises of three essays. The first was an ATLAS OF INDIAN COMMODITY FLOWS; the second explored the complex inter-relationships between commodity flows and the regional economic structure; and the last essay presented an intersectoral inter-regional perspective in an input-output framework that provides

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8. Berry B.J.L., Essays on Commodity Flows and the Spatial Structure of the Indian Economy, Chicago; 1966

forecasting ability. Among the interesting offshoots of this study are the analysis of hinterlands of the main ports and balance of flow accounts for Calcutta, Bombay, Madras and Delhi".[9]

1.5.2 Berry has studied the commodity flows mainly on the basis of inland Trade Accounts and other related sources of data on coasting and international trade. Inland trade accounts are available both on a quarterly and an annual basis and contain the quantity of trade in sixty-three commodities moving by rail and inland steamer as between the different Trade Blocks of India. Most of this analysis was based upon the data pertaining to the year 1959-60.

1.5.3 Berry's work reveals an adequately satisfactory picture of inter-state, inter-regional and inter-port commodity flows. For each of the 65 commodities, a series of the following 12 maps has been compiled : (i) quantity into metropolitan centres; (ii) quantity out of metropolitan centres: (iii) other flows; (iv) quantity in and out; (v) three similarly maps expressing the flows in terms of values; (vi) major producing areas; (vii) potentials of urban population; (viii) railroads, (ix) the next maps are of factor structure showing the groups of shippers and groups of destinations

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9. Ibid

and the last of series is (x) major regional flows. Finally an attempt was made to determine the inter-sectional, interregional perspective in an input-output framework.

1.5.4 One of the main results of this study is the delimitation of four (based on analysis of flows in terms of quantity) or three (based on analysis of flow in terms of value) functional regions gravitating towards the major metropolitan centres of the country -- Calcutta, Bombay and Madras -- Delhi being included in terms of the analysis of quantity.

1.5.5 Berry's study consists of rich factual material and is innovative in the application of new quantitative methods. It may, however, be noted that the study does not take note of the freight flows originating due to imports through the three major Indian ports which act as "gateways" for export and import of goods - particularly of those goods which India is still not in a position to produce, namely machinery, equipment, chemicals, etc.[10] The predominant position of these centres is, to a large extent, the result of irrational location of the productive forces, whose pattern was shaped during the colonial period.

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10. Bengupta P., & Galina Idasyuk (op. cit.)

Berry's study indicates that the regional structure of the Indian economy continues to correspond to the colonial model and the centrifugal forces continue to be strong.

1.6 Problem Posed:

More than ten years have lapsed since Berry's study and it would be fruitful to examine if the colonial pattern still persists; whether the centrifugal suction mechanism still continues to function and the extent to which the national home market has been integrated? The present study would throw some light on these aspects; particularly if its findings are compared with those of Berry. This study would also clarify whether the relation of ports with their hinterlands are still weak and whether the movements over the cantilever still dominate.

1.7 Hypotheses:

The study examines the following hypotheses:

1. Inter-metropolitan ties are stronger than the metropolitan - hinterland interactions, and metropolitan dominance continues to be an attribute of commodity flows in India.

2. Centrifugal forces in the Indian market continue to be stronger than the centripetal forces.

1.7.1 The above two hypotheses are studied with reference to movement of commodities in India. The commodity movements take place along well-defined network channels. These channels which are more or less permanent features of the landscape have much to do with subsequent patterns of flow on them. Thus the motivations behind the development of a network could explain the resultant patterns of flow. Huge investments have been made for further strengthening the already developed in the metropolitan centres and the urban agglomerations around them. Thus there exist greater incentives and more attraction in these enclaves in comparison to the respective hinterlands. As a result, the already developed centres of urban accretion grow bigger and stronger whereas the underdeveloped segments of the hinterlands either deteriorate relatively, stagnate or move forward slowly. The main big business of the organised sector is concentrated in these centres of urban accretion.

1.7.2 The development of productive forces in the resource rich but, underdeveloped regions of the hinterland calls for a more efficient organisation of the space economy through a hierarchical system of nodes and sub-nodes based on the principle of the territorial division of labour. To the extent that such a efficient organisation of space does not emerge on the scene and the space economy continues to correspond

with the regional structure of under-development inherited from the colonial period, the metropolises are bound to dominate over the originating as well as terminating commodity flows and the inter-metropolitan links are of necessity going to be stronger than the metropolis - hinterland ties.

1.8 Methodology:

The methodology adopted for this study would be as follows:

1.8.1 The first task is to identify the metropolitan centres. This has been done on the basis of population size. The million cities of India, as enumerated in the population census of 1971, are considered as metropolitan centres to start with. Such centres are nine in number namely, Bombay (5970575), Calcutta (3148746), Madras (2469449), Delhi (4065698), Kanpur (2996232), Bangalore (3365515), Hyderabad (2791762), Ahmedabad (2910307) and Poona (1135034).

1.8.2 The delineation of metropolitan - hinterlands was done with the help of cartographic tools of analysis in the following manner:

(A) The flows of the nine metropolitan centres were mapped on the basis of originating and receiving flows (Refer Figures ~~I.3~~ 1.20 to ~~II.18~~). The total

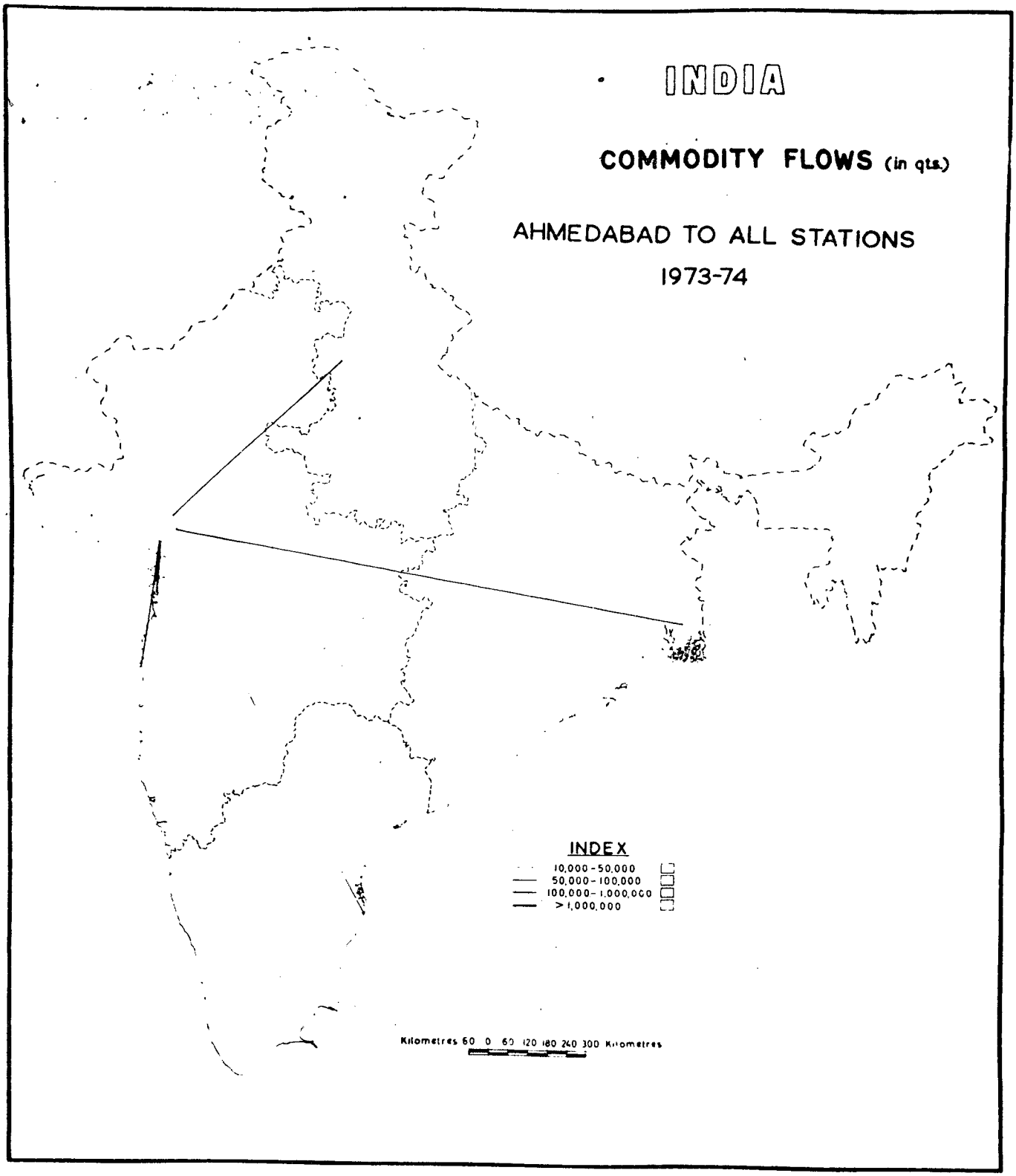
INDIA
COMMODITY FLOWS (in qts.)
AHMEDABAD TO ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.5

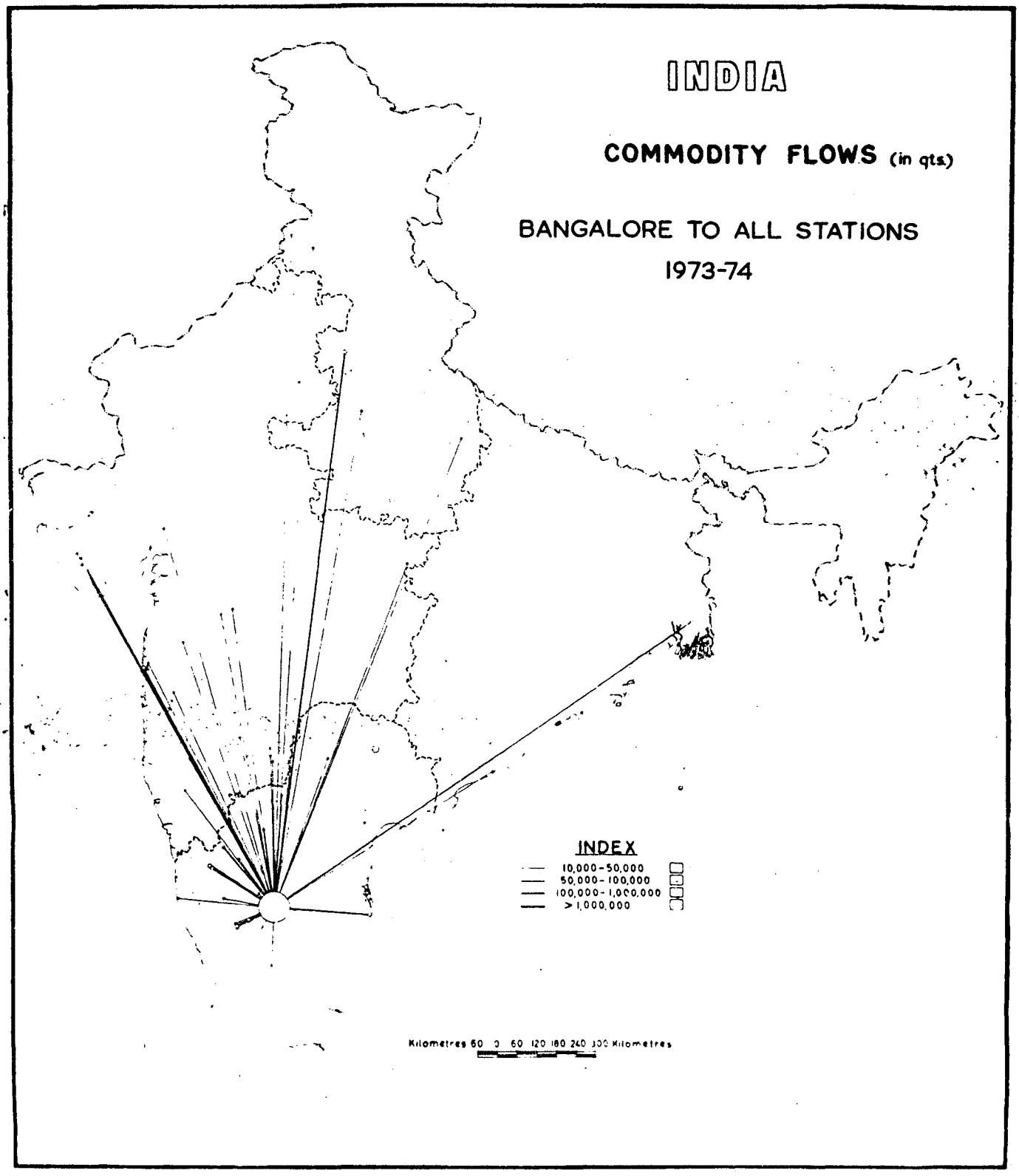
INDIA
COMMODITY FLOWS (in qts)
BANGALORE TO ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.4

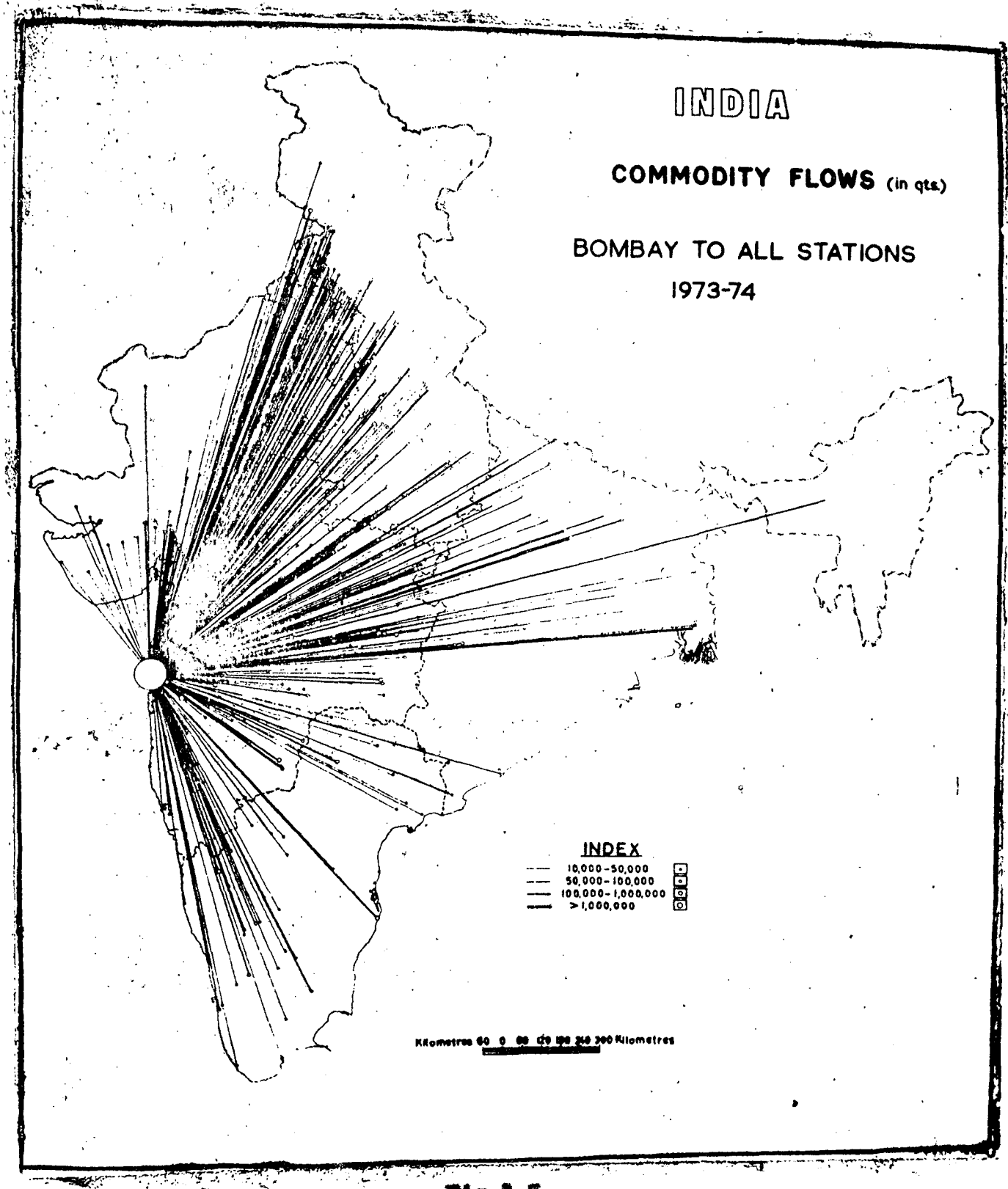
INDIA
COMMODITY FLOWS (in qts.)
BOMBAY TO ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
>1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.5

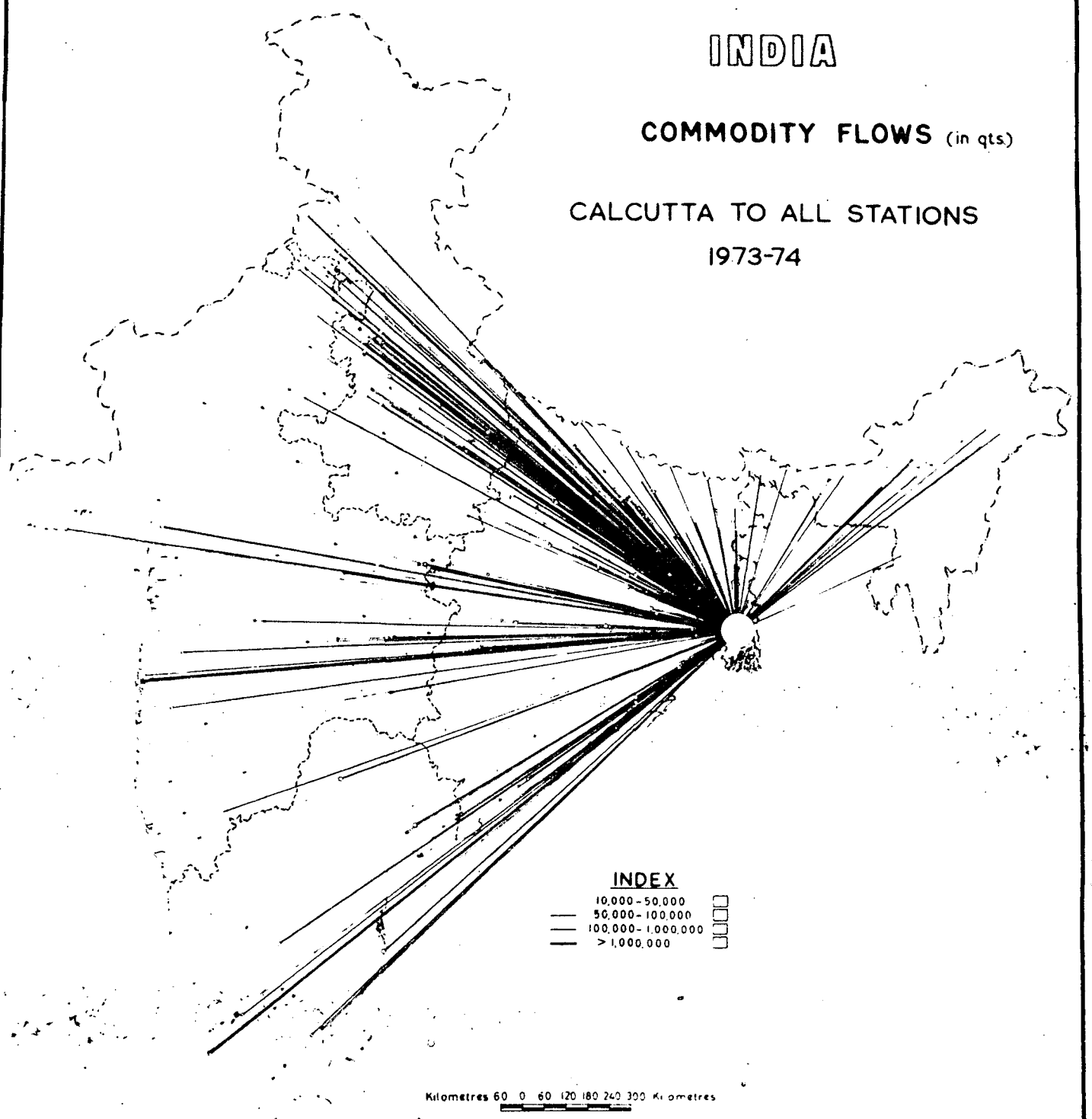

Fig.1.6

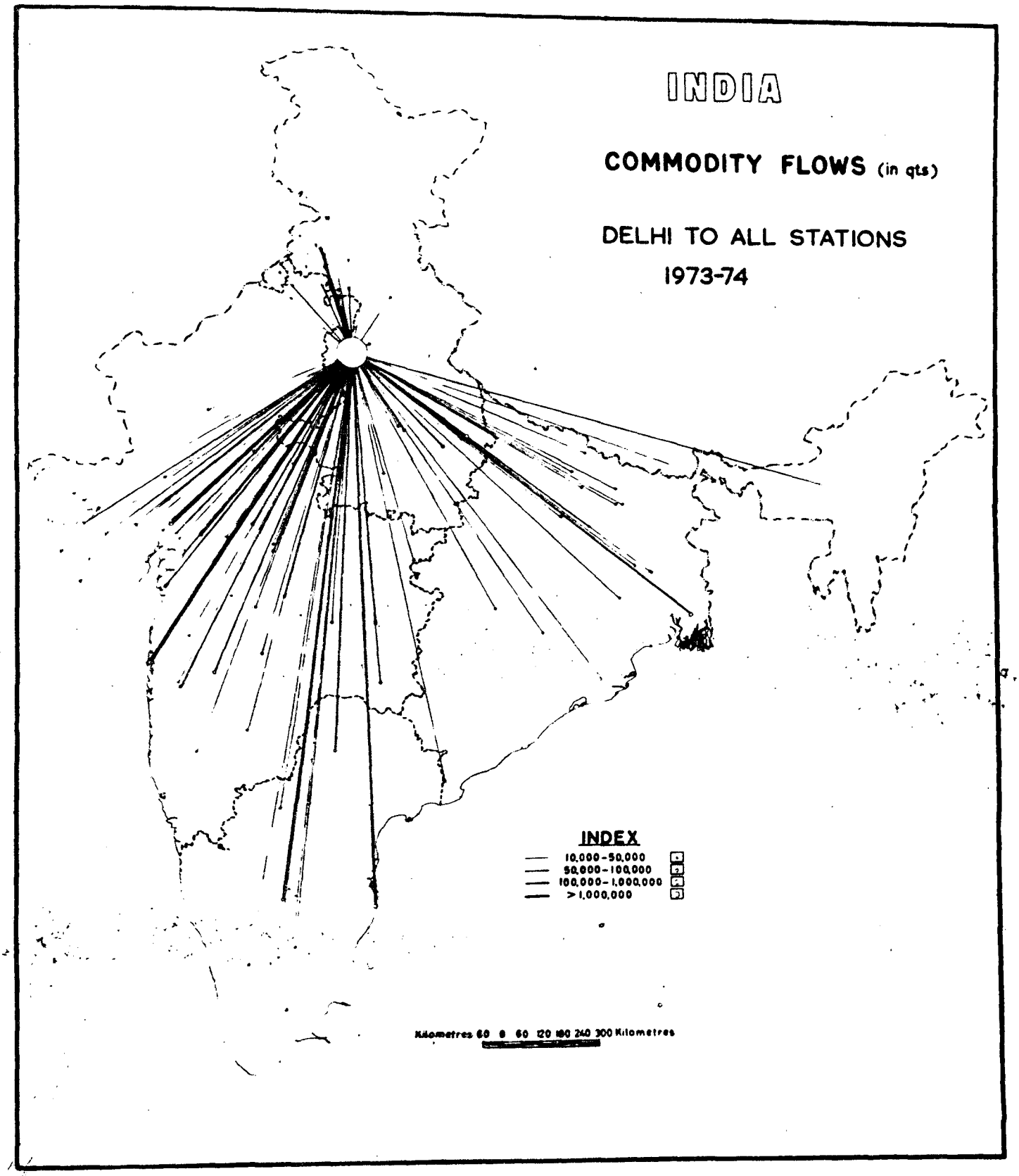
INDIA
COMMODITY FLOWS (in qts)
DELHI TO ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
>1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.2.7

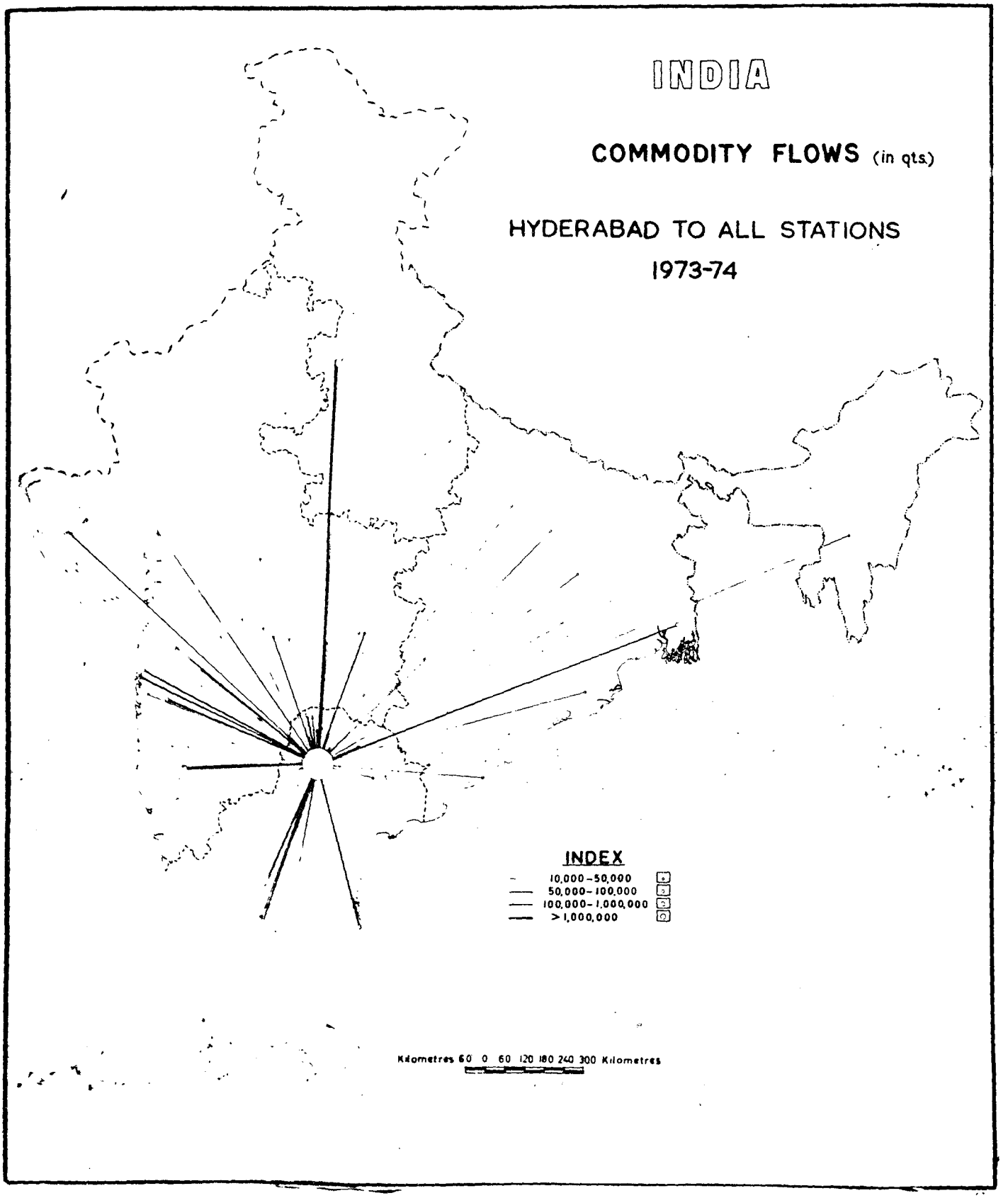
INDIA
COMMODITY FLOWS (in qts.)
HYDERABAD TO ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
>1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.8

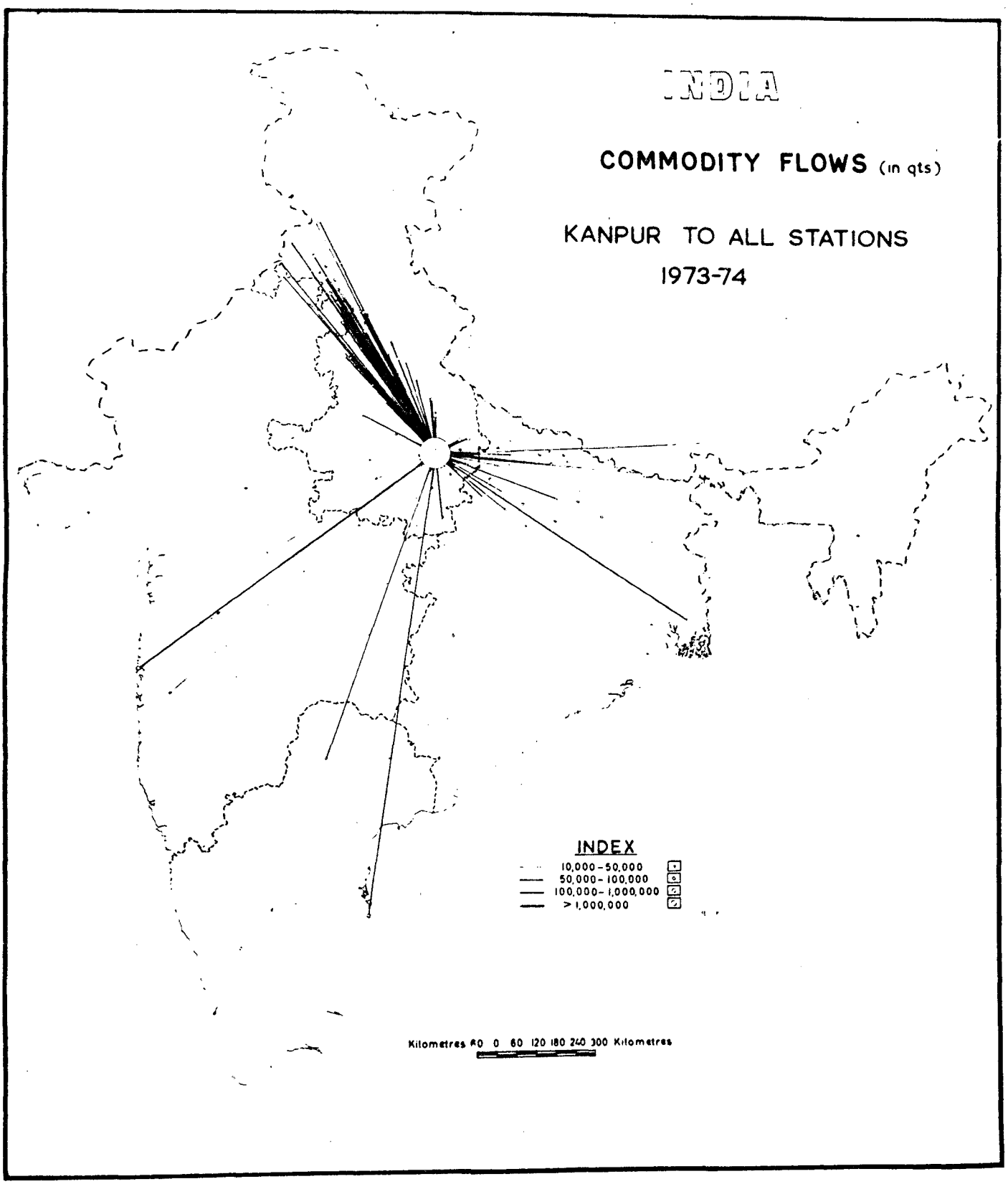
INDIA
COMMODITY FLOWS (in qts)
KANPUR TO ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.9

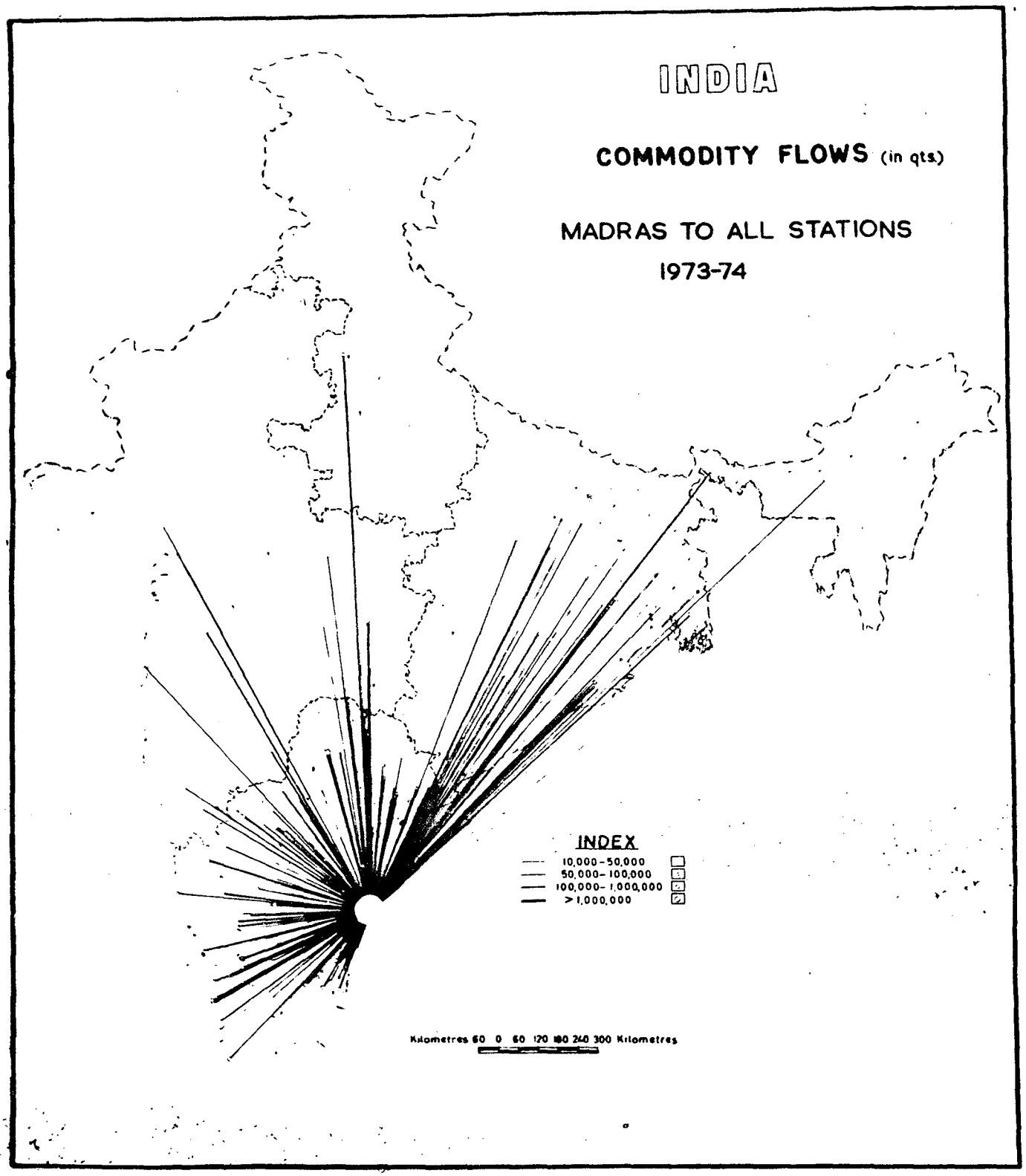
INDIA
COMMODITY FLOWS (in qts.)
MADRAS TO ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
>1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig. 1.10

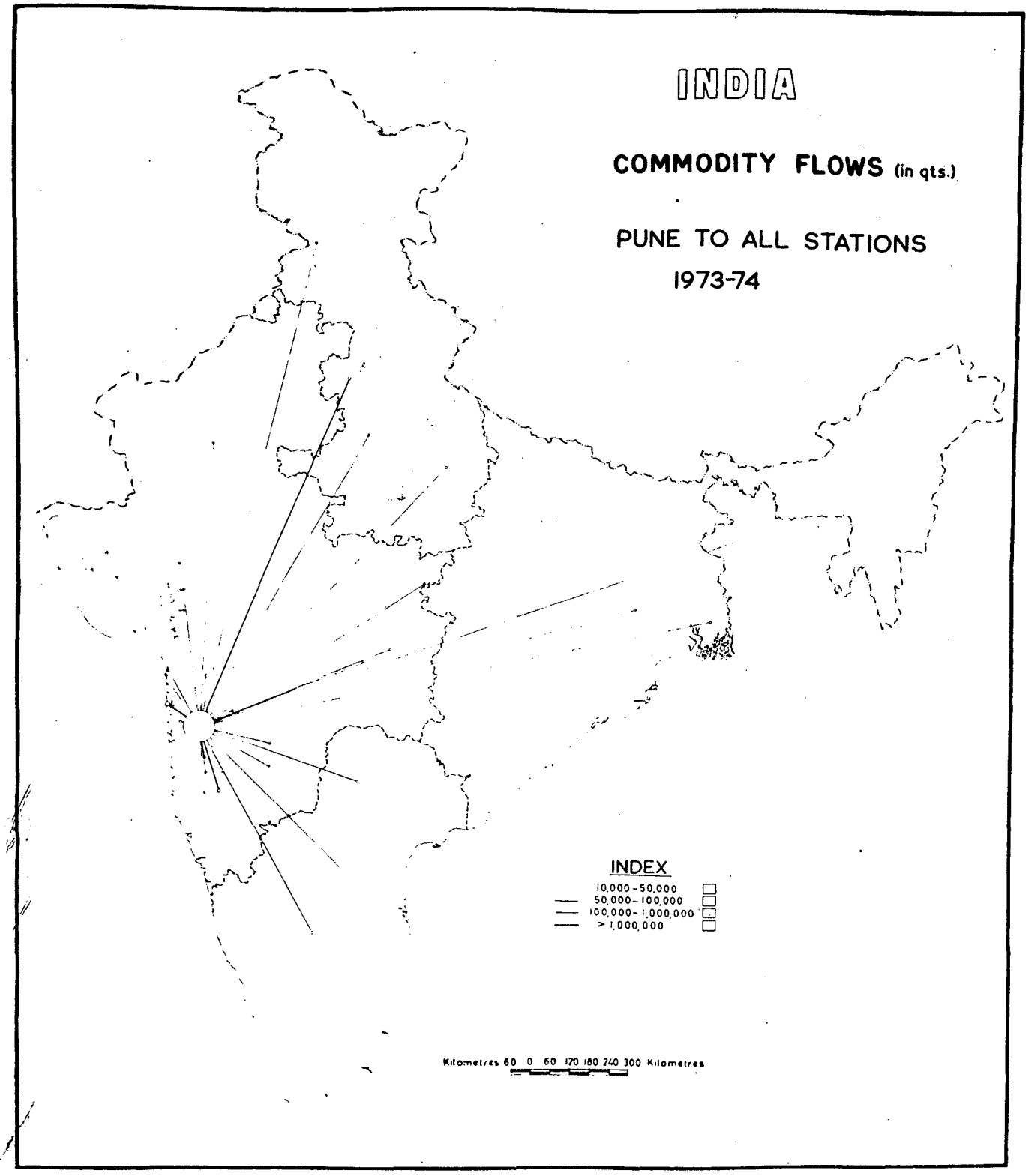
INDIA
COMMODITY FLOWS (in qts.)
PUNE TO ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.11

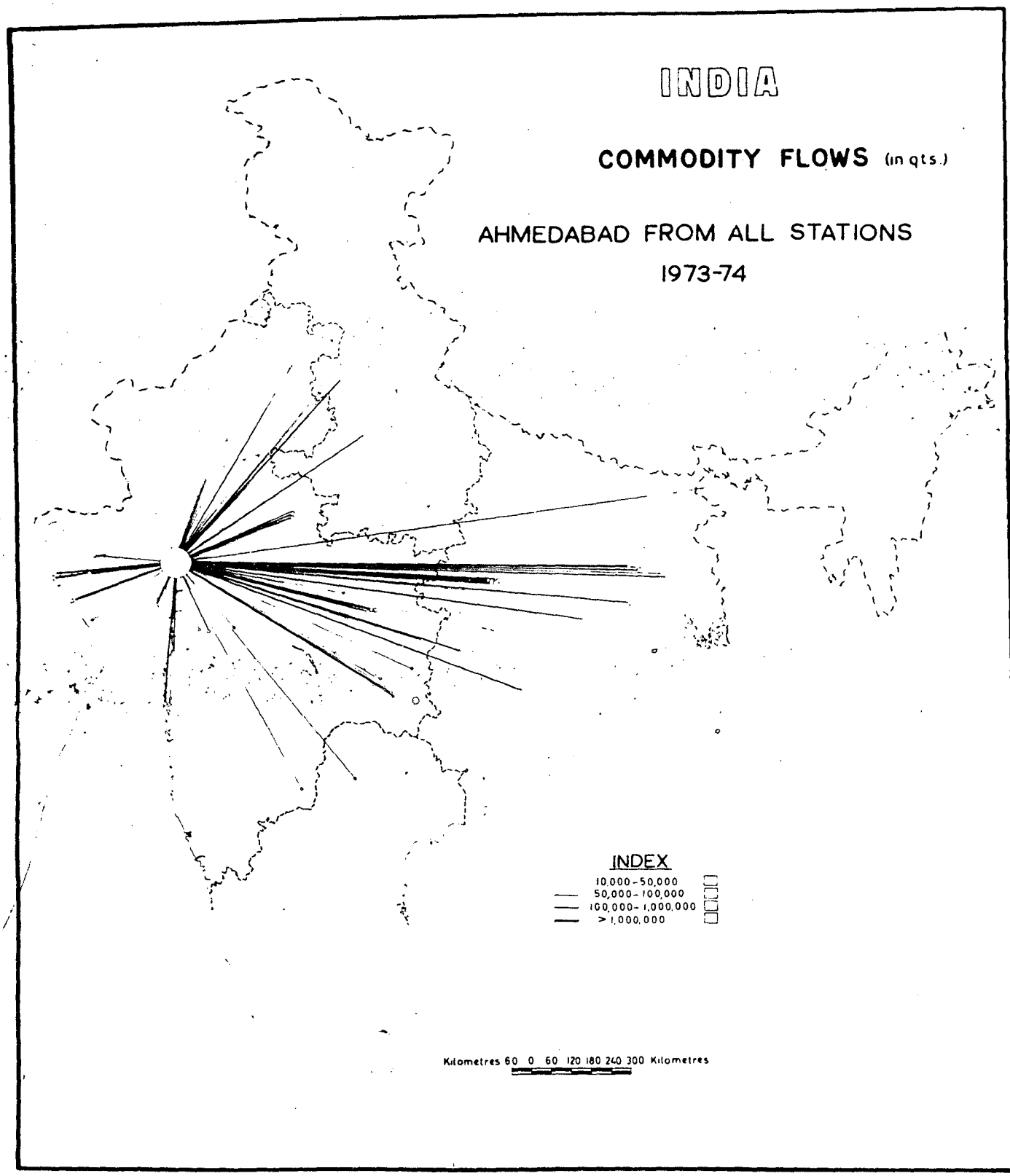
INDIA
COMMODITY FLOWS (in qts.)
AHMEDABAD FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.12

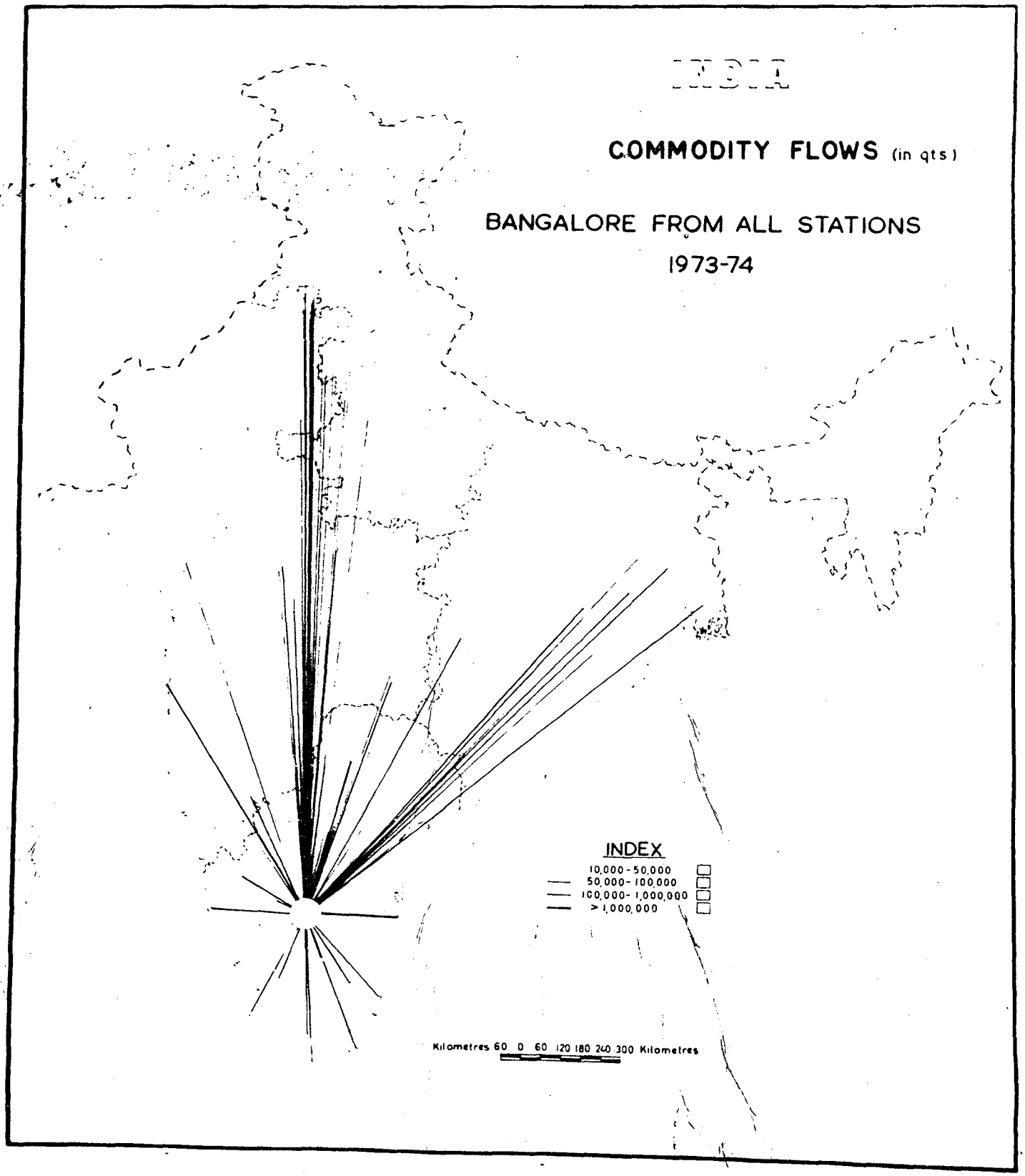
INDIA
COMMODITY FLOWS (in qts)
BANGALORE FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.13

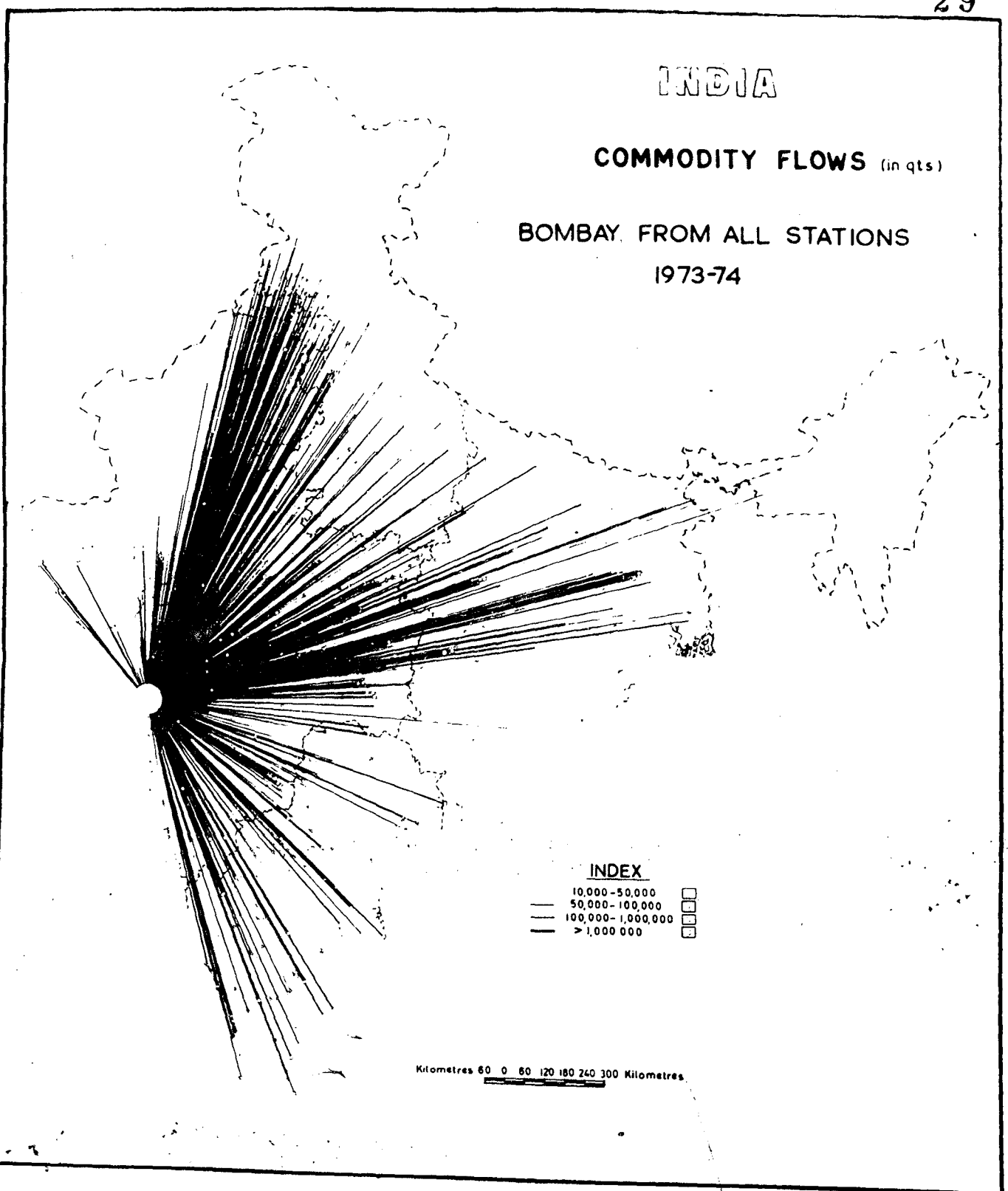
INDIA
COMMODITY FLOWS (in qts)
BOMBAY FROM ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
>1,000 000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.14

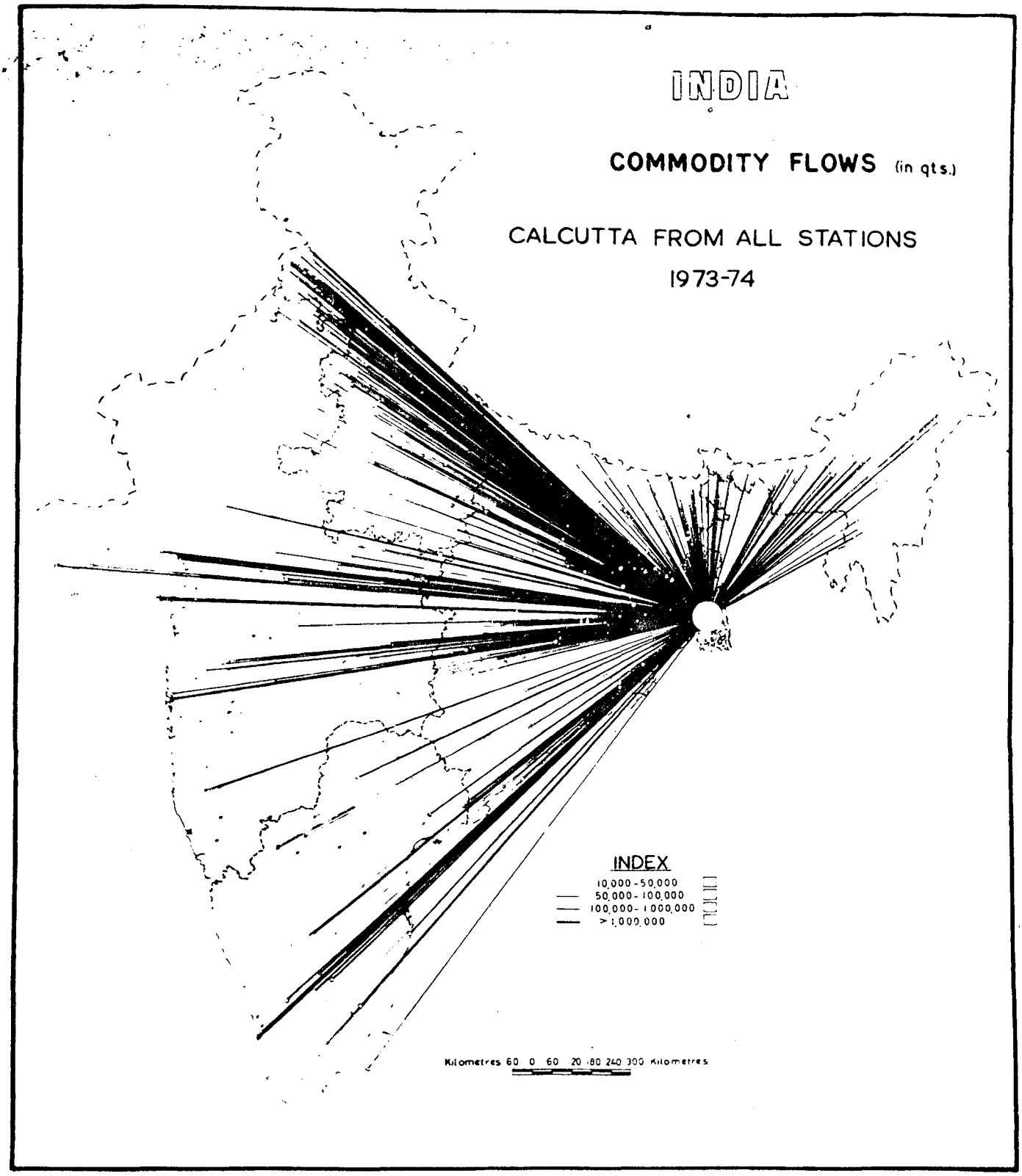
INDIA
COMMODITY FLOWS (in qts.)
CALCUTTA FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
CALCUTTA
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.15

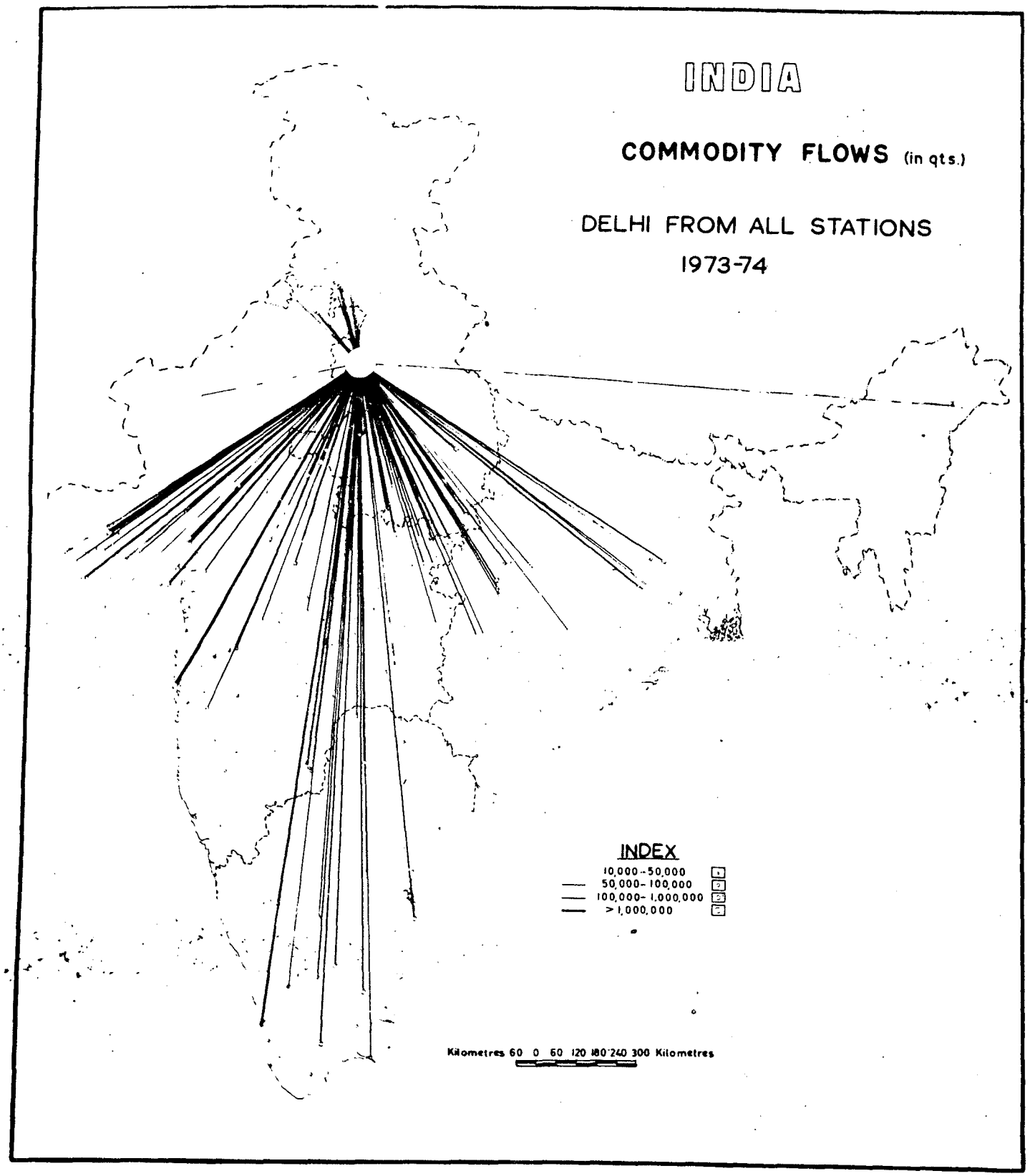
INDIA
COMMODITY FLOWS (in qts.)
DELHI FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.16

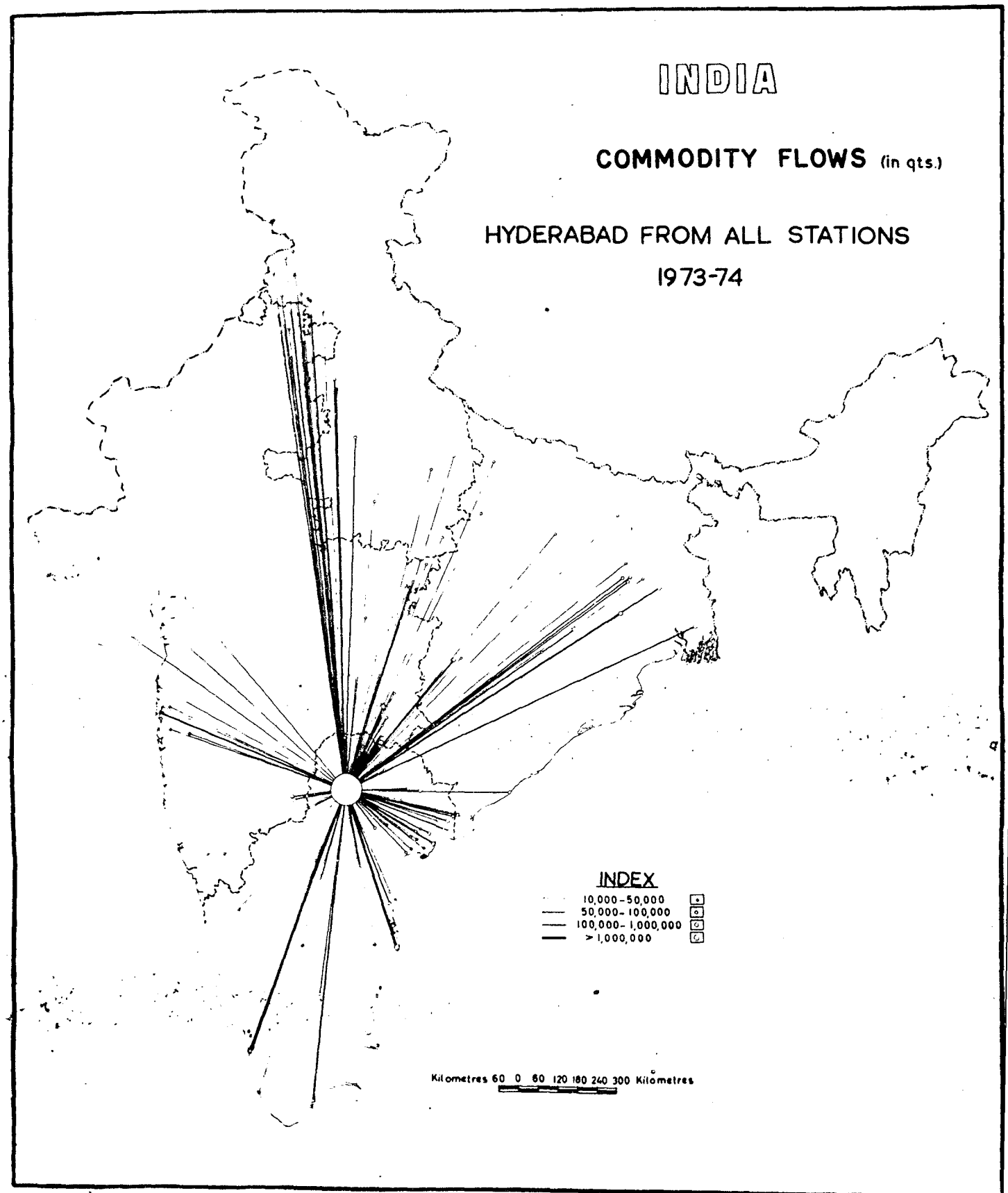
INDIA
COMMODITY FLOWS (in qts.)
HYDERABAD FROM ALL STATIONS
1973-74
INDEX
10,000-50,000
50,000-100,000
100,000-1,000,000
>1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.17

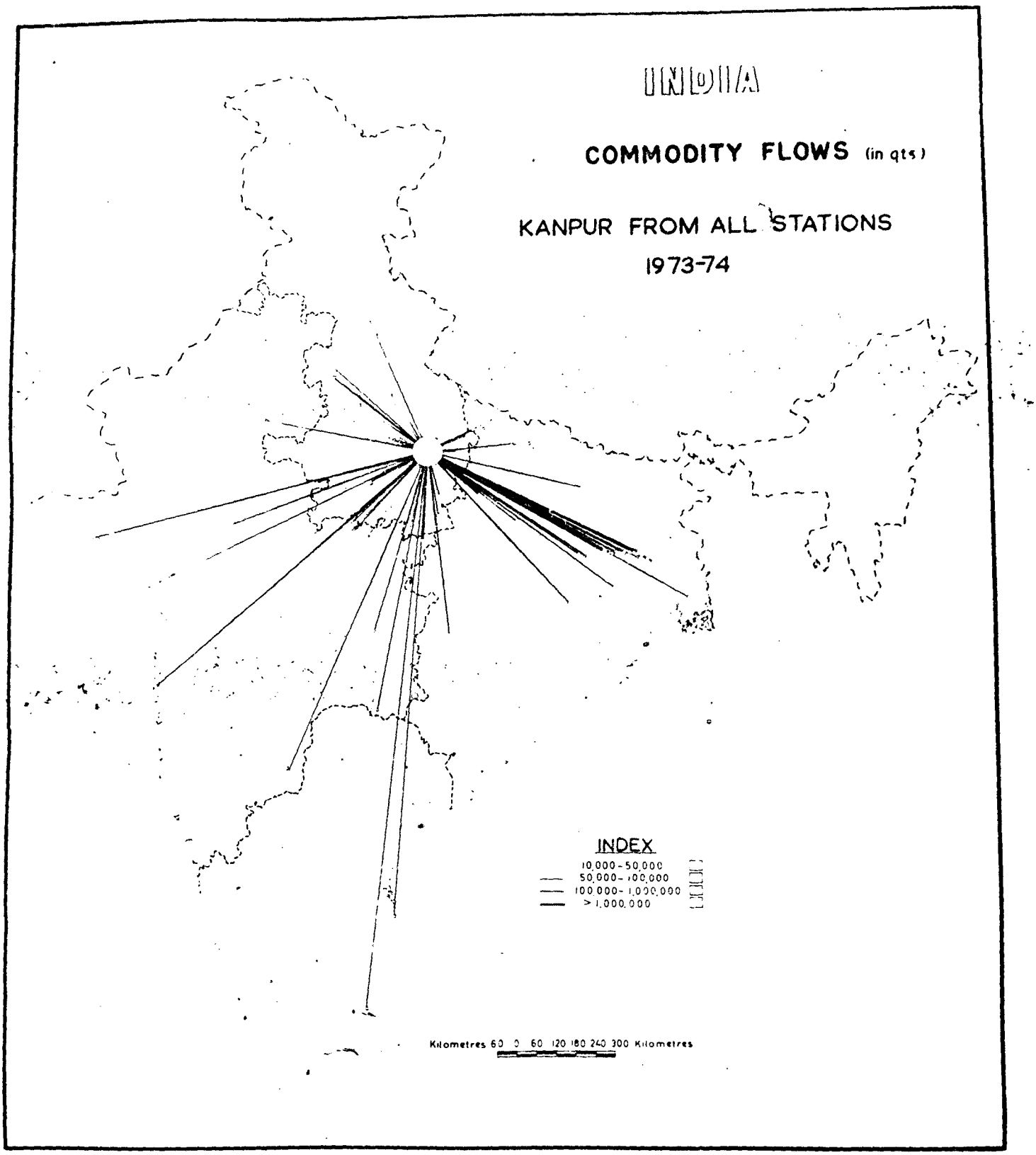
INDIA
COMMODITY FLOWS (in qts)
KANPUR FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.18

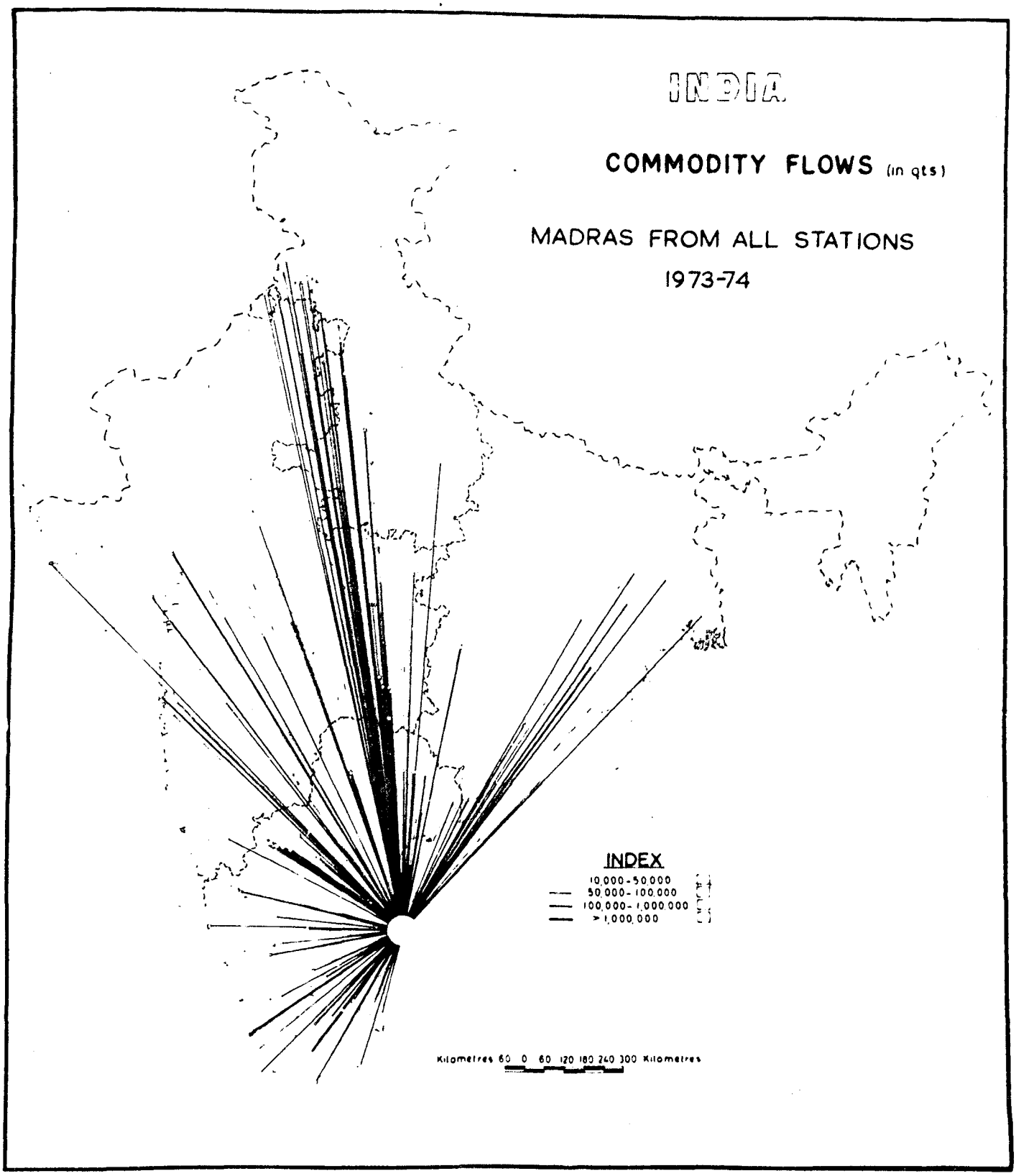
INDIA
COMMODITY FLOWS (in qts)
MADRAS FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.19

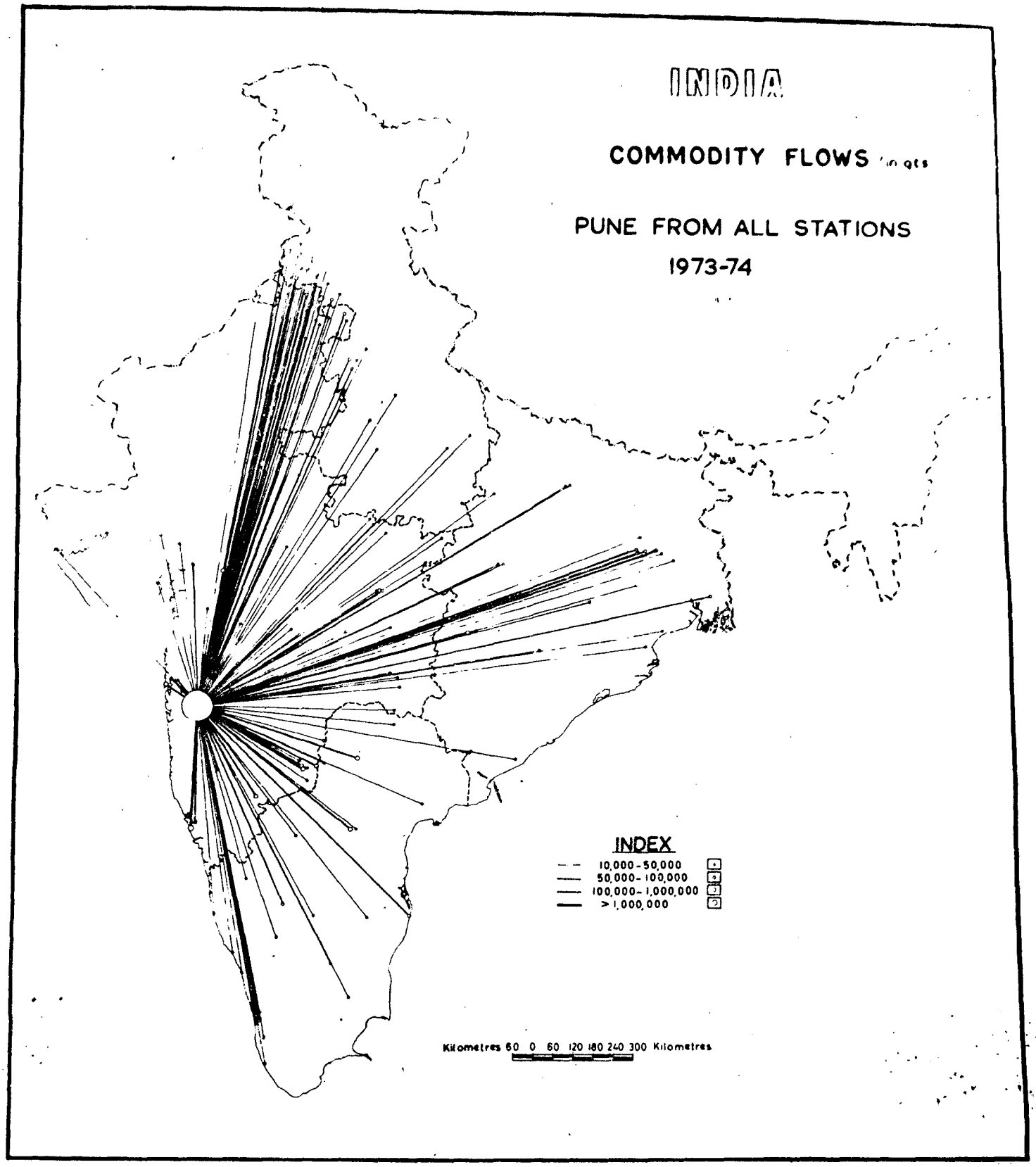
INDIA
COMMODITY FLOWS
PUNE FROM ALL STATIONS
1973-74
INDEX
10,000 - 50,000
50,000 - 100,000
100,000 - 1,000,000
> 1,000,000
Kilometres 60 0 60 120 180 240 300 Kilometres

Fig.1.20

originating tonnage from each centre was mapped with the help of flow lines (Figures II.1 to II.9). The same was done for terminating tonnage (Figures II.9 to II.18). While the flows below 10,000 quintals were ignored, the rest were grouped under the following categories for purposes of mapping: (i) Very High (>1000000) qts; (ii) High (100000 to 1000000) qts; (iii) Medium (50000 to 100000) qts; and (iv) Low (10000 to 50000) qts.

(B) These maps (Figures II.1 to II.18), by themselves, do not lead to the delimitation of the hinterlands, as they do not bring out the dominant spatial linkages of the stations with respect to the different metropolis. Therefore, on the basis of these eighteen maps, another map was prepared (Refer Figure II.19). A specific symbol was allotted to each metropole and all stations having dominant linkage with a metropole in terms of its commodity flows were plotted with that symbol. The hinterlands were then delineated by drawing a line connecting the midpoints of two sets of symbols.

(c) It may, however, be noted that for purposes of this excercise, stations having a total flow of 50,000 quintals or less were not taken into account. In other words, a metropolitan-hinterland

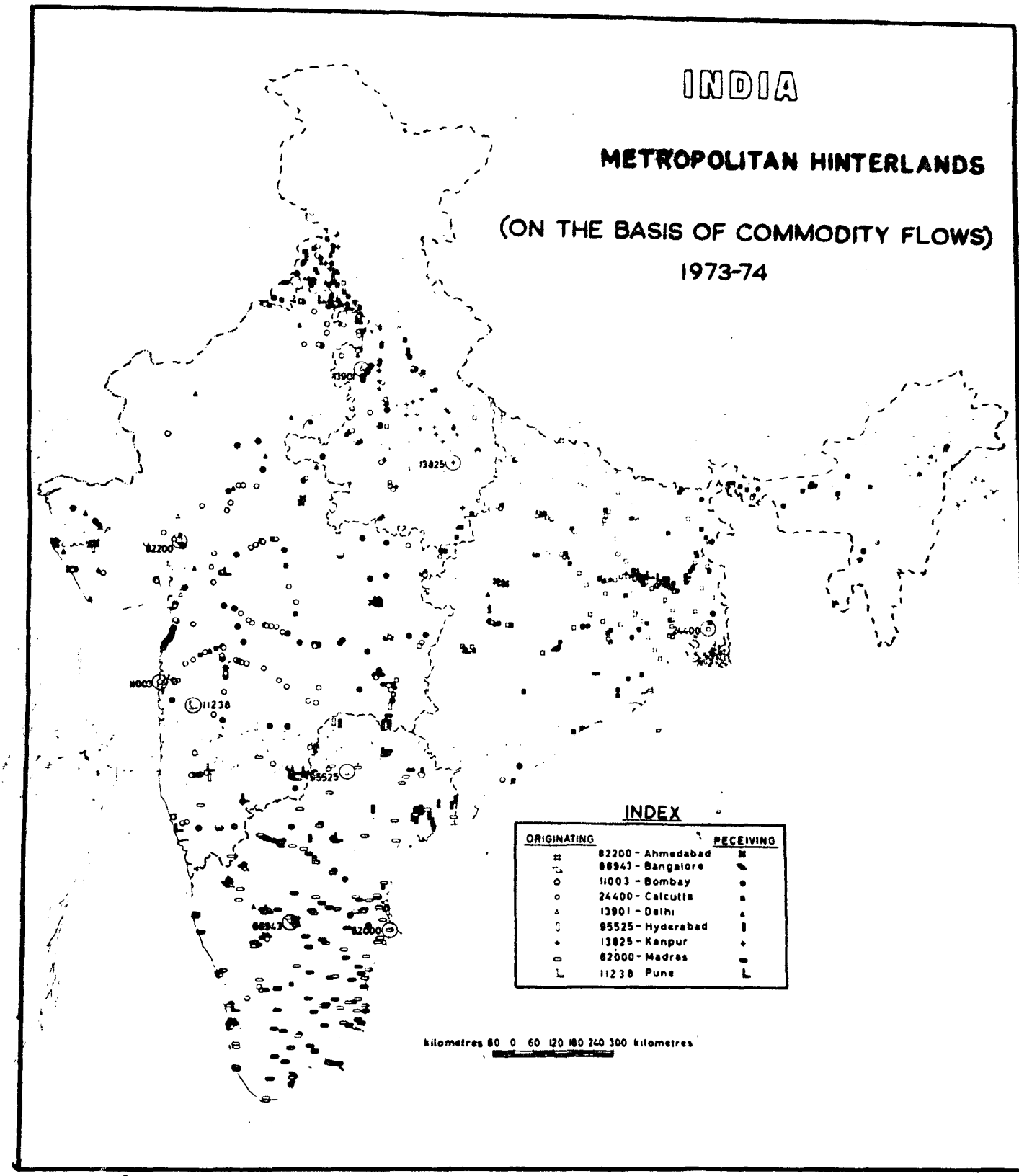
INDIA
METROPOLITAN HINTERLANDS
(ON THE BASIS OF COMMODITY FLOWS)
1973-74
INDEX
ORIGINATING
RECEIVING
82200 - Ahmedabad
66943 - Bangalore
11003 - Bombay
24400 - Calcutta
13901 - Delhi
95525 - Hyderabad
13825 - Kanpur
62000 - Madras
11238 Pune
kilometres 60 0 60 120 180 240 300 kilometres

Fig.1.21

is defined on "the basis of the single strongest flow emanating from or moving to",[11] each of the metropolitan centres thus depending on the larger center for the functions that the aggregated smaller centres lack. "This nesting of nodes defines the organisation of network of cities and the position of each node within the network. Such nesting depends upon the available bundle of functions and the relative dominance of bundles".[12]

(D) A close study of the map (Figure ~~II.19~~ I.21) revealed that three of the million plus towns are in reality assimilated within the hinterland of the four major metropols. Consequently, the stations having the symbols of the following were considered to be a part of the hinterland of the major metropol noted against each:-

Ahmedabad in Bombay
Hyderabad in Madras
Bangalore in Madras
Poona in Bombay.

On the basis of this procedure, the various hinterlands which had clear-cut boundaries were carved out.

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11. Berry B.J.L. and D.F. Marble. Spatial Analysis - Page 409, A Graph Theory Interpretation of Nodal Regions by John D. Nystuen and Michael F. Dacey

12. Ibid

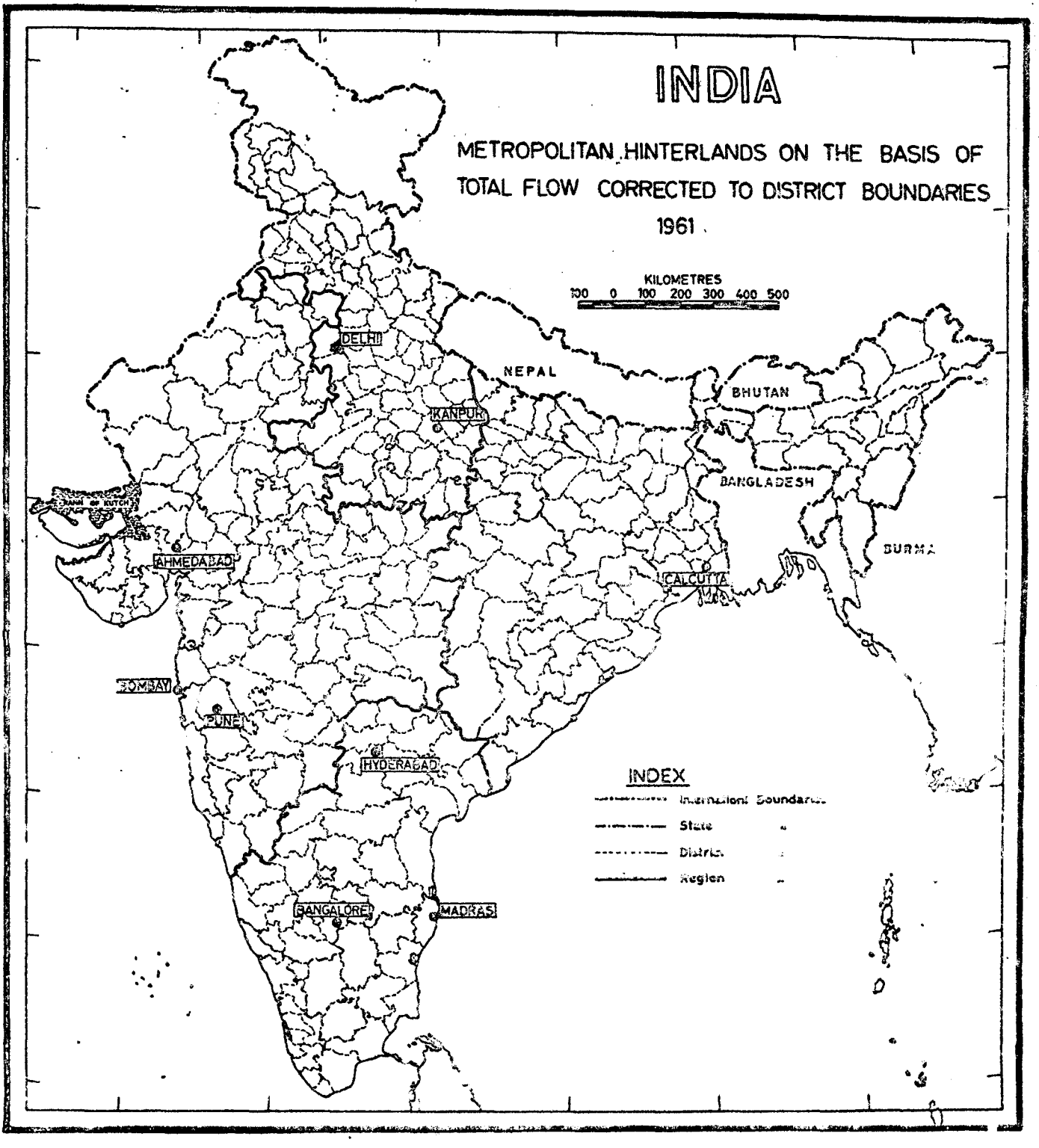
INDIA
METROPOLITAN HINTERLANDS ON THE BASIS OF
TOTAL FLOW CORRECTED TO DISTRICT BOUNDARIES
1961
KILOMETRES
100 0 100 200 300 400 500
DELHI
NEPAL
BHUTAN
KANPUR
BANGLADESH
BURMA
AHMEDABAD
CALCUTTA
BOMBAY
PUNE
HYDERABAD
BANGALORE
MADRAS
INDEX
International Boundaries
State
District
Region

Fig. 1.22

(E) Delhi and Kanpur, on the other hand seem to have common shippers and receivers, and thus may be considered to have a common bi-nodal metropolitan hinterland. Finally, we are left with four metropolitan centres: Bombay, Calcutta, Madras and Delhi-Kanpur. These four have well-marked and mutually exclusive hinterlands. ~~Finally~~ the line of demarcation was then adjusted to the district boundaries (Refer Figure ~~II.20~~ 1.22).

1.8.3 The subsequent analysis was carried out on the basis of these metropolitan centres and their hinterlands as delineated in the manner discussed above. With the hypotheses, stated earlier, in view, the analysis restricted itself mainly to the data pertaining to metropolitan to metropolitan flows and metropolitan to hinterland flows. The flow of the identified metropolitan centres and hinterlands was calculated in terms of originating, terminating and total flows. This was done for each commodity group separately. On the basis of these, series of tables were prepared and analysed.

1.8.4 It may be noted that the magnitude of flows of the metropolises and stations of the hinterlands are not comparable. They differ substantially in

population size and the number of nodes involved. These differences were eliminated in order to make meaningful comparisons. The flows were expressed in terms of population size and the number of nodes in each metropolitan centres and their hinterlands.

1.8.5 A series of flow maps have been made on the basis of the modified data. Besides these, many other maps and diagrams have been prepared to throw light on the various aspects of this study. This has been dealt in detail ~~as~~ in a later section.

1.9 DATA BASE AND ITS LIMITATIONS

The study has utilised the commodity flow data recorded by the Ministry of Railways. Among other things the data tabulates origin/destination matrix for over three hundred commodities in terms of tonnage moved between different stations that are served by the railways. The records are maintained on an annual basis. The study however pertains to the year 1973-74 during which period the railways carried 75% of all commodities moved in the country by various modes of inland transportation. The computerised data recorded in magnetic tapes was duplicated from the various zonal headquarters of the Indian railways. [13]

13. There are nine zonal railways; they are (i) South-eastern (at Calcutta), (ii) Eastern (at Calcutta), (iii) North-eastern (at Gorakhpur), (iv) North-Eastern Frontier (at Pandu), (v) Northern (at New Delhi) (vi) Western (at Bombay), (vii) Central (at Bombay), (viii) Southern (at Madras) (ix) South Central (at Secunderabad)

1.9.1 The format of the data is such that it records minute information, probably, for the use of railway accounting and such other purposes. The data is therefore not directly usable for a problem in regional economy as has been posed here.

1.9.2 A variety of problems were encountered while attempting to use the data in the study. One set of problems - though apparently trivial - consumed considerable time and resource -- this relates to uncommon data formats, units of weight (quintals, tons, etc.) and time (monthly, yearly, etc.) of different railway zones.

1.9.3 The second set of problems of data relate to the necessity for aggregation of units of observation in the context of the present study. Keeping the scope of the study in view the data is aggregated at two levels. The origin-destination points in the original data are defined as all railway stations, halts, booking offices, out-agencies, etc. These units of observation are not comparable to the settlement systems of the economy. For example, railway stations, halts and booking offices within a city (or a census defined settlement) are treated as separate nodes of the origin -- destination matrix in the base data. Such points of

observations number about 10,000. These points were aggregated so that the redefined nodes are comparable to the census defined settlements. The resultant dimension of the matrix is of the order of 6775 x 6775. Though the matrix gets reduced in this process, the units of observation become meaningful for the present study.

1.9.4 A second level of aggregation relates to the grouping of commodities in order to reduce the number of such matrices. Commodity aggregations in the study reduce the number of matrices from over 300 of the initial data to nine. Initially a two-digit classification numbering thirty nine homogenous groups with a certain degree of homogeneity were defined. However, in this study, a further aggregation has been done — reducing not only the number of groups but also the degree of intra-group homogeneity.

1.9.5 The nine Commodity groups[14] are as follows:

COMMODITY GROUPS	NAMES
I	FOOD PRODUCTS
II	RAW MATERIAL FROM PRIMARY SECTOR
III	COAL/FUEL

14. For details of the items of the group refer to Appendix-1

COMMODITY GROUPS	NAMES
IV	INPUT INTO AGRICULTURE
V	CONSTRUCTION MATERIALS
VI	INDUSTRIAL PRODUCTS
VII	DEFENCE GOODS
VIII	LIVESTOCKS
IX	MISCELLANEOUS

1.9.6 Analysis based on commodity composition exclude defence goods, livestocks and miscellaneous categories. Of these three defence goods and miscellaneous categories are included in the total weights. Defence goods as a category is not being considered for two reasons: (a) Their flow patterns are a function of non-economic factors. (b) It constitutes a mixed bag of goods.

1.9.7 The miscellaneous group of commodities have been excluded for reasons of heterogeneity and insignificant proportion to the total tonnage. Livestock, on the other hand, were recorded in the basic data in terms of head-counts and as such are not additive to rest of the groups which were recorded in terms of tonnage.

1.9.8 A few limitations of the study may be noticed. First, this study is based on only one mode of

transportation, that is the railways. It may be pointed out here that the study did not take into account all the modes of transportation and hence the picture may be only a partial one. Here, one may recollect that it had been mentioned earlier that for the period under study, the railways constituted 75% of the total flow and it is hoped that analysis of commodity flows by railways would throw light on the nature of inter-regional relationships inspite of this limitation. Secondly, road transport data is not available on the national scale. Moreover, road transport would generally reflect micro level interactions. At the macro level, road transport carries commodities of high value and small bulk hence, the findings of this study, which is concerned with the All India picture, would only be marginally affected due to the exclusion of commodity flows by road. Another limitation of this study is that its analysis is in terms of weights and not in terms of value. It may be noted that there were a number of constraints in computing values. Firstly, this would involve a huge amount of expenditure and computer time, which is not very easy to overcome. Secondly, there exists such a huge range of prices for one commodity that it would be very very time consuming to decide on an average price. Moreover, it would have been very difficult

to account for regional price differences.

1.10.0 ORGANISATION OF THE STUDY

Following this introductory chapter, the study is organised in four more chapters. The next chapter would deal with the geographical background of each of the metropolitan centres and their hinterlands in terms of their characteristics.

1.10.1 The third chapter probes into the nature of various sets of tables prepared on the basis of originating, terminating and total flows with a view to understand the nature of inter-metropolitan and metropolitan-hinterland ties.

1.10.2 The fourth chapter makes an attempt to test the hypotheses on the basis of flow matrices represented in terms of average flow per unit station/per unit of population.

1.10.3 Finally the last chapter gives a summary of all the points made in each chapter and also some concluding remarks.

CHAPTER - II

METROPOLITAN CENTRES AND THEIR HINTERLANDS: THE GEOGRAPHICAL BACKGROUND

2.1.0 The regional development process is significantly influenced by the distribution of important resources and the spatial arrangements of production systems based on them. The physical landscape directly affects the alignment of transport links and indirectly the inter and intra regional commodity flows which is guided by the utilization of natural resources. The nature and level of the regional economy exerts considerable impact on the character and magnitude of terminating and originating freights.

2.1.1 An attempt has been made in this chapter to analyse the geographical setting of the metropolitan hinterlands to access the resource base and finally comprehend the characteristics of the commodity flows. As stated earlier, the hinterlands have been delimited on the basis of total flows, to and fro, of all the metropolitan centres. We thus obtained four major hinterlands with their metropolitan centres. These have been dealt individually in the subsequent discussions.

BOMBAY AND IT'S HINTERLAND

2.1.2 The metropolis of Bombay is situated in a low hilly Island known as the Bombay Island. Close to it

lies the northern part of the Salsette Island. The southern part is separated from the Bombay Island by the Mahim Creek and narrow marshy area. The bay formation in the east of Bombay and Salsette islands, makes it one of the finest harbours of India. Bombay metropolitan has a population of over 5 million people living in an area of 603 sq. kms. (see Table No. II.1). It is a leading commercial and industrial centre of the country with Thana and Kalyan being it's satellite towns. The metropolis forms one of the most important industrial belts of India. The concentration of automobile industry, manufacturing mainly, passenger cars, scooters, jeeps and trucks, makes it an important vehicle producing centre. Besides, Bombay is an important textile and consumer goods producing centre of the country. Its proximity to the crude exporting Persian Gulf countries has led to the establishment of two large refineries in Bombay. Based on this, a number of petro chemical industrial units have come up.

2.1.3 The metropolis of Bombay encompasses a large area of the country in its hinterland demarcated on the basis of commodity flows. The hinterland includes the following : - (1) the peninsular plateau which forms a tabular block within the frame work of Sahyadri (Western Ghats) in the west, a part of Vindhyan Scarplands in the

north and a part of the Deccan plateau. It includes that part of the Aravallis which lies in Rajasthan, the Malwa plateau and the western part of Narmada valley lying between Vindhyan and Satpura hills. (ii) The Deccan traps, (iii) Konkan coastal lowlands, (iv) Goa and a part of northern Karnataka, (v) Gujarat Plains, (vi) Peninsular of Kutch and Kathiawad and (vii) the Thar desert. The hinterland is mainly a rolling plateau interspersed with scarped hill ranges which dominate the landscape. The Gujarat coastal plains have large inlets such as the Gulf of Cambay and the Rann of Kutch. The western Ghats sometimes referred to as the Sahyadri range, almost rise up to the height of 3000 to 4000 ft. above the sea level.[1] There is a very steep and highly dissected fall to the undulating and narrow coastal lowland of the Konkan. In the south, the landscape acquires more rounded form of structures.

2.1.4 In terms of temperature and rainfall variations the hinterland has considerable local diversity which influence and gets influenced by the terrain, soil, and hydrological conditions. The temperature is moderate in January and high in May. The rainfall highly varies

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1. O.H.K. Spate and A.T.A. Learmonth, India and Pakistan, Methuen & Co. Ltd. 1967, Page 23 and 24

in the hinterland ranging from less than 5" to more than 80"[2]. The annual rainfall is the heaviest in the Konkan coastal lowland, the Sahyadri receives a heavy rainfall of more than 80". The rest of the hinterland has a medium rainfall, except for its arid and semi-arid areas which has very little rainfall. These areas being in and around the Thar desert, Kutch, and Kathiawad region. The western Ghats experiences hot and humid climate with heavy rainfall and long rainy seasons. The Maharashtra plateau as a whole, on the other hand lies in the rain-shadow of the Ghats - which is also an area of high variability of rainfall. As a result of the rainfall variations, there vegetation also varies in the hinterland. The tropical wet - evergreen forests flourish in areas of heavy rainfall such as the western slopes of Ghats of the Peninsula. The tropical dry deciduous forests are found in the rain-shadow area. The most important trees are sal, teak, simul and sissoo, which give hard and durable timber. Dry and thorny vegetation occurs in the semi-arid areas of Kutch and Kathiawad. The vegetation cover is very thin and stunted, with small patches of dry deciduous forests on the Girnar Hills. The natural vegetation in the

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2. Ibid (Page - 47)

north coast of Kutch and Kathiawad turns into poor grass and bush, which has desertic character in certain places. The soils vary considerably over the hinterland depending on the variations in the geological structure, climate and vegetation. It has new alluvium in the coastal areas and valleys, followed by red gravelly laterite and lateritic soils, towards the interior. Along the rivers, the fertile deep black soils and also medium black soils are found especially in the valleys of Tapti and Narmada. Patches of old alluvium are also found here. The Rann of Kutch, is an area of the saline alluvial. The desert soils are found in Rajasthan. Below it, the red and yellow soils are seen.

2.1.5 After having discussed the natural environment, it is of crucial significance to analyse the demographic parameters in order to estimate the human resources. The table No. II.1, reveals that the population of the hinterland exceeds 132 million with an area of 1147023 sq. kms. The intra-hinterland variations in the distribution of population are well marked. There are tracts of low and very low densities of population in the semi-arid to arid conditions in the Thar desert. Belts of high and high medium densities of population occur in the areas situated to the north of Bombay, mainly in

TABLE No. II.1

DISTRIBUTION OF POPULATION, AREA AND STATIONS OF METROPOLITAN HINTERLANDS *

Sl. No.	Names	Number of Stations	Total area (in Sq.Kms)	Population in (millions)
1.	Greater Bombay	1	603	5
2.	Bombay Hinterland	2362	1147023	132
3.	Calcutta	1	104	3
4.	Calcutta Hinterland	2125	874270	199
5.	Delhi-Kanpur	2	7606	7
6.	Delhi-Kanpur Hinterland	1089	625975	85
7.	Madras	1	128	2
8.	Madras Hinterland	1194	511041	108

* Source : Census of India, 1971
General Population Tables, Government of India Publication

Baroda area and tracts of the cotton-growing region of Ahmedabad. Low and medium densities stretch along the eastern part of Rajasthan to inland Gujarat and much of Kathiawad and Southern Kutch. Large thinly populated areas mainly tribal in character are observed in parts of the Satpuras and Vindhyan ranges. The urban population is concentrated mainly in Bombay to Baroda belt and in the Ahmedabad cotton textile region.

2.1.6 It would be worthwhile to study the hinterlands' economy in general in order to have an idea about the resource utilisation of the region. The study of economy has been attempted under four broad heads, i.e. in terms of agriculture, power and mineral resources, industry and transport. The general agricultural economy consists of mainly the production of millets, rice and wheat being the main cereals and oilseeds and cotton - the commercial crops. Besides, sugarcane and groundnut are also grown. The study of the distribution of the areas under these crops show a strong impact of physio-climatological conditions. For example, large areas are devoted to the cultivation of bajra, jowar in the arid and semi-arid regions of Rajasthan, Kutch and Kathiawad. Similarly the Gujarat plains are very famous for cotton cultivation, "but the crop is not so dominant as this reputation would suggest."[3] Only Broach and Baroda

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3. Ibid (Page No. 651)

districts has it as the first ranking crop. Rice is fairly widely grown towards the humid southern Gujarat plains, such as in Kaira - Bajra, Jowar being the most important cereals and maize is grown towards the north. Groundnut is cultivated over a large area in Sabarkantha. The Konkan raises only millets. The cultivated parts of the Western Ghats are rich from the view point of rice production. Tobacco is grown in the Karnataka plateau. The most outstanding belt of orange production is restricted to the Maharashtra plateau around Nagpur. Coconut palms are, of course, found all along the coast. Besides this, betel-leaf, betel-nut and bananas are also produced. Alphanso mangoes are a speciality here. Thus the hinterland has jowar and millets as the first ranking crop. Next comes rice and the commercial crop i.e. cotton. This is followed by maize and groundnut. Ragi is produced in small quantities.

2.1.7 An estimation of the power and mineral resources of the Bombay hinterland, reveals that the reserves of minerals are very limited. Only small quantities of iron ore, manganese ore, lignite, limestone and coal are extracted. Other non-ferrous and non-metallic minerals found in the region are Bauxite, glass sand, gypsum, mica, salt, kyanite, steatite, asbestos, lead and zinc.[4]

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4. Census Atlas of India, 1971, Government of India Publication

A few coal mines are being operated in the Maharashtra plateau. Recently a few fields of natural oil have been struck in the Bombay and the Gulf of Cambay area of the hinterland. A refinery has been built with Soviet help near Baroda. Exploration of the sea bed of Kutch, Kathiawad and Cambay is regarded as worthwhile. The Western Ghats have considerable potentials of hydro_electricity. Bombay hinterland constitutes an area which is suitable for the setting up of a petro-chemical complex. By-products such as of coal-tar are also produced to certain extent. Among the minerals, manganese ores are widely distributed in Peninsular India especially in Bhandara which produces chromite as well. Lead and Zinc are produced in Rajasthan. Asbestos is also found here. The main concentrations of mineral resources are mainly in Rajasthan, eastern part of Maharashtra and Goa.

2.1.8 The hinterland encompasses some of the important industrial belts of the country. The cotton textile is the main industry. Its major centres are Ahmedabad, Nagpur and Sholapur. A few of the Indian cement industries are located in Kathiawad and in other parts of the hinter-land. Many other food processing industries, engineering industries and agro-based industries are located in this hinterland. Sugar refineries have also been set. It also has drugs and pharmaceuticals units. A few chemical

industries and transport equipment industries are also located here.

2.1.9 The transport network of this hinterland is relatively well developed in terms of railways, roadways, airways and waterways. The bombay hinterland has the highest number of railway nodes i.e. 2362 (see Table No. II.1) out of a total number of 6775 nodes for the country as a whole. The density of railways is highest in Gujarat plains, an area of flat topography with very dense population. The density decreases towards the Konkan coastal lowlands and towards the northern portion of the hinterland i.e. in the state of Rajasthan.

2.1.10 Lastly, the geographical diversities and economic disparities have been seen in terms of the varying levels of development. In this context, let us study Table No. II.2, prepared on the basis of the levels of development for the districts of India which was worked out by M.N. Pal.[5] One finds that the relatively developed districts occur in areas around Ahmedabad and Bombay. Large variations in terms of development can be observed in the hinterland varying from 'extremely high' to 'very low'. In the 'extremely high' category,

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5. M.N. Pal, Levels of Regional Development, Indian Journal of Regional Sciences, 1976, Number 1 & 2

Table No. II.2 *

LEVELS OF DEVELOPMENT FOR THE METROPOLITAN HINTERLAND

Names of Hinterland	EXTREMELY HIGH						VERY HIGH						HIGH						MEDIUM						LOW						VERY LOW					
	Z	X	Y	Ys	Yt	Yu	Z	X	Y	Ys	Yt	Yu	Z	X	Y	Ys	Yt	Yu	Z	X	Y	Ys	Yt	Yu	Z	X	Y	Ys	Yt	Yu	Z	X	Y	Ys	Yt	Yu
	(in No.of Dists.)						(in No.of Dists.)						(in No.of Dists.)						(in No.of Dists.)						(in No.of Dists.)						(in No.of Dists.)					
Bombay Hinterland	1	0	0	1	0	0	2	1	4	8	4	12	12	8	22	20	17	23	31	26	33	33	44	27	52	49	34	27	24	33	3	16	8	12	12	6
Calcutta Hinterland	1	0	1	2	2	0	3	8	6	5	6	6	9	37	11	15	13	13	38	29	34	27	29	23	38	12	26	25	26	36	1	4	12	16	14	12
Delhi-Kanpur Hinterland	0	0	0	0	1	0	14	11	12	10	14	15	11	42	15	16	11	13	15	19	12	8	13	13	37	5	25	22	22	21	1	1	14	22	17	16
Madras Hinterland	0	0	0	0	1	0	12	10	12	16	15	9	12	18	17	14	11	20	18	12	14	14	16	13	8	9	7	6	7	8	0	1	0	0	0	0

* Source: With the help of M.N. Pal's level of development from Indian Journal of Regional Science, 1976, No. 1 & 2

INDEX: Z = Composite Index of Development
X = Index of Agricultural Development
Y = Index of Non-agricultural Development
Ys = Index of Development in Secondary Activities
Yt = "Index of Development in Tertiary Activities
Yu = Index of Urbanisation

the hinterland has only one district each in the composite index (Z) and in index of development in secondary activities (Ys). The 'very high' category has the maximum number of districts (12) in terms of Yu (index of urbanisation). The 'high' category also has its maximum districts under the index of urbanis tion (Yu). The 'medium' category has its highest number of districts in the index of development in tertiary activities. The 'low' category has maximum number of districts in its composite index and index of agricultural develop ent (X) and almost all its indicators have large number of districts. The 'Very Low' is prominent in terms of index of agricultural development (X). Out of 105 districts in this region, if one studies the composite index (Z), then it is seen that only 15 districts are in the first three categories of high level of development, 31 districts in the medium level of development and 55 districts fall in the last two categories or Low level of development. Thus the hinterland has more than half its area in the low level of development. Mainly the hinterland is "one of advanced commercialisation and also incipient commercialisation".[6]

CALCUTTA AND ITS HINTER LAND

2.2.1 The metropolis of Calcutta is situated on the left bank of the Hooghly river. Despite its eccentric

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6. Ibid

situation, in the littoral which after 1869 was the furthest from Europe, Calcutta remained the British capital of India from 1773 until 1912. However, "Calcutta is not the natural centre for 'the concentration of local energies' even for Bengal alone, according to Reclus. On this unpromising site, pent narrowly between the river and the Salt Water Lakes, there rose a 'city of palaces' - and a far larger city of hovels".[7] The metropolis of Calcutta has the highest density of population. Calcutta district had more than three million inhabitants in 1971 with an area of only 104 sq. kms. (refer Table No.II.1). This gives rise to the exceptionally high density. The areas lying along the river Hooghly are much more densely populated than the rest of the metropolis. The conurbation as a whole has more than 7 million people. Calcutta proper is more commercial and administrative than industrial, being outstripped in this regard by the great industrial town of Howrah. This town lies across the river Hooghly and may hardly be regarded as a suburb, with the terminals of the railways to the west and south. Calcutta metropolis is the second largest town of India, after Bombay. Though it is a river port, situated at a distance of 148 kms from the sea, it is the chief export port of India because of its rich agricultural hinterland.

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7. O.H.K. Spate, *Op. cit.*, page 591

The location of various industries are along the Hooghly river. This is quite obvious because of the availability of river port facilities at Calcutta. This locational advantage is particularly useful to export oriented industries like jute manufacturers. Jute mills are strung out along the river from below Budge Budge to Naihati with notable concentration north of Howrah and above all in and around Bhatpara. Calcutta, is the most important jute spinning and weaving centre of the world. In addition, the other textile industries include hosiery and silk, but apart from cotton they are of little account. Of much greater importance are the very diversified engineering and metallurgical industries, developed in close association with Asansol - Raniganj coal and Jamshedpur iron and steel in the Calcutta hinterland. There are numerous engineering works of all sizes and types mostly located in Calcutta or its immediate suburbs. Machine parts for the jute mills and a wide variety of light machinery are produced. The rolling of aluminium sheets and bars from ingots are done at Belur. Railway workshops, ship repairing, motor assembly, and allied industries are worth mentioning. A motor-vehicle plant has been projected in Konnagar. Thus the variety of consumption goods are large, which is typically a metropolitan characteristic. However,

Calcutta proper is distinctive in having the bulk of one of the major industries of the country, namely jute. Other miscellaneous products produced here are rubber, chemicals, rice-milling and paper. The importance of publishing and educational centre is also attached to Calcutta metropolis. Finally, the large boot and shoe factory is located at Batanagar. However, "by and large Calcutta seems destined to be outstripped by Bombay both in population and dynamism."[8]

2.2.2 The hinterland of Calcutta ranks second in terms of area among all the hinterlands (Refer Table No.II.1). It includes the following main regions — (i) The Bengal Delta, (ii) Assam-Burma ranges, (iii) Assam Valley, (iv) Shillong Plateau, (v) the middle Ganga Plains, (vi) Chota Nagpur and the Damodar Plateaus, (vii) Northeast Deccan - the upper Mahanadi basin, (viii) Chhattisgarh, (ix) Orissa Deltas, (x) Andhra Desa: The North. We start with, Calcutta hinterland includes a part of the Greater Himalayas. The highest peak of the eastern Himalayas is Kanchenjunga in Darjeeling district. In the extreme north-east, the trend of the Himalaya changes to north-south forming the divide between India and Burma. The area of west Bengal is mainly taken up by the true Delta and the great mass of alluvial fans.

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8. Ibid, Page 597

The Assam Valley on the other hand is formed of the alluvial terraces of the Brahmaputra and its numerous tributaries. The Shillong Plateau also known as Meghalaya is in fact a detached block of the Peninsula with summit level of 4,500 - 6,000 ft. To the east the plateau is linked to the Barail and so to the Assam - Burma Ranges. The middle Gangetic plains are essentially built up of vast alluvial cones. The great plains in this hinterland are watered by the Ganga-Yamuna system and the Brahmaputra system. The Ganga-Yamuna system is the largest river system which fills up the trough. The plains also receives drainage from the southern tributaries such as the Chambal and Son. A part of the rolling highlands of the Bundelkhand lies here. The Baghelkhand Plateau in Chotanagpur, the Ranchi and Hazaribagh plateaus are mostly all under forests. The Damodar basin here occupies only a small area but its human significance is immense because of the location of the innumerous Indian coalfields. The plain of Chhattisgarh is more or less covered by broken forests. The three rivers, Baitarani, Brahmani and Mahanadi combine to form a great alluvial salient across the base from Balasore to Lake Chilka. The Mahanadi is one of the most active depositing streams, but its

flow is extremely irregular. The hinterland also includes the north of Andhra Desa basically, a narrow lowland.

2.2.3 In terms of climatic variations, the temperature ranges are moderate with not too severe winters and summers. The hinterland however on an average experiences excessively humid climate. The rainfall is very heavy along the coasts, in West Bengal, Bihar and Assam due to the Bay of Bengal monsoon currents. In general the hinterland receives an adequate amount of rainfall with June, July and August as the peak months. The range of annual rainfall does not vary too much in this hinterland. It lies between 40" to 80"[9]. As a result, of the heavy rainfall, tropical wet-evergreen forests flourish here especially in the western parts of Nagaland, and Assam areas. These forests support bamboo, veneer species and the famous iron-wood used for construction work. Tropical semi-evergreen forests are found in a belt parallel to the area of Tropical wet-evergreen forest, in the Assam Valley, Mahanadi delta and the entire northern eastern Ghats. They include ebony, teak, rose-wood and iron-wood. Most of the trees yield high valued timber. The evergreen forests are also found here. They constitute of Sal and Bamboo. The district 24-parganas consists of

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9. Ibid. Page 47

littoral and swamp forests which are used for fuel and construction work. A word or two may be added in this context regarding the soil types. Mainly, the hinterland consists of Red soils, Red and yellow soils and Red and gravelly soil, forest and hill soils and calcareous alluvium. A patch of mixed red and black soil is found near river Damodar. A patch of saline alluvium (Riverine) is also seen in eastern U.P. plains. Deep black and medium black soils are also found in little quantities.

2.2.4 It is not surprising to find that the population concentration is maximum in the most fertile tracts of the hinterland. From table II.1, one clearly finds that the Calcutta hinterland has the highest population i.e. more than 199 million as against an area of 874270 sq.kms. This clearly shows that the region has a very high density of population. The great stretch of population of high to extremely high densities (over 600 per sq. mile)[10] are in the rice lands of the Bengal Delta. Around the Calcutta conmurbation, the population is maximum rising to more than 7 million. Most of Assam Valley also has high density. The middle Ganga plains also have a high density of population. Low medium densities of population are found in the hills

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10. Ibid, Page 124

and in the Bundelkhand, Baghelkhand areas.

2.2.5 A study of the hinterlands agrarian economy reveals that in general, rice would be considered as the first ranking crop. Millets are also quite in abundance. A little quantity of wheat, Barley, Ragi and pulses are also grown. Among the commercial crops, jute is produced mainly in west Bengal. Tea is grown in the hills of Assam and West Bengal. A little cotton and rubber are also produced. Paddy is also grown in large quantities in Bengal. Sugar, tobacco and oilseeds are singnificant. The agricultural picture of the hinterland is quite homogenous and consistant.

2.2.6 Coming to the next aspect of the hinterland's economy, i.e. the power and mineral resources; there is vast production of coal from various coal field. The best coking coals are found in the Jharia fields. Raniganj, Jamshedpur, are all important depots of coal. Dhanbad, besides coal, also has a small lead/ zinc refinery. Orissa is scattered with manganese and iron ores. The hinterland has a considerable amount of limestones. There are a few steel plants and mining centres. Minerals for non-ferrous and non-metallic industry includes graphite, copper ore, mica, lead and zinc and the most important being petroleum. The oldest

exploited oilfield is in Assam. A few oilfields are being explored from time to time. Calcutta hinterland is quite rich in mineral resources and is scattered with mining centres.

2.2.7 Besides this the hinterland is ~~indebted~~ endowed with a few agro-based industries. Like Bombay hinterland, it specialises in textile industry such as jute industry. Most of these jute industries are concentrated along the Hooghly belt. This location advantage is particularly useful to export oriented industries too. Availability of coal from Raniganj only 194 kms away in the west, iron and steel from Asansol, Durgapur and Jamshedpur, raw materials for paper industry and the riverport facilitating the import of essential raw materials from abroad have contributed immensely to the development of the Hooghly industrial belt. The major metal based industry in the region is structural steel products and smelting of copper. Among the non-metallic mineral based industries, cement, pottery, clay products and glass ware are worth mentioning. Industries for electrical goods are also quite in abundance. Locomotives, manufacturing of coaches, wagons, etc also holds an important position. Fertilizers, synthetic rubber and rubber products, plastic products, medicines and watches are also produced in

large quantities. Jute and tea industry are the two major industries of the hinterland. A cotton textile industry and a few paper industries are located in Orissa.

2.2.8 The transport economy of the hinterland is one of wide variations. While the areas around Calcutta and Dhanbad shows a high density of railways, the coastal Orissa have poor development of railways. The density of railways is also quite low in Chotanagpur and Bastar plateaus. Eastern U.P. has a high level of network development. Waterways in this hinterland are also utilised by a number of ports developed. The most important ones being Kidderpore Docks, Vizag., etc. The hinterland has a total number of 2125 railway nodes. (Refer Table No.II.1).

2.2.9 Finally the hinterland studied in the light of its levels of development (Refer Table No.II.2) reveals that the category 'Extremely High' level of development have a few districts for the indicators, Ys and Yt. 'Very High' has the highest number of districts for the indicator X. 'High' has the maximum districts in X again; 'Medium' is highest in Z; 'Low' is also in Z as well as Yu; and 'Very Low' is maximum in Ys. We also find that out of a total of 92 districts for the indicator S, only 13 districts fall in the first three categories.

38 districts fall in medium group and 39 districts are in the low categories. In the first three categories, taken together, the index of agricultural development has the maximum number of districts. Agriculture thus is a more important factor in the development of the districts.

DELHI-KANPUR AND ITS HINTERLAND

2.3.1 Little is needed to emphasise the larger nodality of Delhi - the gateway between the Thar - Aravalli barrier and the Himalaya; the marchland position between the northwest, ever accessible to new waves of invasion and cultural intrusion. The site enjoys long-sustained significance. The metropolis is an old town situated on the right bank of the Yamuna where low ridges of the northern Aravalli range terminate near the river. It has grown over a site which suits military strategy. The Muslim rulers who extended their empire to the east and central India, realised the importance of Delhi and declared it the capital of their empires. Its dominant functions throughout its existence have been thus both military and administrative. The metropolis of Delhi is centrally located in the agriculturally rich plains — the Ganga Plain to the east and the Punjab-Haryana plain to the north-west enabling the metropolis to manage unfailing supplies of

food. Delhi easily maintains its control over a major part of India. After independence New Delhi has expanded rapidly. A large number of new housing colonies have developed. A few industries have also been established. This twin town now functions as one centre of commerce and culture. However, New Delhi preserves it distinct administrative function. It manufactures cotton textiles, chemicals, electrical goods, food products, television sets, automobile parts and a variety of consumer goods. It also preserves old handicraft industries such as ivories, wood carving, bronzes, etc. It is the third largest city after Bombay and Calcutta. Kanpur, on the other hand, is situated on the right bank of the Ganga in central Uttar Pradesh. This town was built during the British regime. It is the chief industrial centre of the Ganga plains. Though industry is diversified at Kanpur, tanning of leather, manufacturer of leather goods, cotton and woollen textiles, chemicals and hydrogenated oil are very significant. Kanpur is the principal centre where shoes and plastic goods are manufactured. Engineering industry is also important. It has foundaries and iron re-rolling mills. Railway wagons, oil engines, oil expellers, railway equipment and steel furniture are also manufactured. It has Asia's largest area fertilizer manufacturing plant. Aircrafts

are also manufactured here. The district of Kanpur leads in the production of manufactured goods. Delhi-Kanpur together have a population above 7 million with an area of 7606 sq. kms. (Refer Table No.II.1).

2.3.2 The Delhi-Kanpur hinterland includes the following regions : (i) the Himalayas: Kashmir and Karakoram; (ii) Central Himalayas, (iii) Punjab Plains, (iv) the Indo-Gangetic Plains and (v) the Aravallis. The vast Himalayas in the north form the international boundary of India. The greater Himalayas are flanked in the north-west by three parallel ranges -- the Karakoram, Laddakh, and Zaskar. Two parallel ranges are also in the south, namely; the Pir Panjal and Sivalik ranges. The Vale of Kashmir over which the river Jhelum meanders, lies between the greater Himalayas and the Pir Panjal. The Sivaliks in the central Himalayas have a remarkably even crest but are largely deforested and savagely eroded. The layout of the Ravi and Beas Valleys is similar to that of the Chenab. Sutlej is however very different from all these rivers. It breaks right through both the Great Himalaya and the Zaskar Ranges. On the other hand, the Punjab area forms an immense plain. The region is a great mass of alluvium brought down by the Indus and the five rivers - from west to east Jhelum, Chenab, Ravi, Beas and the Sutlej. The hinterland enclosing the Indo-Gangetic plains presents the simple

usual alluvial monotonous terrain excepting for a few scattered and broken Aravalli ranges. This plain stretches from Rajashtan area in Delhi-Kanpur hinterland with shifting sand-dunes and dry wadis to the well watered Sutlej-Beas system of the north west of the great plains. The hinterland also includes almost the whole of the Aravalli range. They are one of the oldest mountain systems, still retaining some relief in the world.

2.3.3. The climatic variations in this hinterland are few. The regions on a height experience cool and severe cold weather almost all through the year. The Himalayas acts as a barrier by protecting the sub-continent from the true winter monsoon current flowing from Siberia across China. The hinterland has very hot and dry summers and very cold winters. The humidity is very low. Rainfall however, is moderate in the hinterland. The Himalayas and hills receive rainfall in terms of snow and receives rains both in summer as well as winter. There are a few pockets which receives a heavy rainfall, such as near Amritsar and Dehradun. The other areas have more or less constant rainfall. The sub-tropical dry evergreen forest generally flourish in the northern parts of Punjab, NE part of Jammu and Kashmir and Himachal Pradesh where the annual rainfall is between 800-1,250 mms.[11]

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11. Census Atlas of India, Op.Cit.

The sub-tropical pine forests are found in Jammu and Kashmir, Himachal Pradesh and hill districts of Uttar Pradesh. Himalayan moist temperate forests are located in the northern hill region. Himalayan dry temperate forests are in the southern part of Ladakh and Doda districts, and in the northern part of Chamba district. Sub-Alpine and Alpine forests stretches north west to southeast of Jammu and Kashmir. Naturally, the soils in the northern part are of the type of forest and hill soils. A patch of Terai soil is found around river Chenab. As we, reach the Punjab area, the soils there is of old alluvium.[12]

2.3.4 Coming to the population aspect, here again the maximum population would be found concentrated in the fertile and agriculturally rich plains of Punjab and Uttar Pradesh. As one proceeds to the north towards the hills, the population reduces. In the Himalayan region, probably a little concentration of tribal population would be found. Delhi-Kanpur hinterland has a population of more than 85 million and an area of 625975 sq. kms. (Refer Table No.II.1). The upper Ganga and Yamuna plains contain a very large tract of high density of population. The areas around these plains have high medium to medium densities. This stretches across the lower Son Valley and also stretches across the Indo-Gangetic divide. In Punjab, the long densely settled and intensively cultivated

[12] Ibid.

hillfoot tracts of well-irrigation have high densities.

2.3.5 Before a study is made about the economy of the hinterland, one factor should be kept in mind that the hinterland consists of the most fertile tracts and agriculturally rich plains of the Punjab and Uttar Pradesh. The fertile tracts of the Indo-Gangetic plains together with the Punjab and Haryana plains enable the hinterland to declare wheat as its primary produce. Wheat is the principal crop cultivated here. Bajra is grown in large quantities in Rajasthan area. Sugarcane is also available in surplus. Besides these, cotton and oilseeds are also raised as the commercial crops. Potato is another important cash crop grown here. Gram is another important crop. Rice and Maize arefound in the Jammu and Kashmir State. Zaafgran is raised in the south east of Srinagar. Fruits are available in plenty in the state of Jammu and Kashmir. Fruits like apple, pears, apricot, peach, cherry and many other dry fruits are produced here.

2.3.6 Although India has a rich endowment of mineral resources, it is however unfortunate that Delhi-Kanpur hinterland doesnot have the same degree of endowment. Infact, the hinterland as a whole has very little, of the country's mineral resources. On the other hand, the hinterland faces an acute shortage of power despite

large developments. The few mineral resources available for ferrous metallurgical industry are mainly Dolomite. Limestone is also found alongwith Dolomite in the Uttar Pradesh hills. A little iron ore and magnesite are also found. Amongst the minerals for ferrous and non-metallic uses, one finds Gypsum and Mica in considerable amounts and copper ore, lead and zinc, slate, graphite and glass-sand, to some extent.[13]

2.3.7 Delhi-Kanpur hinterland unlike that of Bombay's and Calcutta's is famous for the woollen's industry among the textiles. The Himalayas look after themselves with horse-gown and sheepskin. There are many woollen factories at significant locations in the hinterland. They are, Amritsar, Dhariwal, Kanpur and so on. Kashmiri Silks are a speciality. The major industries here are the Textile industry and the Engineering industry. Sugar refineries and Gur factories are seen quite often. There are many wood based industries engrossed in producing handicrafts. Among the metal based industry, the manufacture of iron and steel and steel products are quite prominent. The Faridabad and Ghaziabad complex forms a strong industrial belt. Besides all these, Moradnagar is the base of the Ordinance Factory. Factories

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13. Ibid

of scientific, medical and surgical instruments; heavy machines and tools, and for general jobbing are also scattered. Bicycles, locomotives and all kinds of motor vehicles are also manufactured. Last but not the least, it is famous for the production of innumerous types of perfumes, cosmetics, medicines and pharmaceuticals.

2.3.8 The transport development of the region as a whole is well developed if one is to exclude the hilly areas. That leaves us with the western Uttar Pradesh — which has a very high density of railways; the Punjab plains which has a medium density and the part of Rajasthan which of course has a poor railway network. The Kashmir valley has no railways. The whole hinterland has 1089 railway nodes. However, because of Delhi metropolis, the hinterland occupies a pivotal position in the networks of national highways, railways and airways. It is linked not only within the region but with every trading, commercial, industrial, strategies and other important centres.

2.3.9 The level of development of Delhi-Kanpur hinterland shows ubiquitous distribution. The composite index (Ii) shows, out of a total number of 80 districts, (refer Table No. II.2) 25 districts are in the first three categories. 15 are having MEDIUM and 38 districts

are having LOW level of development. In the first category 'EXTREMELY HIGH' only one district exists in terms of the indicator Yt. The second category 'VERY HIGH' has the highest number of districts in terms of the indicator Yu. In the case of 'HIGH' level of development, indicator X has the highest number of districts. X is again the highest for MEDIUM level of development. In the category 'LOW', the composite index Z has the majority of the hinterland's districts. Finally 'VERY LOW' level of development, Ys contains the maximum number of districts. The districts around Delhi metropolis would have VERY HIGH level of development. And one would find relatively under developed districts in the Himalayan foothills extending considerably in the plains and in the Rajasthan desert.

MADRAS AND ITS HINTERLAND

2.4.1 Madras Metropolis is the fourth largest city of India. The city owes its importance today to history. Next to Vishakhapatnam, it is the leading port of the east coast. In the absence of natural barricade against strong waves, a wall has been built in the sea to enclose the port. The Madras metropolis has a population of over 2 million and an area of 128 sq. kms. Because, of its port facilities the city has emerged as an important industrial city after independance. Modern industries

are centred mainly at Ambattur and Guindy both located close to Madras. However, industrially Madras is outstripped not only by Bombay and Calcutta but by several towns within the state, such as Madurai and Coimbatore. Until the electric grid changed the perspective "Madras was not well placed as regards either raw materials or power".[14] A few of the important industries located in Madras are cotton textiles, silk factories, rubber tyres and tubes manufacturing, tanning of hides and skins, teleprinters, etc. There also exists a petroleum refinery at Madras. It refines the imported crude. However, "the sum total of Madras industry, except perhaps for tanning is not impressive".[15] There exists though the usual metropolitan trades such as the foundries and workshops, minor metal crafts and also printing. The location of small consumption factories are spreading in the city or in satellites within 20 miles or so. Some of these factories are bicycles, cars, tractors, lorries, rolling stock, paint, matches, chemicals, glass, pencils and so on. Leather is also important.

2.4.2 Madras metropolitan engulfs almost the whole of south India as its hinterland. It includes (i) the

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14. O.H.K. Spate, op. cit., page 748

15. Ibid page 749

Kerala coastal plains (ii) almost the whole of South Deccan plateau, (iii) Southern Blocks consisting of Nilgiris and Anaimalai Hills, (iv) Telungana, (v) a lower part of the eastern hills, (vi) Andhra Desa, (vii) Tamilnad. The Eastern Ghats, a part of which lies in this hinterland are so much worn down that their hilly characters in places are lost. The Nallamala hills, the Shevaroy and Javadi hills are found in Andhra Desa and Tamilnad. The peninsular rivers other than Tapti and Narmada flow to the Bay of Bengal also cutting through the eastern ghats. The East coast is much broader than the west coast due to the formation of deltas by the major river systems of the Peninsula. The Tamilnad is situated to the east of the Cardomom hills. This includes the Coimbatore Plateau and the Upper Vaigai valley and the low country formed due to the subsidence of land between the Karnataka plateau and the hills stretching from the Javadi Hills to the Pachaimalai hills. The Kerala coasts on the other hand is a narrow coastal plain. Diversity in landscape is a marked feature of this coastal plain. It is a continuous line of cliffs of the western Ghats broken at the Palghat Gap. At some places the flowing rivers suddenly leap over these

cliffs to make beautiful water falls. In the extreme southwest of this plateau rises Nilgiri plateau where the eastern and the western ghats meet. The Andhra Desa in the hinterland is a region of broad valley plains and low hills.

2.4.3 The hinterland is hot almost all through the year. The climate represents the nearest approach in India to equatorial conditions. During winter the temperature rarely falls below 21°C. Andhra Desa is climatically a transition zone. In terms of rainfall, the coasts experience the heaviest rainfall. It decreases as we approach the interior from the coasts. However, the hinterland as a whole experiences a heavy rainy season. As a result, tropical dry deciduous forests are found in the drier part of Tamilnad upland, southern part of the eastern ghats. Sal and Teak are the most important trees here. Tropical thorn forests are common in the Tamilnad Plains, Telengana plateau, Karnataka plateau; the important species is acacia. But, in some parts of Karnataka and Tamilnad plateaus, Sandal wood tree is grown. Littoral and swamp forests are found in the heavy alluvial deposits near the coastal areas of Andhra Pradesh. Thus the coasts have new alluvium soils. The interior on the other hand, consists

mainly of red soils. A patch of peat soil is found near Alleppey. The laterite and lateritic soil and a little amount of forest and hill soils are also seen. The deep black soil and the medium black soil occurs in patches all over the hinterland.[16]

2.4.4 Madras hinterland has a total population of 108 million people (Refer Table No.II.1). It has belts of high and very high densities of population. 108 million people live in an area of 511041 sq. kms. The belt of very high and extremely high densities stretches almost from Karwar to Kanya Kumari; the coastal rice lands of Kerala emerges as one of the largest stretches of extremely high rural populations not only in the hinterland but also in the nation. "Near Kanya Kumari the narrow coastal lowlands show a sharp change to medium and high medium densities associated with the contrast between perhumid Kerala and semi-arid Tamilnad".[17] There are patches of high density in the main river plains. The hill tracts have medium to low density of population. The same picture emerges in the south-eastern raised rim of the Mysore plateau. A salient of high density reaches northwest along the railway line to the coal-mining area of Singareni and Warrangal.

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16. Census Atlas of India, op. cit.

17. O.H.K. Spate, op. cit., page 123

2.4.5 Finally we come to the economy of the hinterland. To start with, in terms of agriculture, the hinterland's main cereal grown is rice. This crop can grow satisfactorily only if it grows in a few inches of water. This is supplied by the heavy rainfall or natural floods of the hinterland. Besides rice, millets, jowar and ragi are also grown here. Oilseeds are produced among pulses. Among the commercial crops, cotton, sugarcane, coffee, tea, groundnut, tobacco and spices are grown in large quantities. Tobacco is grown in abundance especially in the districts of Madurai and Tiruchchirapalli. Coconuts are extensively grown all over the hinterland especially along the coasts. Kerala has suitable conditions for producing rubber. Plantain is quite commonly grown among fruits.

2.4.6 If one looks in search of mineral resources, it would immediately be clear that Madras hinterland is blessed with mostly Manganese and iron ore. Some amount of dolomite, manganesite, limestones, lignite, a little coal in Andhra Pradesh are also found. Mining centres are scattered all over the hinterland. Among the minerals for non-ferrous and non-metallic industry one is likely to find certain quantities of china-clay, mica, lead and zinc, gold, copper ore, graphite, gypsum

and even diamond in very small quantities. Wherever there is absence of coal in the hinterland, almost in all places, it has developed its own hydro-electric power for industrial and domestic uses. However, this is still not enough for the region as a whole. One of the main belts of hydro-electric potential in the hinterland is on the Nilgiris and the middle Cauvery.

2.4.7 In terms of its industrial economy, the region may be called as one of diversified manufacturing. Industries based on locally available agricultural raw materials such as cotton, tobacco, hides and skins, sugarcane, etc are scattered all over the hinterland. The major industries are basically agro-based industries which are few in number, such as cotton industries, forest-based industries and engineering industry; tanning of hides and skins is a well-established industry in the north eastern part of Tamil Nadu, Bangalore town also is an important industrial centre for engineering industries. Among the metal-based industries, the hinterland has a few iron - steel and structural steel products industry. Cement and factories for various construction materials are a few among the non-metallic mineral based industries. The hinterland also has a few transport equipment industry. Mysore has sandalwood oil factory and a few silk and cotton textile mills.

On an average the region is industrially backward. One of the probable reasons would be scarcity of power especially in the Telengana and Rayalseema regions.

2.4.8 Finally we come to the hinterland's transport development. The transport system is fairly developed. The east coastal low-land is served by railways whereas west coastal lowland being strewn with hills and innumerable creeks, has no railway connection, for example between Bombay – Mangalore. Tamilnad plateau on the other hand, has a dense network development. Similar is the case for road network development. The air transportation are developed for only Madras Metropolis and a few other towns. The coastal areas are also served by Navigable canals. In terms of railway development, pockets of high density will be seen around Madras, Vijayawada, ~~Nagpur~~, Tiruchirapalli. In general, Madras hinterland has a medium density of railways. It has ~~about~~ 1194 nodes (Refer Table No.II.1). The density of railways decreases as one enters the Telengana plateau.

2.4.9 The level of development of Madras hinterland is comparatively higher than the other

hinterland. The composite index shows that 24 districts out of a total of 53 districts (table No.II.2) have 'Very High' and 'High(level of development. 18 districts have 'Medium' level of development. And 8 districts have a 'Low' level of development. Madras hinterland's development is much contributed by its high agricultural development and its secondary and tertiary activities.

2.5.1 After a brief discussion of the geographical background, we shall now proceed to study yet another aspectof the metropolitan-hinterlands. Before that, one basic element of economic regionalisation is clearly noticed on the basis of all the analyses. Bombay, Madras, Calcutta and Delhi-Kanpur are the major metropolitan centres which play the key role of any region-forming cores of national importance and thus are the most important factors in the shapking up of the country-wise spatial structure of the economy. Even, Kanpur alone, also plays a role of region forming cores of regional importance. Table No.II.3 shows the percentage of settlements with railway nodes in terms of rural, urban and total.

2.5.2 Bombay metropolis is the dominating centre of its region formation. Bombay connurbation consists

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For details of the Rural/Urban Structure see Appendix IV

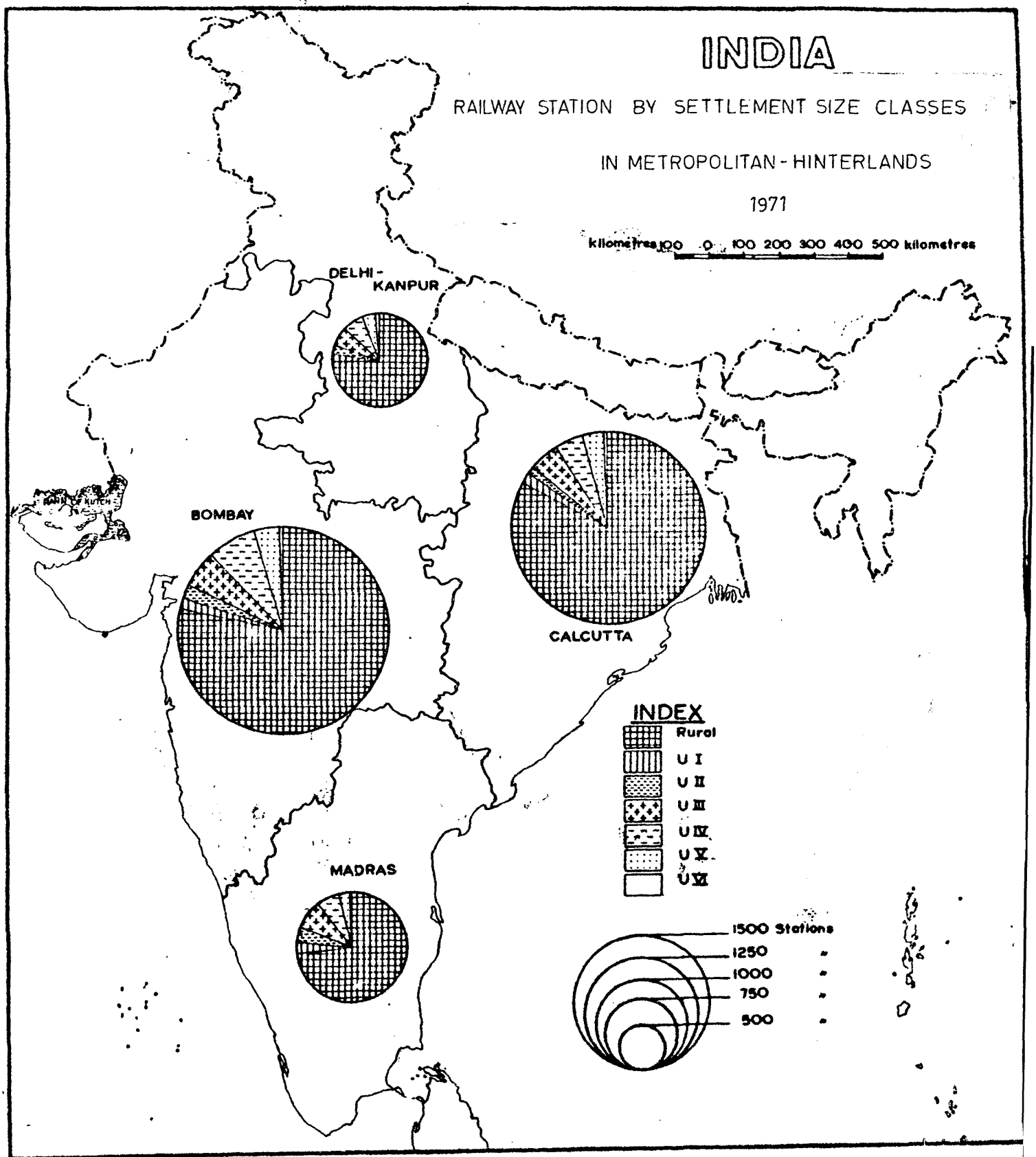

INDIA
RAILWAY STATION BY SETTLEMENT SIZE CLASSES
IN METROPOLITAN - HINTERLANDS
1971
kilometres 100 0 100 200 300 400 500 kilometres
DELHI - KANPUR
BOMBAY
CALCUTTA
MADRAS
INDEX
Rural
U I
U II
U III
U IV
U V
U VI
1500 Stations
1250
1000
750
500

Fig 2.1

of a number of amalgamated cities and towns. The Bombay hinterland as seen from Table II.3 shows that out of a total number of 2362 stations, 1853 stations are classified as rural. The remaining urban stations have been further classified into six categories (Refer Appendix-IV). The proportion of this rural/ urban nodes has also been represented in figure 2.1. From this figure it may be observed that a large portion of the hinterland is consisting of rural nodes. Among the urban classification urban III and IV are more common in all the metropolitan hinterlands. However, inspite of a major urban centre like Bombay, the region can hardly be termed as 'urbanised'. Even among a total of about 900 urban centres, hardly 500 of them have railway linkages (refer Table No.II.3).

2.5.3 The Calcutta agglomeration on the other hand, comprising of the Calcutta conurbation and many other adjacent industrial cities forms together with new port and industrial centres, the most important region forming node of the Eastern India from figure 2.1, it is clear that a majority of the nodes are rural. From a total of 2125 nodes, more than 1700 nodes are classified as rural (refer Table No.II.3). Hardly 1% of the total rural settlements in the hinterland are connected with railways.

Table No. II.3

RURAL/URBAN STRUCTURE OF METROPOLITAN - HINTERLANDS

Sl. No.	Hinterland	No. of Dists.	All settlements			Total urban settlements			Total Rural Settlements		
			No. of all settlements	No. of Settlements with Rly. Stns.	% of Col. 5 to 4	No. of urban S.	No. of U.S. with Rly. Stn.	Col. 8 as % to Col. 7	No. of R.S.	No. of R.S. with Rly. Stn.	% of 11 to 10
1	2	3	4	5	6	7	8	9	10	11	12
1.	Bombay Hinterland	105	129242	2362	1.83%	879	509	58%	128363	1853	1.44%
2.	Calcutta Hinterland	92	270162	2125	0.78%	623	367	59%	270339	1758	0.65%
3.	Delhi-Kanpur Hinterland	80	117502	1089	0.93%	451	272	60%	117051	817	0.70%
4.	Madras Hinterland	53	55095	1194	2.17%	576	317	55%	54519	877	1.61%

2.5.4 The bi-nodal metropolitan hinterland of Delhi-Kanpur consists of more than 1000 nodes. Out of which more than 800 are rural. And hardly .7% of the total rural settlements are connected with railway lines.

2.5.5 Finally, coming to the Madras hinterland, one may state that the industrial potential of the Madras metropolis is much inferior than that of Bombay and Calcutta. Out of a total of 1194 nodes, almost 900 are rural nodes. However, one fact is observed from Table II.3. Madras hinterland has the highest proportion of rural stations i.e., 1.61% and thus also the highest proportion of settlements with railway stations, i.e., 2.17%.

CHAPTER III

FREIGHT CHARACTERISTICS OF METROPOLITAN CENTRES

3.1.1 In this chapter we bring out various characteristics of metropolitan freight associated with the originating and terminating tonnage and their commodity composition. Much of the analysis is presented through a number of tables. A preliminary base is provided by the consideration of freight characteristics of the nine million cities of India. Following this the four metropolitan centres of Bombay, Calcutta, Delhi and Madras which define distinct hinterlands around them are dealt with in greater details.

Dominance of Million Cities in Railway Freight

3.2.1 Transport network is considered neutral, serving all the places connected by it with equal efficiency. However, in reality not all places connected by a system of routes are in a position to utilise equally such infrastructural facilities of spatial integration. The tendency for some nodes to dominate the privileges of utilising the network for movement, results from a host of other policies and decisions such as location of activities, freight rates, industrial licensing etc. and the nature of regional resource base,

TABLE NO.III.1.1

PERCENTAGE OF METROPOLITAN FLOWS TO THE NATIONAL FLOWS (1973-74)

S.No.	Names of commodity groups	National flows (in qts.)	Ahmedabad as % to col (3)	Bangalore as % to col.(3)	Bombay as % to col. (3)	Calcutta as % to col (3)	Delhi as % to col. (3)	Hyderabad as % to col (3)	Kanpur as % col. (3)	Madras as % to col.(3)	Pune as % to col(3)	All Met. centres as % col.(3)
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Total Originating(O)	1816417706	0.07	0.15	3.16	1.38	0.37	0.24	0.99	1.38	0.08	7.43
2.	Total Terminating(R)	1816417706	0.61	0.68	3.39	5.19	2.96	0.93	0.95	2.65	1.26	18.61
3.	Total (O+R)	3632835412	0.34	0.41	3.28	3.28	1.66	0.58	0.77	2.01	0.67	13.02
4.	Food Products(O)	205666635	0.10	0.30	4.37	1.49	1.38	0.66	0.24	2.50	0.18	11.22
5.	" " (R)	205666635	0.49	1.51	5.48	8.38	3.88	1.55	0.69	1.59	1.07	24.63
6.	" " (O+R)	411333270	0.30	0.91	4.92	4.94	2.63	1.10	0.47	2.04	0.62	17.93
7.	Raw Materials from Primary Sources(O)	424321674	0.12	0.04	0.22	0.20	0.07	0.07	0.05	0.11	0.001	0.88
8.	" " " " (R)	424321674	0.21	0.11	2.14	5.50	0.62	0.18	0.38	5.87	3.38	18.39
9.	" " " "(O+R)	848643348	0.16	0.07	1.18	2.85	0.35	0.13	0.22	2.99	1.69	9.63
10.	Coal/Fuel (O)	734154076	0.0002	0.11	2.26	0.49	0.003	0.0001	0.73	1.35	0.001	4.95
11.	" " (R)	734154076	0.84	0.60	0.96	3.95	3.76	1.01	1.18	1.37	0.36	13.66
12.	" " (O+R)	1460308152	0.42	0.35	1.61	2.22	1.88	0.51	0.95	1.36	0.18	9.30
13.	Inputs Into Agriculture (O)	130111189	0.11	0.17	7.42	2.36	0.76	0.39	2.21	3.63	0.07	17.12
14.	" " " (R)	130111189	0.14	0.37	4.62	1.05	0.69	0.37	0.45	0.49	0.30	8.49
15.	" " "(O+R)	260222378	0.13	0.27	6.02	1.71	0.72	0.38	1.33	2.06	0.19	12.81
16.	Construction Materials (O)	136183492	0.03	0.002	4.59	0.55	0.17	0.57	0.01	1.53	0.01	7.46
17.	" " (R)	136183492	0.88	1.28	4.54	5.54	4.08	1.46	1.06	2.51	1.03	22.37
18.	" " (O+R)	272366984	0.45	0.64	4.57	3.04	2.13	1.02	0.53	2.02	0.51	14.91
19.	Industrial Products (O)	122631776	0.09	0.42	5.56	8.95	0.76	0.35	0.24	1.69	0.13	18.18
20.	" " (R)	122631776	1.17	1.35	7.99	9.26	5.15	1.74	2.14	3.47	0.56	32.43
21.	" " (O+R)	245263552	0.63	0.88	6.58	9.10	2.95	1.05	1.19	2.58	0.34	25.30

historical factors and so on. Under these circumstances it may be expected that the large population clusters would account for a considerable proportion of the national freight. In order to bring out the variable behaviour of the million cities with reference to the originating, terminating and total freight handled and with respect to commodity groups, table III.1.1 is presented. The table records the percentage share of each metropolitan centre in the national freight (originating, terminating and total).

3.2.2 The dominance of million cities in the total freight is apparent. Although there are about 7000 nodes served by the railways, the nine million-cities account for about 13% of the total freight (Table III.1.1). Among these million cities the dominance of the four largest metropolises of Bombay, Calcutta, Madras and Delhi are also marked (Refer Fig. 3.1 to fig. 3.7). Consistently in all cases the proportion of terminating freight is much larger than the originating freight. The nine cities together account for about 19% of the total terminating tonnage in the country, whereas their shipments amount to 7% of the total originating tonnes.

3.2.3 Column thirteen of the table (III.1.1.) records the share of metropolitan (all million cities)

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

TOTALS (1973-74)

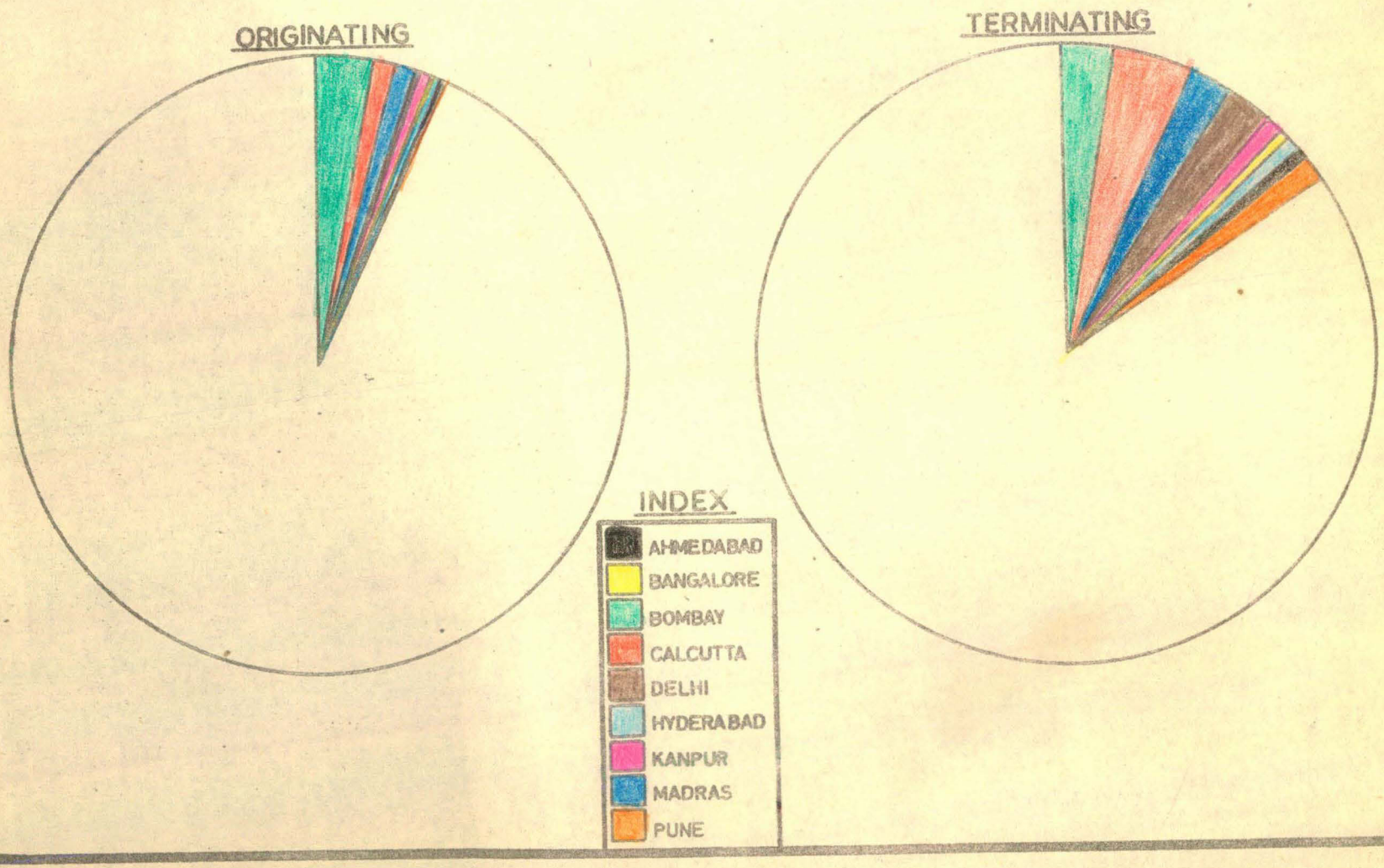


Fig.3.1

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

FOOD PRODUCTS (1973-74)

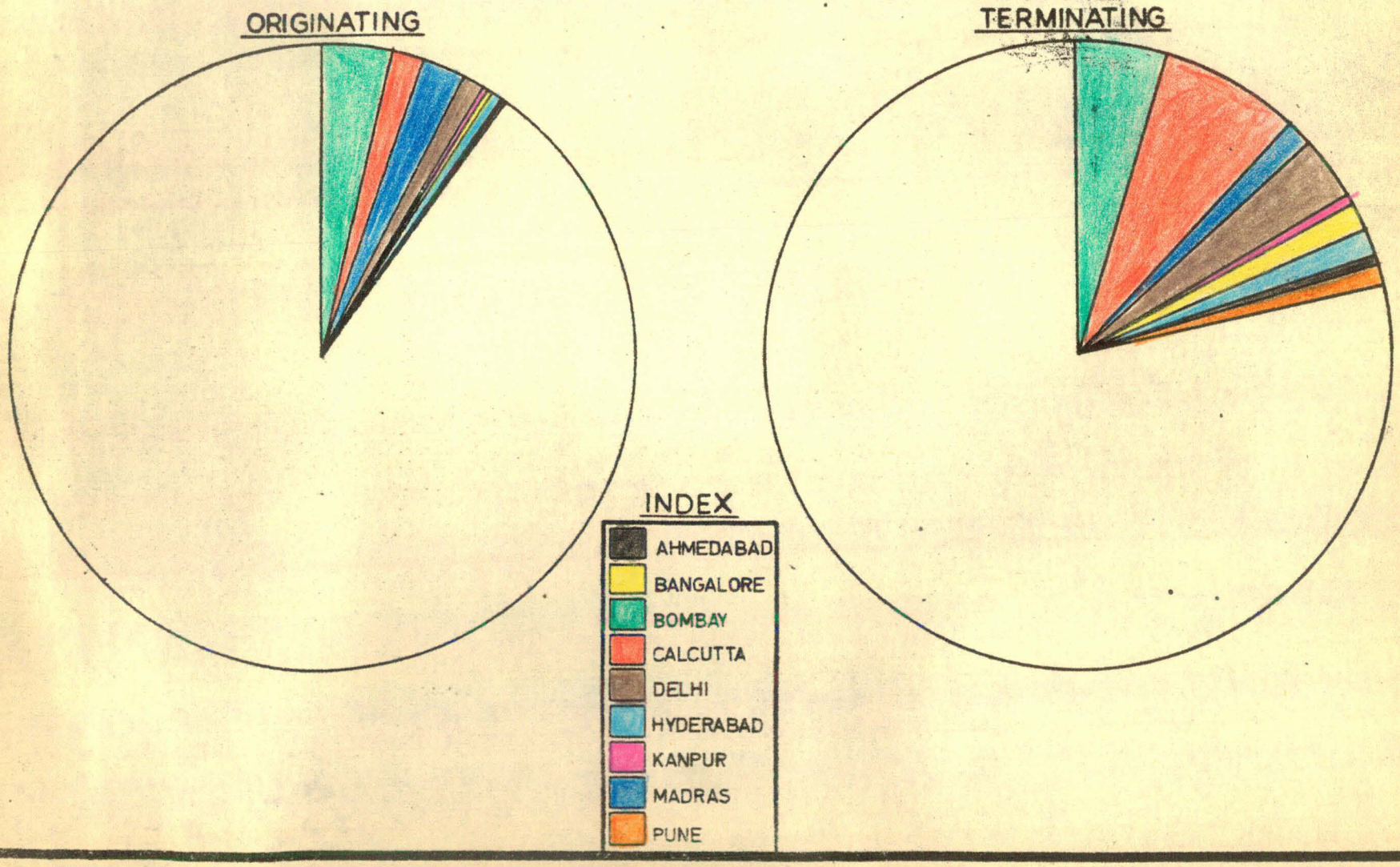


Fig.3.2

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

RAW MATERIALS FROM PRIMARY SOURCES (1973-74)

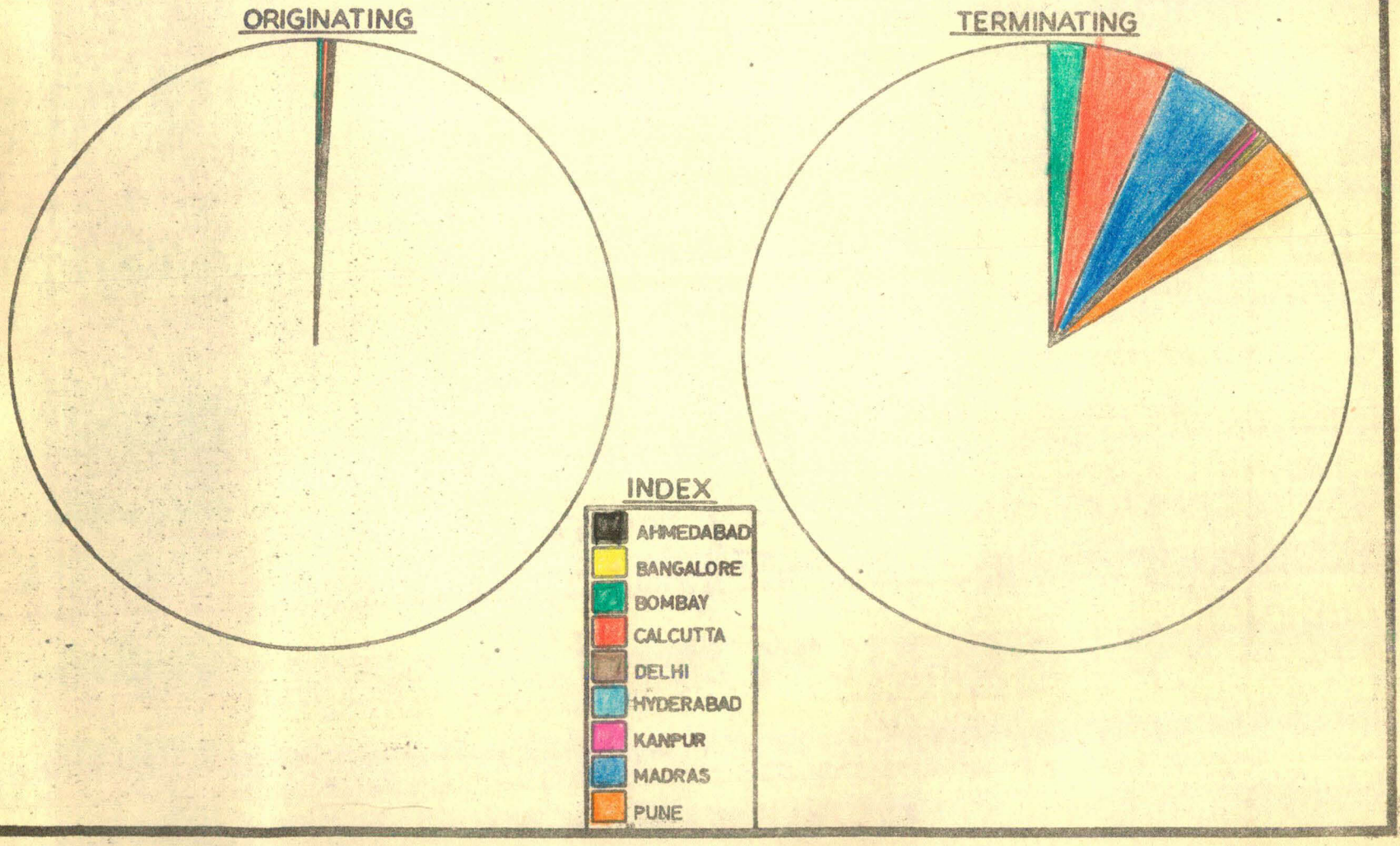


Fig.3.3

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

COAL / FUEL (1973-74)

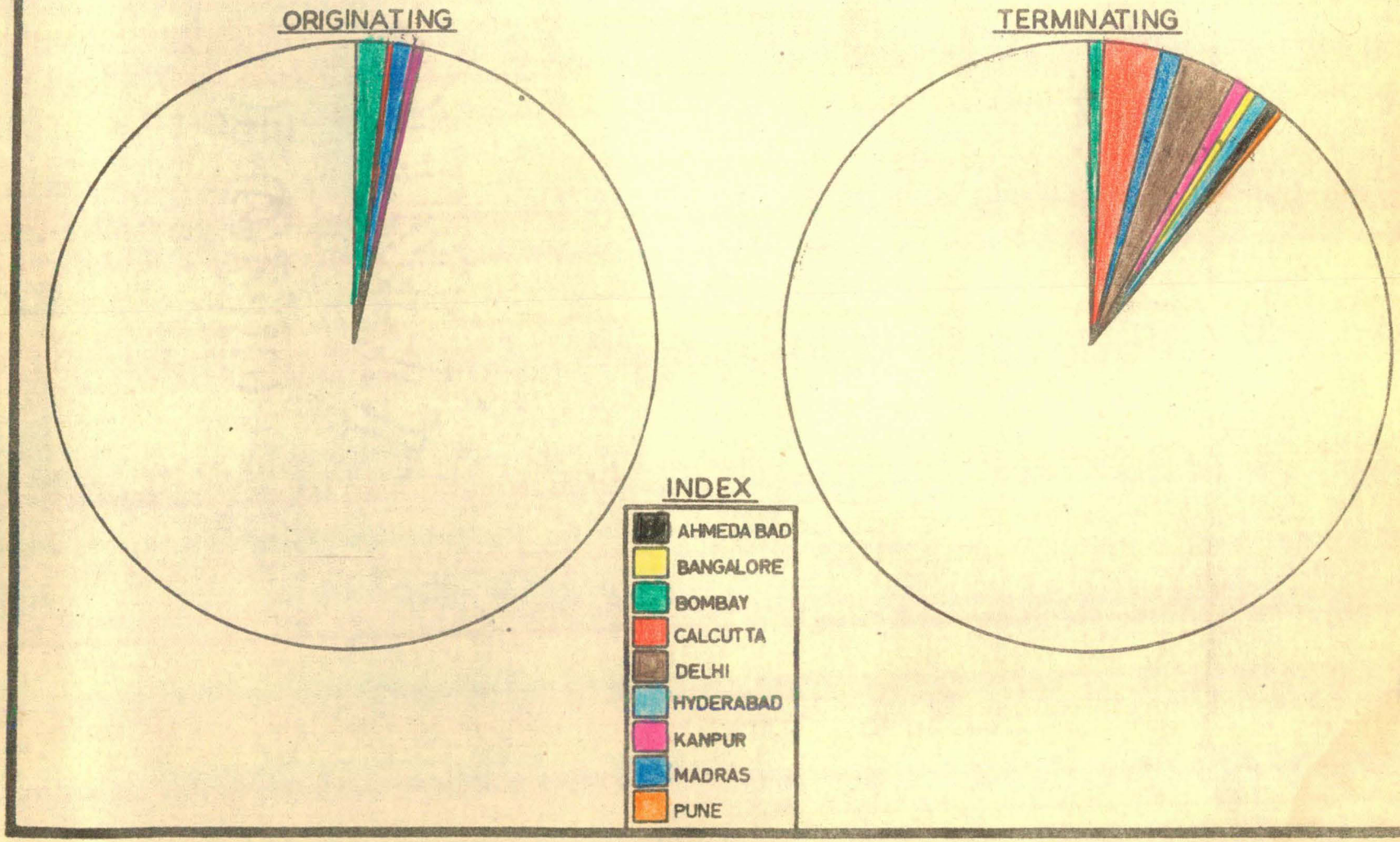


Fig .3 .4

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

INPUTS INTO AGRICULTURE (1973-74)

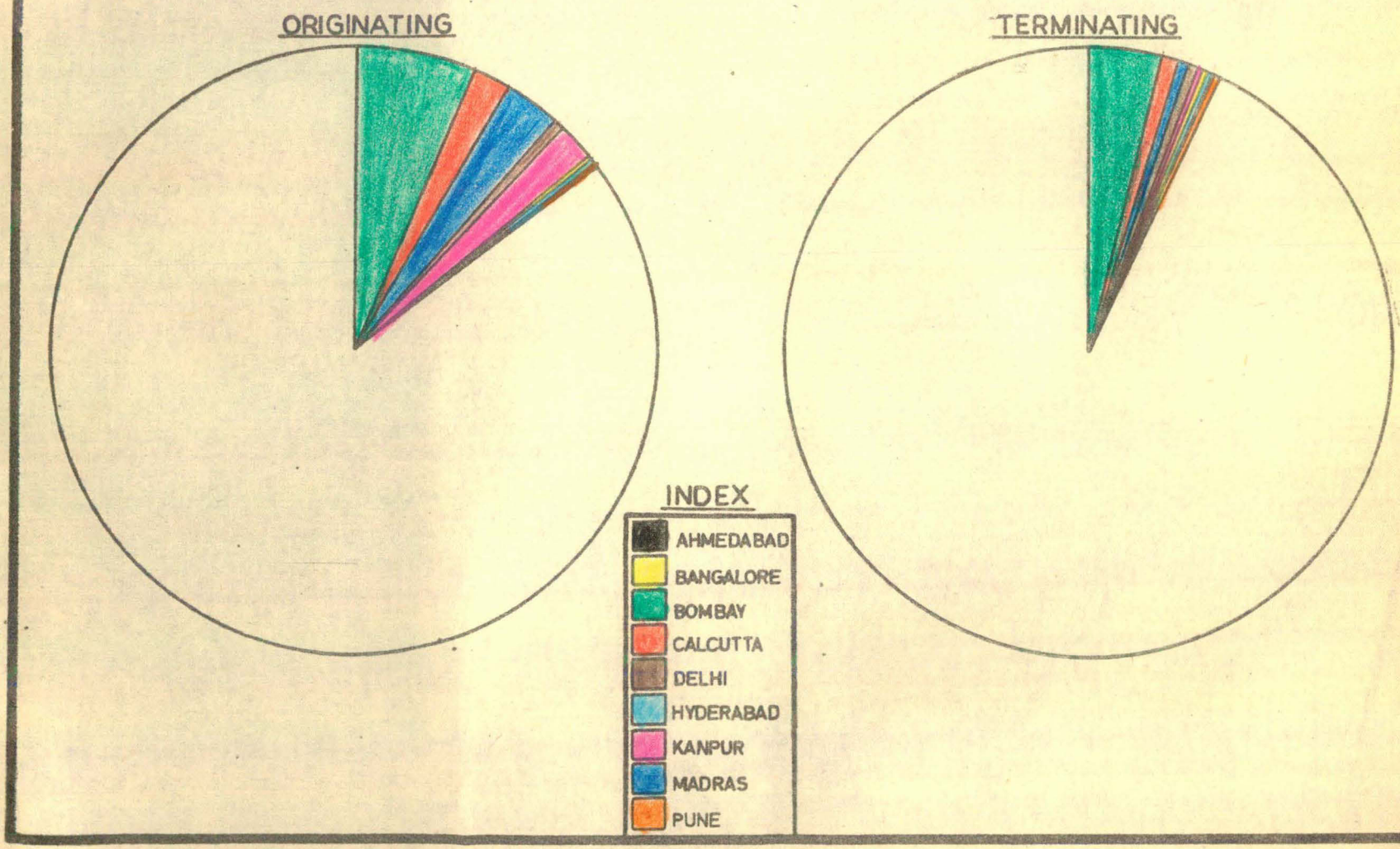


Fig.3.5

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

CONSTRUCTION MATERIALS (1973-74)

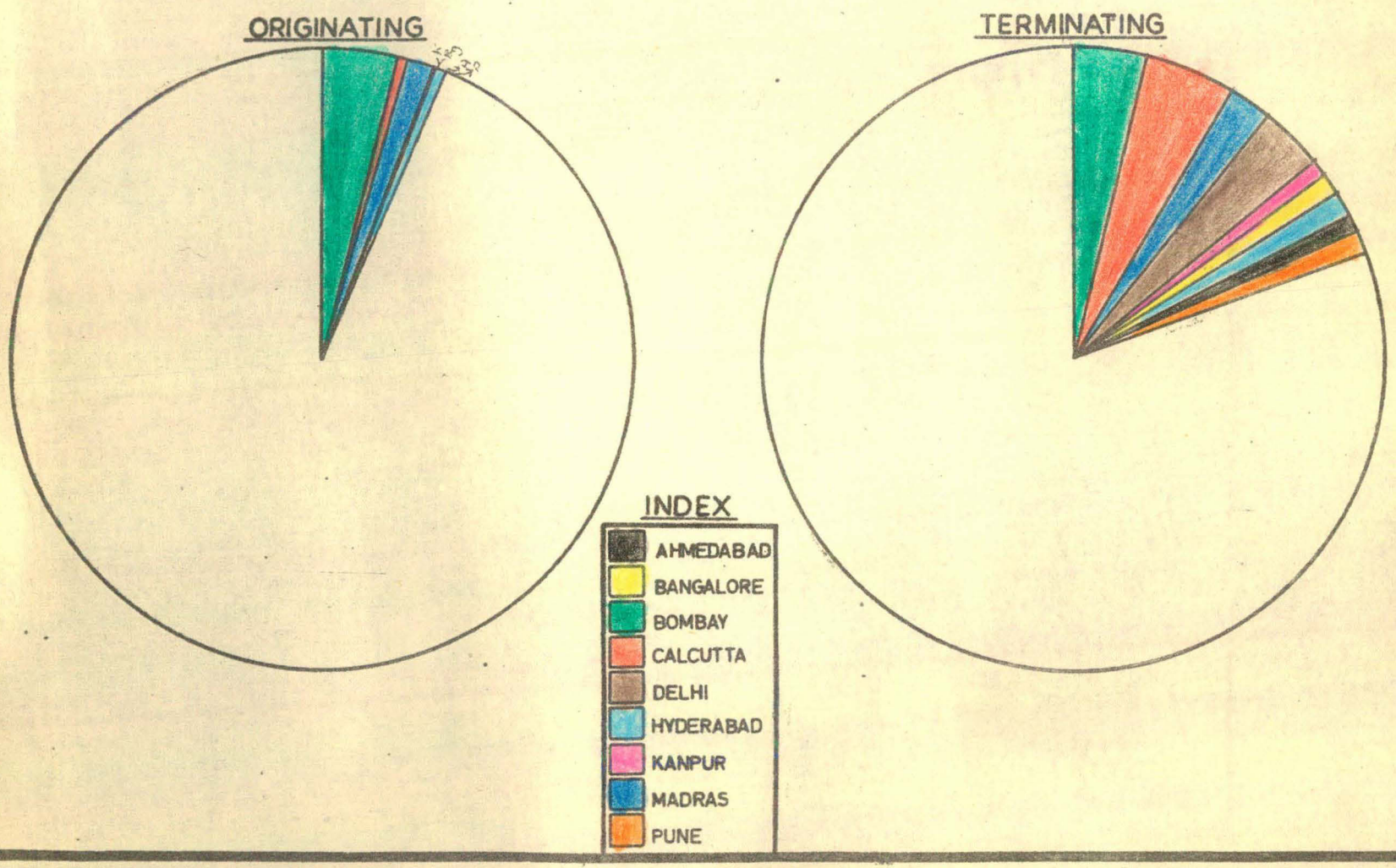


Fig.3.6

SHARE OF METROPOLITAN FLOW TO THE NATIONAL FLOW

INDUSTRIAL PRODUCTS (1973-74)

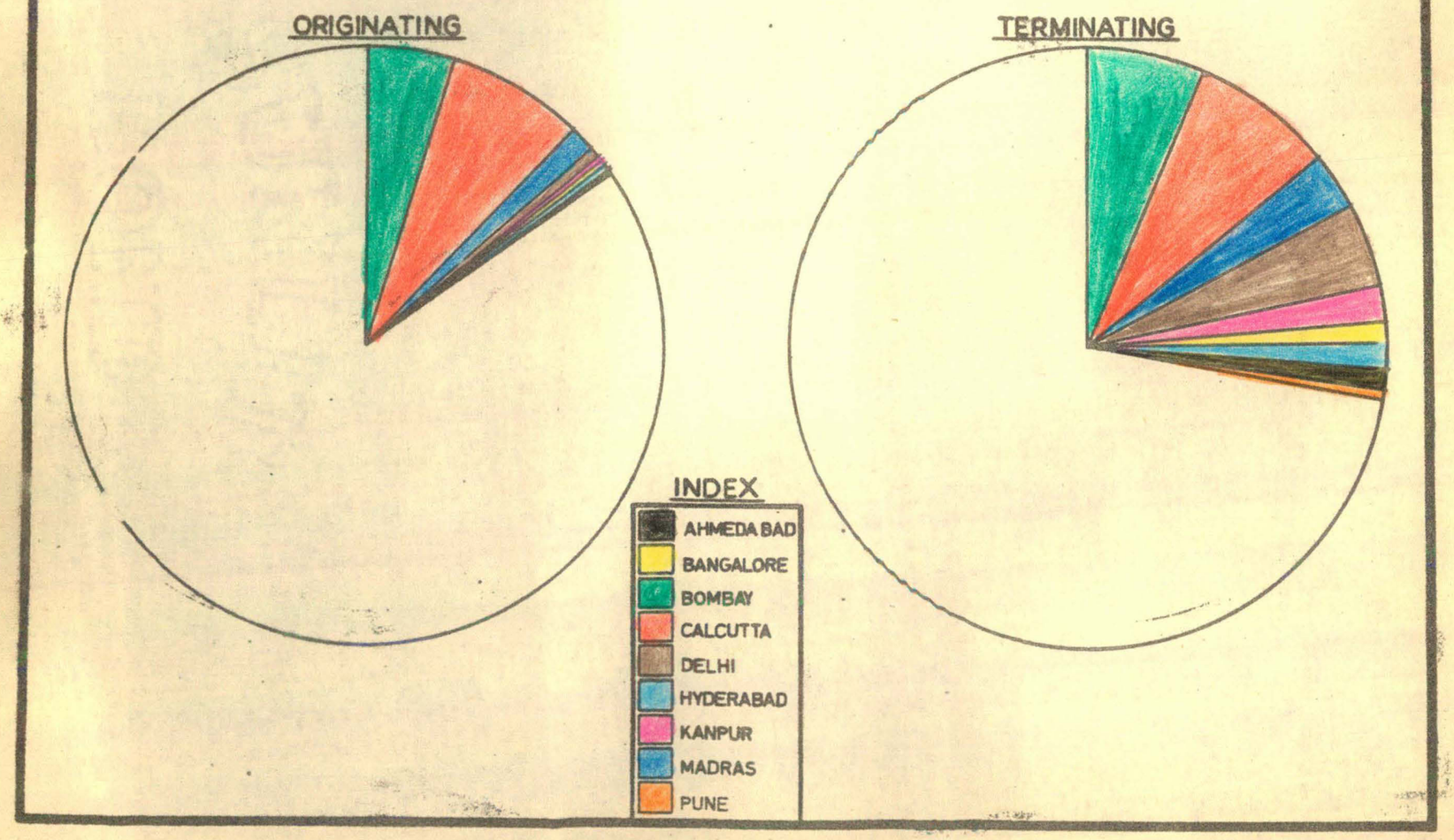


Fig.3.7

shipments to total originating tonnes, metropolitan receipts to total terminating tonnes, and metropolitan freight transaction (originating and terminating tonnes) to the total freight transaction in the country for each commodity group. A scrutiny of the column brings out the fact that except for inputs into agriculture (which records greater proportion of originating tonnage) in all other commodity groups receipts dominate over shipments. In the case of fuel one would notice a receipt dominant pattern if one considers individual cities, except in cases like Bombay, where the originating tonnage is bloated due to imported petroleum. The most striking feature that emerges from the study of the table is the consistent dominance of receipts over shipments irrespective of the products, be it a hinterland produce (food products, raw materials) or metropolitan/urban products (industrial, construction material etc.). The only exception to this behaviour is the reversal of the pattern that one encounters in the case of 'inputs into agriculture' which has to be ultimately consumed in the rural hinterland and of which the metropolitan centres have little use. The fact that industrial products account for the largest share of the metropolitan shipments (18%) as compared

to other commodity groups is easily offset by their receipts of the same commodity group which accounts for the largest share of receipts (32%).

3.2.4 We may now consider commodity wise proportions of originating, and terminating freight of the nine million cities. Since cities are not the producers of food and raw materials (from primary sources) the metropolitan receipts of these two commodities are much larger than their shipments. However, since many of these cities also ship food products (which amounts to a significant proportion) it is apparent that these centres, other than consuming this commodity also act as collection/distribution centres. Madras is the only centre where food product shipments are larger than their receipts. Obviously other modes of transport contribute significantly to the receipts of food product at Madras.

3.2.5 As brought out in the previous chapter, since the four largest cities (Calcutta, Bombay, Madras and Delhi) demarcate their own hinterland within which their interactions are most dominant, their share in the metropolitan transactions are much larger than the other million cities, in all the commodity groups individually as well as in the total freight. Consequently since they cater to the hinterland with their

collection and distribution function the size of the hinterland has much to do with their relative share of the freight in so far as food products and other hinterland produce are concerned (refer fig. 3.2).

3.2.6 Raw materials from primary sources must also necessarily be shipped from the hinterland and received at various urban clusters. Consequently the million cities indicate largest difference between the share of shipments and receipts in this group of commodities. Again Bombay, Calcutta and Madras indicate considerably large proportion of receipts than other million cities. Pune, with its growing industrial base also records a very large proportion of raw material receipts (3.38%). Conversely, among the first four metropolitan centres, Delhi with its weak industrial base receives a much smaller share (0.62%) of this commodity. The nature of the industrial base and the nature of raw materials account for the relative share of the receipts of the metropolitan centres. The large proportion of Calcutta (refer fig. 3.3) perhaps results from the terminating iron ore and other minerals for exports, jute in its semi processed and un-processed form which are bulk commodities. Similarly, the high values of Madras results from the flow of hides, skins, bones, glass and raw materials for cement plants. Compared to these two centres, Bombay records a lower

value possibly because of the cotton textile base, whose raw material, a large amount of which is semi-processed and processed tends to flow from the nearby hinterland through roads, and also because of the synthetic textile base, whose raw material is directly or indirectly import based.

3.2.7 Production is largely confined to hinterland of Calcutta. Table III.1.1 show that excepting for Bombay, all the other cities have a dominant receipt pattern (refer fig. 3.4). As pointed out earlier, Bombay's originating tonnage dominates over its terminating tonnage because of imported crude. Madras metropolis has a more or less equal proportion of originating/terminating tonnage.

3.2.8 Four centres, Bombay, Madras, Calcutta and Kanpur associated with petroleum based refineries and the consequent development of petro-chemical and fertiliser complexes lead to a large shipment of inputs into agriculture from these nodes. Other cities record very small proportion of shipments of this commodity group. Obviously the receipts are meagre in all cities.

3.2.9 Each of the nine cities individually record a much larger proportion of receipts of industrial products than their shipments. Of these Delhi, the

the fourth largest city with its weak industrial base receives unproportionately larger quantity of industrial products than it ships. Similar situation is also encountered with Ahmedabad and Kanpur. The four largest metropolitan centres again exchange industrial products in much larger quantities than the rest of the million cities.

CONSUMPTION DOMINANCE

3.3.1 From earlier presentation it is clear that metropolitan centres deal with all kinds of commodities both in their shipments and receipts. What is the net position in terms of commodity shipments and receipts? This is brought out in Table III.2.1. The excess of originating over terminating tonnage per unit of total of originating and terminating tonnes are presented for each of the nine cities with reference to the six commodity groups and the total freight in the table.

3.3.2 The most striking feature of the table is the large number of negative values, indicating excess of receipts over shipments, including those which are urban products (like industrial goods). The only exception is inputs into agriculture where the maximum number of positive values i.e. 6 out of 9 cities are noticeable. Except for this if we

TABLE No.III.2.1

TRADE IN THE ECONOMY OF NINE METROPOLITAN CENTRES

Category	Names of Commodity groups	Ahmedabad	Bangalore	Bombay	Calcutta	Delhi	Hyderabad	Kanpur	Madras	Pune
1	2	3	4	5	6	7	8	9	10	11
I	Totals	- .79	-.63	-.03	-.58	-.78	-~~0~~.59	-.24	-.32	-.88
II	Food Products	-.65	- .67	-.12	-.70	-.48	- .40	-.48	+.22	-.71
III	Raw Materials From Primary Sources	-.26	- .50	-.82	-.93	-.79	- .44	-.77	-.96	-1.00
IV	Coal/Fuel	-1.00	- .50	+.40	-.78	-1.00	- .99	-.24	-.01	-.99
V	Inputs into Agriculture	-.12	- .38	+.23	+.58	+.05	+.05	+.66	+.76	-.62
VI	Construction Materials	-.94	-1.00	+.01	-.82	-.92	-.44	-.99	-.24	-.98
VII	Industrial Products	-.86	-.53	-.15	-.11	-.74	-.66	-.80	-.35	-.62

consider each of the cities, the excess of originating tonnage occur in most cases against those commodities which are not the products of these places. As for example the only positive values in the case of Bombay is against Fuel, which is largely accounted for, by its port function of importing petroleum. For Madras the positive value occurs in the case of food products.

3.3.3 In other cities like Ahmedabad, Bangalore, Calcutta, Delhi, Pune and Kanpur excess of receipts in practically all commodities are noticeable. It is therefore clear that all these cities are essentially consumption centres, and where shipments exceed receipts, the commodities happen to be either those which are not their products (like food products) or those which are not consumable at these places (as, inputs into agriculture).

Freight Characteristics of Large Metropolitan Centres

3.4.1 We now consider the four largest metropolitan centres which organise the space economy at the national level with reference to their freight characteristics and commodity composition. A scrutiny of table III.3.1 indicates that Calcutta and Delhi have the largest gap between their orginating and

TABLE NO.III.3.1

PROPORTION OF COMMODITY-WISE ORIGINATING AND TERMINATING FREIGHT OF METROPOLITAN CENTRES

Sl. No.	Names of Metropolitan Centres	TOTALS			FOOD PRODUCTS		RAW MATERIALS FROM PRIMARY SOURCES		COAL/FUEL		INPUTS INTO AGR		CONST.MATERIAL		FINISHED PRODS	
		Total Flow (in qts.)	Origin (in %)	Receiv. (in %)	Origin (in%)	Receiv. (in%)	Origin (in%)	Receiv (in%)	Origin (in%)	Rec. (in%)	Origin (in%)	Receiv (in%)	Origin (in%)	Receiv (in%)	Origin (in %)	Receiv. (in %)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	Bombay	119050154	48	52	44	56	9	91	70	30	62	38	50	50	42	58
2.	Calcutta	119269414	21	79	15	85	3	97	11	89	69	31	9	91	49	51
3.	Delhi-Kanpur	87239912	20	80	30	70	12	88	13	87	74	26	4	96	12	88
4.	Madras	73156151	34	66	61	39	2	98	50	50	88	12	38	62	33	67

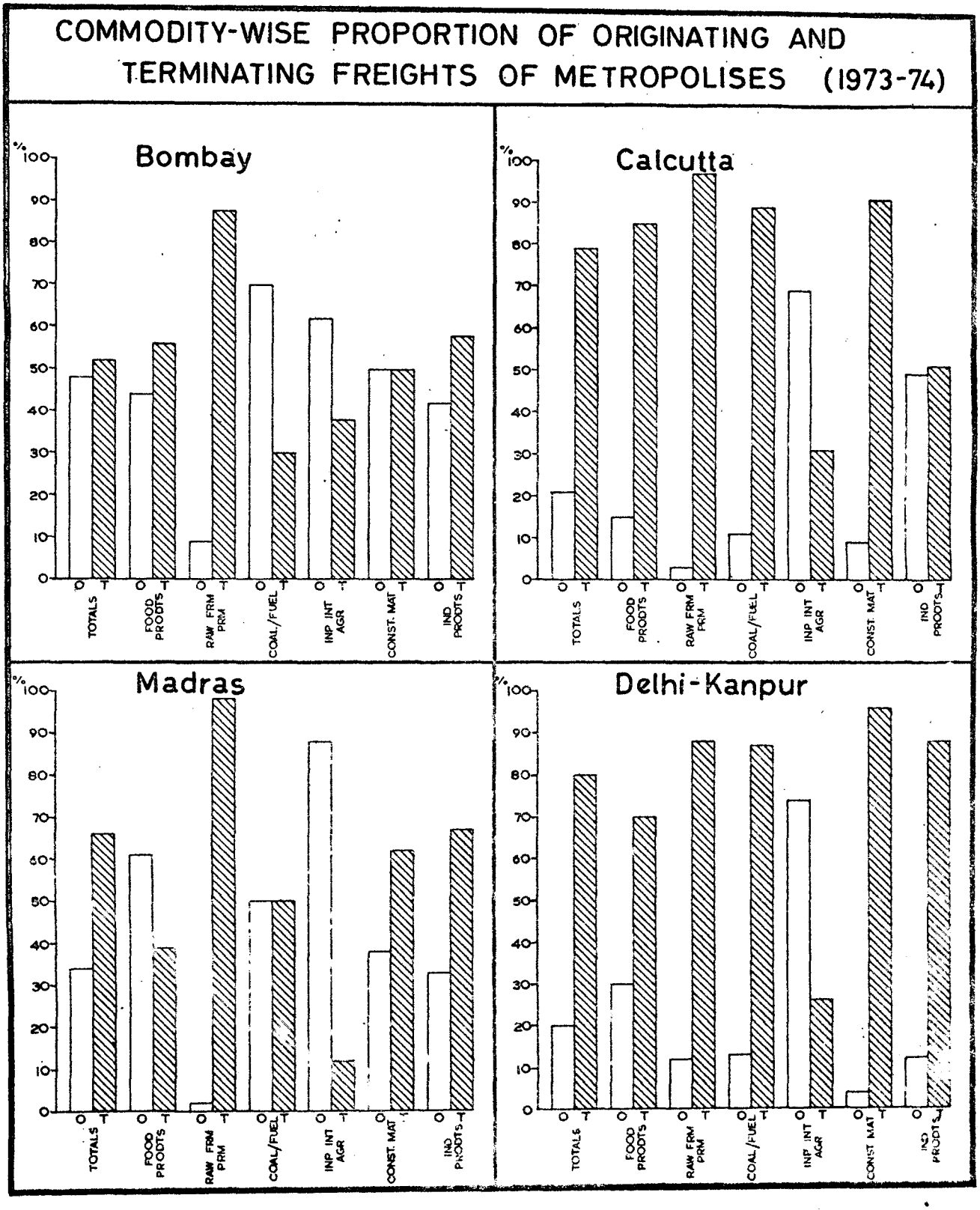

COMMODITY-WISE PROPORTION OF ORIGINATING AND TERMINATING FREIGHTS OF METROPOLISES (1973-74)
Bombay
Calcutta
Madras
Delhi-Kanpur
%
100
90
80
70
60
50
40
30
20
10
0
O
T
TOTALS
FOOD PRODTS
RAW FRM PRM
COAL/FUEL
INP INT AGR
CONST. MAT
IND PRODTS

Fig.3.8

and terminating tonnage followed by Madras, and lastly Bombay which shows a balance of incoming and outgoing freight at an aggregate level (Refer figure 3.8). However, this balance differs considerably between different commodity groups and the metropolitan centres. Such differences are rooted to the nature of the commodity and the location of the metropolitan centres with reference to the resource base.

3.4.2 It can be observed from the table that Bombay indicates a balance between originating and terminating tonnage except for raw materials from primary sources, fuel and inputs into agriculture. As is to be expected the share of the terminating flow is dominant (91%) in in the case of raw materials from primary sources.

3.4.3 What is, however, more surprising is the case of coal/fuel where the share of originating tonnage is 70% of the total transaction of this commodity at Bombay. This may be explained by the fact that the Bombay metropolis refines imported crude in its two large refineries. It is one of the most important centre of petro chemical industry in the nation. It appears that receipts of coal (from other parts of the country) is more than offset by the shipments of petroleum and its fuel products. As far as inputs into agriculture are concerned the excess of originating over terminating

flow is easily explained by the fact that Bombay is an important centre of production of chemical inputs agriculture implements. Because of its urban base, the terminating tonnage is smaller. This also indicates the re-distributive role played by Bombay.

3.4.4 Calcutta Metropolis presents a more asymmetrical picture, where in terminating flows exceed originating flows by a considerable magnitude with the exception of inputs into agriculture. This may partly be explained by a considerable share of commodities meant for export in the terminating flows; Calcutta being an important centre of redistribution for Deltaic West Bengal; the high density of population in the conurbation and by the persistence of the centrifugal suction process generated during colonial times. What is most surprising is the balance of originating and terminating flows in the case of industrial products. It may partly be explained by the strong inter-metropolitan flow as compared to M.H flows as a result of which Calcutta exchanges industrial goods with other major centres rather than distributing them in the hinterland. From Table III.3.1 it is clear that 69% of total flows of inputs into agriculture are accounted for by the originating freight. The factors responsible for this may be the many industries which are located in Calcutta metropolis

in producing fertilisers and agricultural implements in large quantities. In the case of industrial products, the metropolis shares an almost equal proportion between the originating and terminating flows. In all other cases, the total receipts dominate. She The total receipts of all commodities is 79% while, in the case of Bombay it is only 52%. Several factors may be attributed to this dominant receiving pattern.

The density of population is one of the main factors which is responsible for such a picture. It is known that Calcutta has the highest density of population and hence the demand of commodities is enormous. Besides this the other important factor is that the Calcutta hinterland produces a variety of bulk commodities in large quantities. These are first received by its metropolis-Calcutta, before being distributed to the various other places.

3.4.5 In Madras, majority of the commodity groups namely, raw materials from primary sources, construction materials, industrial products and also total freight, the receipts are greater than its shipments. Coal/fuel on the other hand has equal proportion of originating and terminating tonnage. This is evident from table III.3.1. The remaining commodity groups however are

dominated by their originating flows. Madras metropolitan centre has a diversified manufacturing base within which the dominance of cotton textiles is perhaps noticeable. It collects and produces a wide range of commodities, like foodgrains, groundnut, machinery and fertilisers. From Table III.3.1 it is clear that the originating flows are more dominant in the commodity groups of food products and inputs into agriculture. Their share is 61% and 88% respectively. And taking all commodities together, Madras metropolis receives a huge share i.e., 66% which is because of its diversified economic base.

3.4.6 Delhi-Kanpur again show a similar picture of receipts dominating over originating flows. Excepting for terminating flow of inputs into agriculture, all the other commodity groups do not deviate from this pattern. In the above exception the percentage share of the originating flow is 74% (refer Table III.3.1). Kanpur is the Asia's largest Urea fertilizer manufacturing plant. All this reflects in the 74% of its originating flow of inputs into agriculture. In all the other categories dominance of receipts is discernible. This is so because Delhi only started expanding after independence, and only a few industries have been established. On the other hand, Kanpur like Madras has diversified industrial growth. Out of the total

flow, only 20% is accounted by Delhi-Kanpur's originating traffic.

3.4.7 One may thus conclude that, among the metropolitan centres, freight receipts dominate over the originating tonnage. As we have seen, of the total freight handled, at Delhi-Kanpur and at Calcutta, about 80% is accounted for by receipts (table III.3.1). Bombay handles roughly equal proportion of shipments and receipts. However, this general pattern do not hold good for all commodity groups. The metropolitan centres behave differently in terms of shipments and receipts of different groups of commodities. In the case of Bombay, originating freight dominates in the following two categories: (a) coal/fuel (70%) and (b) Inputs into agriculture (62%). Receipts of raw materials from primary sources account for 91% as against 9% of the shipments. In the case of Delhi-Kanpur and Calcutta receipts dominate of almost all commodity groups except inputs into agriculture. In fact inputs into agriculture is the only group where shipments are dominant in all the four metropolitan nodes. Raw materials from primary sources are similarly consistent with high proportions of receipts of all the four metropolitan centres (refer table No. III.3.1).

Commodity Composition of Metropolitan Freight

3.5.1 Bombay metropolis has diverse commodity groups in its total originating and terminating flows (refer table III.3.2). However, there still exists an exception in the group, raw materials from primary sources. In this case, its total terminating flow dominates over the total originating. The total terminating freight of this commodity group accounts for 14% out of Bombay's total receipts. While the total originating is only accounted by 1% of its total originating flow. The highest originating traffic is in the commodity group coal/fuel (28%). As we have discussed earlier, Bombay metropolis has petroleum refineries which refines imported crude. This is one of the factors leading to such a high share of originating tonnage in the case of fuel. In the case of total receipts, the highest share (18%) is accounted for by food products. However, except in the case of raw materials from primary sources, of the total tonnage handled by Bombay the distribution between the six commodity groups show roughly equal proportions.

3.5.2 Calcutta metropolis like Bombay also has more or less equal proportions of flow among the

TABLE NO.III.3.2

COMMODITY COMPOSITION OF METROPOLITAN FLOWS (IN TERMS OF TOTAL ORIGINATING AND RECEIVING FLOWS)

S. No.	Names of Metropolitan centres	GOODS (In qts.) Total	Origin	Receiv	Food Products Total as % of col 3	Origin as % of col 4	Receiv as % of col 5	Raw Materials from Primary Sources Total as % of col 3	Origin as % of col 4	Receiv as % of col 5	Coal/fuel Total as % of col 3	Coal/fuel Origin as % of col 4	Coal/fuel Receiv as % of col 5	Inputs into Mfg. Total as % of col 3	Inputs into Mfg. Origin as % of col 4	Inputs into Mfg. Receiv as % of col 5	Construction Materials Total as % of col 3	Construction Materials Origin as % of col 4	Construction Materials Receiv as % of col 5	Indus. Produ Total as % of col 3	Indus. Produ Origin as % of col 4	Indus. Produ Receiv as % of col 5
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1.	Bombay	119050154	57462523	61587631	17	15	18	8	1	14	19	28	11	13	16	9	10	10	10	13	11	15
2.	Calcutta	119269414	25012705	94256709	17	12	16	20	3	24	27	14	30	5	12	1	6	2	7	18	43	12
3.	Delhi-Kanpur	87239912	17400202	69839710	14	21	12	5	3	5	47	30	51	6	22	1	8	1	9	11	7	12
4.	Madras	73156151	25026054	48130097	11	20	6	34	1	51	27	39	20	7	18	1	7	8	7	8	8	8

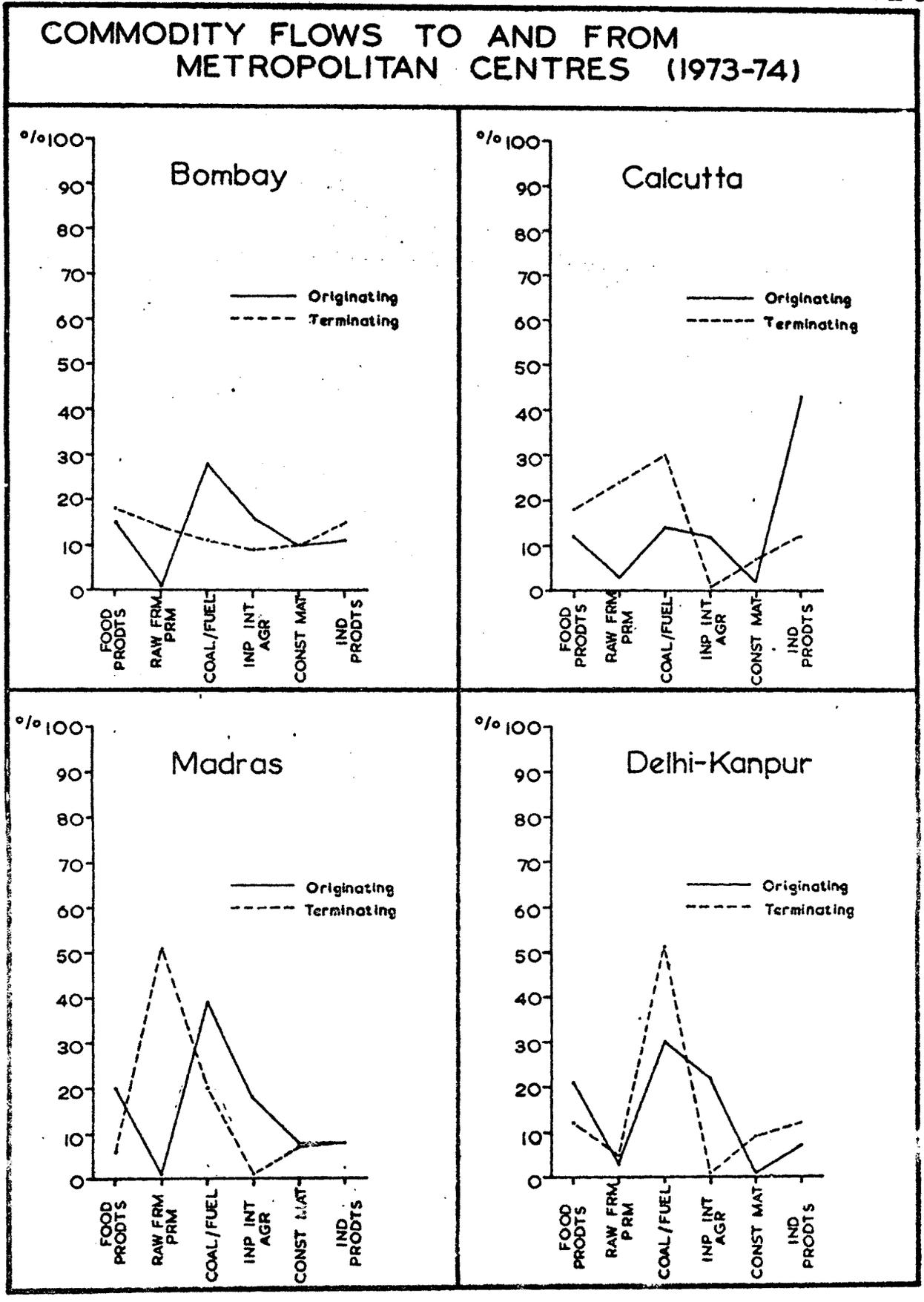

COMMODITY FLOWS TO AND FROM METROPOLITAN CENTRES (1973-74)
Bombay
Calcutta
Madras
Delhi-Kanpur
%
100
90
80
70
60
50
40
30
20
10
0
Originating
Terminating
FOOD PRODTS
RAW FRM PRM
COAL/FUEL
INP INT AGR
CONST MAT
IND PRODTS

Fig.3.9(A)

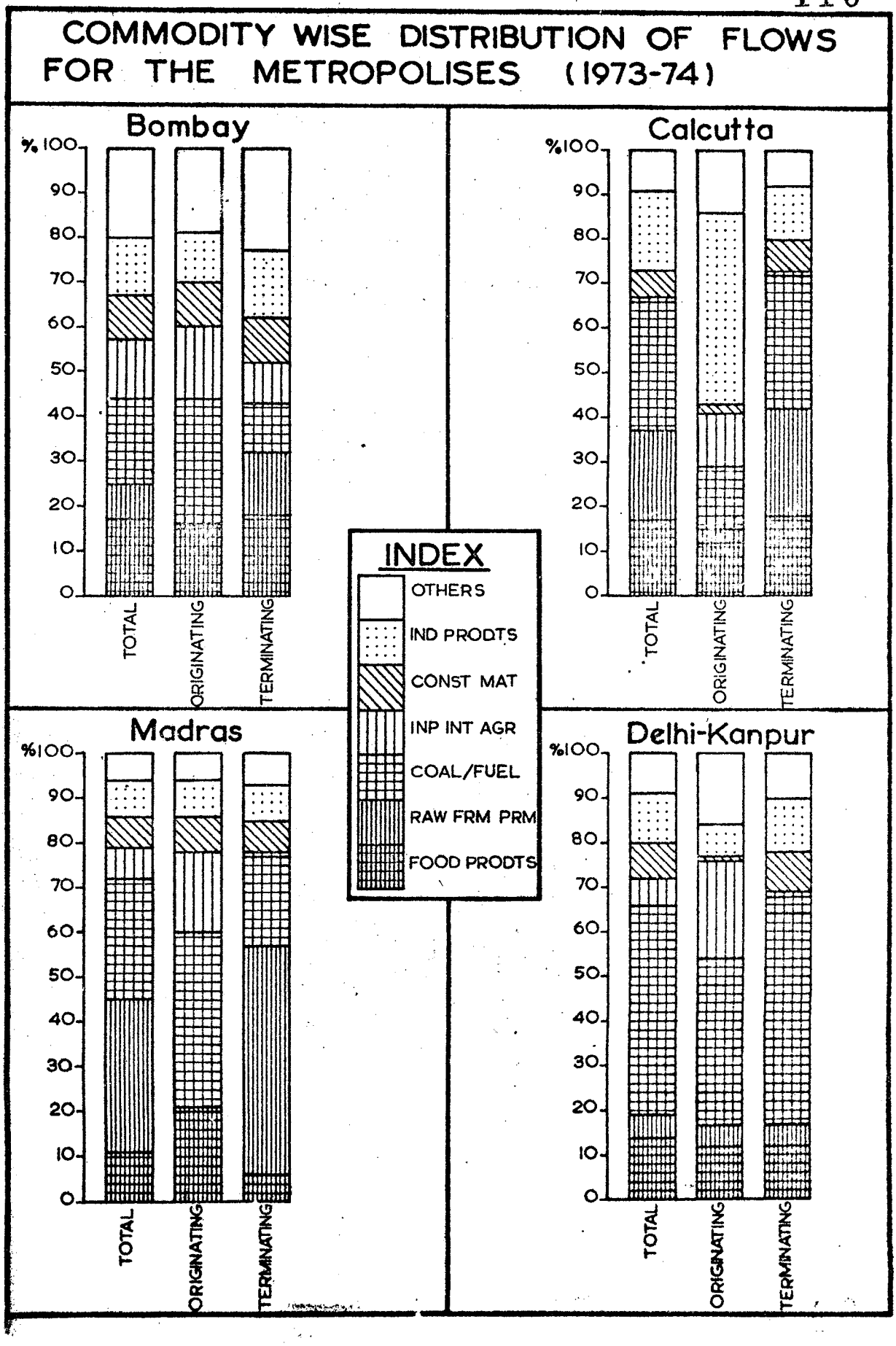

COMMODITY WISE DISTRIBUTION OF FLOWS FOR THE METROPOLISES (1973-74)
Bombay
Calcutta
Madras
Delhi-Kanpur
%100
90
80
70
60
50
40
30
20
10
0
TOTAL
ORIGINATING
TERMINATING
INDEX
OTHERS
IND PRODTS
CONST MAT
INP INT AGR
COAL/FUEL
RAW FRM PRM
FOOD PRODTS

Fig.3.9(B)

commodity groups (refer fig. 3.9(B)). There are, however, some exception. Inputs into agriculture and construction materials have very little share of the total flow. They are only 3% and 6% respectively(T.III.3.2). The highest share is accounted for by coal/fuel i.e. 27%. This may be explained by the vast coal mines situated all over the Calcutta hinterland. The total originating flow is composed largely of industrial products (43%). Raw materials from primary sources and construction materials have very little originating traffic (table III.3.2.) accounting for about 3% and 2% respectively. Total receipts are highest for coal/fuel i.e. 30%. Receipts of inputs into agriculture is negligible (1%) since the product is not consumed at these centres.

3.5.3 Madras has large total tonnage through raw materials from primary sources (34%) (refer fig. 3.9(A). Following this occurs fuel (27%). The rest of the commodity groups have roughly equal share of the remainder each of them accounting for less than 10%. Although Madras metropolis has the highest tonnage (receipts plus shipments) for raw materials from primary sources, the total originating for obvious reasons accounts for 1%. The highest originating share is that of coal/fuel(39%). The distribution of the total terminating tonnage are quite uneven among the various

commodity groups. The raw materials from primary sources accounts the maximum out of the total Madras' receipts (51%). Inputs into agriculture has the least share which is only 1%. The commodity groups namely, food products, construction materials and industrial products have low percentage share, all below 10%. While coal/fuel accounts for 20% of the total receipts.

3.5.4 Delhi-Kanpur's maximum share of the 47% flow is composed of coal/fuel. All the other categories have more or less an equal share. Out of the total originating traffic for Delhi-Kanpur, raw materials from primary sources and construction materials have least share. The largest share that of coal/fuel is closely followed by inputs into agriculture and food products. The share of originating flow for industrial products is fairly low. The share of fuel is not only the highest in originating traffic but also in the receiving tonnage. It accounts for 51% of the total receipts of Delhi-Kanpur nodes. Whereas the bulk of fuel receipts (coal) in the case of Delhi, is probably consumed in the domestic sectordirectly and indirectly (thermal plants), in the case of Kanpur, the fuel receipts (petroleum) is used for industrial purposes, associated with petro-chemical/fertiliser complexes. Inputs into agriculture

have the least share of the receipts which is 1% as in the case of other metropolitan centres (refer Table III.3.2).

Summary

3.6.1 1. The nine million cities of India account for a large proportion of the total interactions through railway freight. Within this dominant role the four largest metropolitan centres of Bombay, Delhi, Calcutta and Madras stand out prominently.

2. The centres indicate diverse commodity composition in their shipments and receipts, with slight pre-dominance of some commodities based on the hinterland resource base.

3. The receipts of freight far outweigh shipments in practially all commdity groups, of which the most striking is the case of industrial products.

4. The metropolitan economy may therefore be called a consumption economy.

5. All the centres tend to involve themselves in trading activities in commodities including those that are produced in their hinterland, with their re-distributive role.

CHAPTER - IV

INTER-METROPOLITAN AND METROPOLITAN-HINTERLAND FLOWS

4.1.1 METROPOLITAN AND HINTERLAND FLOWS - CONCEPTUAL RELATIONSHIPS

The pattern of metropolitan-hinterland freight flows is examined in this chapter in order to test the hypothesis put forward earlier that the inter-metropolitan ties are dominant as compared to the metropolitan-hinterland ties and consequently the centrifugal forces in the Indian market are stronger than the centripetal forces perpetuating the colonial pattern spatial organisation.

4.1.2 It is necessary to outline a framework for the study of Metropolitan (M) - Hinterland (H) interactions. The fundamental difference between the M-M flows, M-H flows and H-M flows stem from the nature of products exchanged. M-M flows are likely to be dominated by higher order goods like finished industrial products. M-H ties may be strengthened through the flows of higher proportions of inputs into agriculture, industrial products etc. Conversely, H-M flows may be dominated by flows of raw materials from primary sources, food products and so on.

4.1.3 However, in terms of absolute magnitude of flows, M-H and H-M exchanges of goods will be greater

than M-H exchanges. This is essentially because of the size of the H in all respects, like population, size and number of nodes. This scale effect renders the flow data incomparable interms of magnitudes. In order to offset the size variations and to make the data comparable, the magnitudes of flows may be expressed as ratios of per unit of population or number of nodes.

Spatial Patterns of Metropolitan Interaction

4.2.1 Inter-metropolitan and metropolitan hinterland flows with reference to the total exchange of freight, and with reference to originating and terminating freight at the metropolitan centres are analysed in order to bring out the spatial patterns of metropolitan interaction.

4.2.2 Tables IV.1.1 to IV.1.7 record the proportions of total tonnage moved from and to metropolitan centres to the total metropolitan movement, for the total freight and for different commodity groups. Metropolitan hinterland flows record the highest proportions in all the seven cases i.e. total freight and also in terms of commodity groupwise, as can be seen from the set of tables. Generally, the largest exchanges are between the metropolitan centres and their hinterland (as it

TABLE NO. IV.1.2

COUNTRY-WISE DESTINATION OF COAL EXPORTS (PERCENTAGE TO TOTAL EXPORTS) AND INTERNATIONAL FREIGHT (TOTAL)

S.No. Names	Bombay $	Calcutta $	Madras $	Delhi Kanpur $	B. Hint. $	C. Hint. $	M. Hint. $	U.K. Hint. $	Actual total Clou (in qts.)
1. Bombay	0.50	2.44	1.26	4.92	48.21	17.73	9.57	13.77	119050154
2. Calcutta	2.43	1.05	1.57	1.07	11.00	67.00	3.01	9.66	119269414
3. Madras	2.05	2.56	1.75	0.91	14.70	9.77	65.05	2.69	73156151
4. Delhi Kanpur	6.71	2.55	0.77	1.66	27.70	41.48	3.24	15.03	07239912

TABLE NO. IV.1.2

COMMODITY-WISE PERCENTAGE OF TOTAL FLOWS (ORIGINATING PLUS TERMINATING) FOR METROPOLITAN CENTRES (FOOD PRODUCTS)

S.No.	Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	D.Hint. %	C.Hint. %	M.Hint. %	DK Hint. %	Actual total flow (in qts.) %
1.	Bombay	0.03	1.49	1.47	6.97	56.45	6.02	9.29	18.26	20257014
2.	Calcutta	1.49	1.69	2.54	3.12	13.84	30.04	7.00	40.16	20304044
3.	Madras	3.54	6.14	7.12	0.93	10.75	11.96	35.48	15.14	8394000
4.	Delhi-Kanpur	11.18	5.01	0.62	0.07	38.27	13.23	7.81	22.98	12637841

TABLE NO. IV. 1.3

COMMODITY-WISE PERCENTAGE OF [illegible] ZONE) (ORIGINATING AND TERMINATING) FOR METROPOLITAN CENTRES (RAW MATERIALS FROM PRIMARY SOURCES)

S.No. Zones	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Hint. %	C.Hint. %	M.Hint. %	DK Hint. %	Actual total flow (in qts)
1. Bombay	0.28	0.84	0.00	1.31	52.73	7.75	22.67	13.54	10026295
2. Calcutta	0.35	1.08	0.49	0.29	11.34	84.91	1.25	3.43	24151658
3. Madras	0.32	0.47	0.10	0.45	2.51	0.89	94.78	0.49	25575348
4. Delhi Kanpur	2.84	1.49	2.45	0.73	25.29	23.61	4.16	39.39	4619002

TABLE NO. IV.1.4

COMMODITY-WISE PERCENTAGE OF TOTAL FLOWS (ORIGINATING PLUS TERMINATING) FOR [illegible] CENTRES (COAL / COKE)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B. Hint. %	C. Hint. %	M. Hint. %	DK Hint. %	Actual total flow (in qts.)
1. Bombay	1.58	0.17	0.93	5.24	66.45	12.03	5.77	0.73	23634516
2. Calcutta	0.12	0.31	0.31	0.25	1.13	96.20	0.20	1.47	32591946
3. Madras	1.10	0.51	2.64	0.34	34.02	10.22	50.64	0.14	20001328
4. Delhi Kanpur	2.98	0.20	0.16	2.46	21.04	62.57	0.01	10.52	41576115

TABLE NO. IV.1.5

COMMODITY-WISE PERCENTAGE OF [illegible] FLOW (ORIGINATING PLUS TERMINATING) FOR METROPOLITAN CITIES ([illegible])

S.No. Zones	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B. Hint. %	C. Hint. %	M. Hint %	DK Hint. %	Actual total flow (in qts)
1. Bombay	0.05	0.64	0.30	2.15	57.46	6.10	11.11	22.56	15670622
2. Calcutta	2.24	0.14	0.69	2.88	13.16	69.28	1.56	10.04	4444628
3. Madras	1.10	0.58	1.24	0.29	7.01	2.76	86.56	0.45	5350301
4. Delhi Kanpur	6.29	2.40	0.29	3.28	38.53	10.59	1.01	36.39	5351972

TABLE NO.IV.1.6

COMMODITY-WISE PERCENTAGE OF TOTAL FLOWS (ORIGINATING AND TERMINATING) FOR METROPOLITAN CENTRES (CONSTRUCTION MATERIALS)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Hint. %	C.Hint. %	M.Hint. %	DK Hint. %	Actual total flow (in qts)
1. Bombay	0.07	1.71	0.21	3.01	51.82	18.06	7.75	15.61	12436629
2. Calcutta	2.57	0.37	1.91	0.08	10.65	71.89	8.65	3.82	8285837
3. Madras	0.46	2.83	0.09	0.02	3.34	14.72	78.40	0.09	5499876
4. Delhi Kanpur	5.32	0.09	0.02	0.09	50.74	6.71	15.13	21.01	7025170

TABLE No.IV.1.7

[illegible]-WISE PERCENTAGE OF TOTAL FLOWS ([illegible]) FOR METROPOLITAN CITIES ([illegible] REGIONS)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	D.Hint. %	C.Hint. %	M.Hint. %	DK Hint. %	Actual total flow (in qts)
1. Bombay	0.35	8.39	1.92	6.44	29.71	33.42	7.08	12.64	16131159
2. Calcutta	6.06	1.41	3.28	4.15	12.67	57.36	7.46	7.50	22325913
3. Madras	4.90	11.56	0.41	3.58	11.27	42.01	18.86	6.62	6531803
4. Delhi Kanpur	10.06	8.99	2.20	0.70	9.39	56.31	3.42	9.72	10317308

should be by definition) followed by exchanges between a metropolitan centre and hinterland of other metropolitan centres (as it should be, because of size characteristics of the hinterland). Cross movements are strongest in the case of Delhi-Kanpur which interact more with either Calcutta hinterland or Bombay hinterland in all commodity groups, indicating weak metropolitan hinterland ties.

4.2.3 Inter-metropolitan flows tend to be dominated by exchanges with Delhi-Kanpur which as indicated earlier results from the weak industrial base of Delhi compared to the other metropolitan centres.

4.2.4 Industrial products tend to show cross movements i.e. a metropolitan centre interacting more with the hinterland of other metropolitan centres. Of this, the most striking is the case of Calcutta hinterland in which are located the basic heavy industries, consequently the exchanged between Calcutta hinterland and all the metropolitan centres are largest. The regional industrial specialities then lead to the cross movements along with strongest inter-metropolitan connections through industrial products as compared to other commodities.

TABLE NO. IV. 2.1

COMMODITY-WISE PERCENTAGES OF TOTAL ORIGINATING FLOWS FOR METROPOLITAN CENTRES (ROWISE)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	M Mint %	Actual total origin.flow (in qtn)
1. Bombay	0.52	2.64	1.31	7.62	53.42	5.22	7.98	17.97	57462523
2. Calcutta	5.54	2.50	3.90	5.74	22.56	45.73	6.78	7.53	25012705
3. Madras	0.30	3.95	2.56	1.47	0.00	9.42	71.85	0.60	25026054
4. Delhi Kanpur	8.90	4.55	1.73	4.16	26.43	11.41	2.98	36.20	17400202

TABLE NO.IV. 2.2

COMMODITY-WISE PERCENTAGE OF TOTAL ORIGINATING FLOWS FOR METROPOLITAN CENTRES (FOOD PRODUCTS)

S.No. Zones	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Hint %	C.Hint %	M.Hint %	DK Hint %	Actual total origin. flows (in qts.)
1. Bombay	0.04	2.00	0.68	9.46	67.20	7.41	4.50	8.68	6994430
2. Calcutta	3.98	5.61	1.39	2.97	8.00	69.75	1.23	5.50	3063465
3. Madras	4.60	9.22	5.82	0.51	17.76	17.04	43.14	0.41	5132096
4. Delhi Kanpur	14.79	14.28	1.38	0.12	22.77	29.06	12.60	2.33	3796112

TABLE NO. IV. 2.3

COMMODITY-WISE PERCENTAGE OF TOTAL ORIGINATING FLOWS FOR METROPOLITAN CENTRES (RAW MATERIALS FROM PRIMARY SOURCES)

S.No.	Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	DK Mint %	Actual total origin.flow(in qts)
1.	Bombay	1.53	2.63	0.70	0.87	32.31	3.69	20.50	20.85	927256
2.	Calcutta	7.20	15.67	10.10	5.06	11.21	30.56	3.72	14.15	829707
3.	Madras	15.30	7.20	2.60	2.03	42.42	9.17	14.46	6.71	479754
4.	Delhi Kanpur	8.69	4.79	18.29	3.00	9.57	9.94	1.57	43.87	565080

TABLE NO.IV.2.4

COMMODITY-WISE PERCENTAGE OF COAL ORIGINATING FROMS FOR METROPOLITAN CENTRES (COAL / FUEL)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	J.Mint %	C.Mint %	M.Mint %	DK Mint %	Actual total origin. flow (in qtn.)
1. Bombay	1.13	0.12	0.14	7.47	70.20	0.16	0.21	12.40	16505502
2. Calcutta	0.56	1.41	0.21	2.25	8.02	71.82	1.67	13.25	3606371
3. Madras	1.98	0.95	2.66	0.68	0.44	0.[illegible]	91.75	0.27	9921443
4. Delhi Kanpur	0.01	0.01	0.00	9.90	14.50	0.00	0.04	75.43	5374910

TABLE NO.IV.2.5

COMMODITY-WISE PERCENTAGE OF TOTAL ORIGINATING FLOW FOR METROPOLITAN CENTRES ([illegible] ETC.)

S.No. Names	Bombay %	Calc-utta %	Mad-ras %	Delhi Kanpur %	B.Hint %	C.Hint %	M.Hint %	DK Hint %	Actual total orig-inating flow (in qts)
1. Bombay	0.04	0.07	0.16	1.75	51.86	5.08	9.86	30.28	9660244
2. Calcutta	3.01	0.10	0.49	1.83	[illegible]	73.57	0.86	9.93	3073729
3. Madras	0.93	0.36	0.70	0.04	5.53	1.93	90.09	0.41	4717551
4. Delhi Kanpur	4.21	1.81	0.35	2.21	33.36	11.66	0.91	43.86	3975505

TABLE NO.IV.2.6

COMMODITY-WISE PERCENTAGE OF SCRAP CONSUMED FROM ZONES FOR [illegible]

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	S.Zone %	C.Zone %	W.Zone %	N Zone %	Actual total originating flow(in qtn)
1. Bombay	0.07	3.38	0.31	5.94	43.16	12.44	2.17	29.02	6250500
2. Calcutta	0.26	2.07	0.41	0.51	1.71	89.66	0.90	3.86	746571
3. Madras	0.29	7.46	0.11	0.05	5.93	37.38	48.63	0.15	2086978
4. Delhi Kanpur	1.14	1.03	0.14	1.29	15.74	9.77	2.01	68.13	248437

TABLE NO. IV.2.7

COMMODITY-WISE PERCENTAGE OF TOTAL ORIGINATING [illegible] FOR [illegible] ([illegible])

S.No.	Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Hint %	C.Hint %	M.Hint %	DK Hint %	Actual total orig. flow (in qts.)
1.	Bombay	0.42	7.39	2.78	11.09	43.26	10.61	9.71	14.63	6019963
2.	Calcutta	7.74	1.43	5.18	7.77	17.31	34.67	12.85	12.83	10972091
3.	Madras	5.84	7.91	0.62	8.78	18.03	21.15	36.77	0.90	2071666
4.	Delhi Kanpur	22.06	5.84	3.50	2.84	3.50	4.08	0.21	56.38	1276174

4.2.5 A similar set of tables is presented to analyse the above mentioned feature in terms of freight shipped from and received at metropolitan centres. Tables IV.2.1 to IV.2.7 record the proportions of originating freight at metropolitan centres and hinterlands. As far as metropolitan hinterland ties are concerned they continue to be strong in terms of metropolitan-hinterland flows, in each case the largest proportion of the freight originating at metropolitan centres terminating at the respective hinterlands, the weakest of this being Delhi-Kanpur hinterland ties and the strongest represented by Madras and its hinterland.

4.2.6 Inter-metropolitan exchanges in food product are dominated by flows originating at Delhi-Kanpur that are explained by the location of the two centres with reference to the food surplus areas of Punjab, Haryana, and Western U.P.

4.2.7 Consequently, Delhi-Kanpur ship an insignificant proportion of their food product shipments to their own hinterland, and a larger proportion is shipped to hinterlands of other metropolitan centres. Raw materials from primary sources originating at the metropolitan centres constitute a very small portion of their originating freight. Except in the case of Madras which ships largest proportion of its raw materials to

Bombay hinterland, metropolitan-hinterland flows remain the dominant followed by inter-metropolitan flows. One of the weakest inter metropolitan ties are exhibited by flows of fuel. Since the metropolitan centres act as collection distribution points, they tend to serve their hinterland with largest shipments to their own hinterland. An exactly similar pattern is to be encountered in the flows of inputs into agriculture. Compared to other commodities industrial products tend to result in strongest inter-metropolitan ties.

4.2.8 Tables IV.3.1 to IV.3.7 record percentage terminating freight at metropolitan centres that are shipped from metropolitan and hinterland nodes. Delhi-Kanpur continue to be weakly connected to their hinterland, and receive a large proportion of their freight from Calcutta and Bombay hinterland. In the other three cases the respective hinterlands remain main sources of freight for the metropolitan centres. The resource base of the hinterlands has much to do with cross movements that are noticed. Agriculturally well developed Delhi-Kanpur hinterland tends to be the major supplier of food products to all the metropolitan centres, whereas the Calcutta hinterland with its heavy industrial base supplies much of the industrial products

[illegible] NO.IV.3.1

[illegible] ([illegible])
TOTALS

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	DK Mint %	Actual total receipts %
1. Bombay	0.49	2.25	1.21	2.40	43.35	29.40	11.05	9.85	61567631
2. Calcutta	1.61	0.66	1.05	0.84	8.94	75.66	3.02	10.22	94256709
3. Madras	1.56	1.84	1.59	0.69	18.28	9.95	62.72	3.70	48130097
4. Delhi Kanpur	6.27	2.06	0.59	1.04	28.09	48.97	3.31	9.75	69839710

TABLE NO. IV.3.2

COMMODITY-WISE PERCENTAGE OF TOTAL REMITTANCE ITEMS FOR [illegible] (FOOD PRODUCTS)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	SK Mint %	Actual total receipts
1. Bombay	0.03	1.08	2.10	4.99	47.87	4.91	13.11	25.91	11262534
2. Calcutta	1.05	1.00	2.75	3.14	14.74	22.98	8.03	46.32	17240579
3. Madras	1.87	1.30	9.16	1.60	20.31	3.98	23.43	38.34	3261304
4. Delhi Kanpur	9.63	1.03	0.29	0.05	44.93	6.43	5.75	31.84	0341729

TABLE NO.IV.3.3

COMMODITY-WISE PERCENTAGE OF TOTAL TAX [illegible] FIGURE FOR METROPOLITAN CENTRES (RAW MATERIALS FROM PRIMARY SOURCES)

S.No.	Zones	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	D.Mint %	C.Mint %	M.Mint %	DK Mint %	Actual total receipts
1.	Bombay	0.16	0.66	0.01	0.54	54.81	8.61	22.89	11.97	9099059
2.	Calcutta	0.10	0.56	0.15	0.12	11.34	83.52	1.16	3.05	23321871
3.	Madras	0.03	0.34	0.05	0.42	1.74	0.73	96.33	0.37	24895594
4.	Delhi Kanpur	2.03	1.04	0.24	0.42	27.48	25.52	4.52	38.76	4054002

TABLE NO.IV.3.4

COMMODITY-WISE PERCENTAGE OF TOTAL [illegible] FOR [illegible] (COAL / FUEL)

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	DK Mint %	Actual total receipts
1. Bombay	2.65	0.29	2.79	0.01	54.19	39.95	0.02	0.10	7049014
2. Calcutta	0.07	0.18	0.35	0.00	0.18	99.23	0.01	0.00	28985575
3. Madras	0.22	0.08	2.62	0.00	67.07	19.83	10.17	0.01	10079835
4. Delhi Kanpur	3.42	0.22	0.19	1.41	22.01	71.06	0.00	0.08	36201205

TABLE NO. IV.3.5

COMMODITY-WISE PERCENTAGE OF TOTAL [illegible] FROM THE [illegible] CENTRES (INPUTS) [illegible]

S.No.	Homes	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	H.Mint %	HK Mint %	Actual total receipts
1.	Bombay	0.07	1.54	0.73	2.79	66.47	7.74	13.11	7.56	6010578
2.	Calcutta	0.53	0.25	1.24	5.25	30.90	48.45	3.14	10.27	1370099
3.	Madras	2.39	2.17	5.24	2.17	19.04	8.95	60.26	0.78	632750
4.	Delhi Kanpur	12.28	4.09	0.14	6.38	53.47	7.50	1.32	14.83	1576467

TABLE NO.IV.3.6

[illegible] PERCENTAGE OF TOTAL [illegible] FOR [illegible] ([illegible])

S.No. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	DK Mint %	Actual total receipts
1. Bombay	0.07	0.03	0.10	0.05	60.57	23.74	13.38	2.06	6186049
2. Calcutta	2.80	0.20	2.06	0.05	11.53	70.13	9.42	3.81	7539266
3. Madras	0.57	0.09	0.07	0.01	1.75	0.86	96.61	0.05	3412898
4. Delhi Kanpur	5.48	0.06	0.01	0.05	52.02	6.60	15.67	20.12	6776733

TABLE NO.IV.3.7

[illegible]

Sale. Names	Bombay %	Calcutta %	Madras %	Delhi Kanpur %	B.Mint %	C.Mint %	M.Mint %	D Mint %	Actual total receipts
1. Bombay	0.31	9.12	1.30	3.02	19.79	50.12	5.15	11.19	9311196
2. Calcutta	4.44	1.38	1.44	0.66	8.19	79.20	2.25	2.35	11353022
3. Madras	4.45	13.33	0.30	1.05	7.90	53.34	10.15	9.40	4260217
4. Delhi Kanpur	8.37	9.43	2.01	0.40	10.25	63.70	3.87	1.96	9041134

to the metropolitan centres. Similarly, fuel again is largely supplied by the Calcutta hinterland to all the metropolitan centres and happens to be insignificant in other hinterlands. Raw materials from primary sources, construction materials and inputs into agriculture, tend to move from the hinterland to the respective metropolitan centres. The former two commodities presumably for consumption at these centres, and the latter for re-distribution.

4.2.9 The analysis of the matrices bring out clearly that receipts of the metropolitan centres as compared to their shipments are more prominent. Commodity composition of the originating and the terminating traffic of the inter-metropolitan, metropolitan-hinterland exchanges are different from each other. Also, Delhi-Kanpur interaction within its region is weakened by the more dominant exchanges between Calcutta and Bombay's hinterlands with that of Delhi-Kanpur's.

<u>Metropolitan and Hinterland Flows</u>

4.3.1 What is the proportion of M-M, M-N, N-M and N-N flows in the total freight moved in the country? This is brought out by table IV.4.1 for the total freight and for different commodity groups. Because of the size

TABLE NO.IV.C.1

PERCENTAGE DISTRIBUTION OF INTRA-REGIONAL - INTERREGIONAL FLOWS

(SECTOR-WISE)

S.No.	Names	INDIA	INTRA TO INTRA	% of 4 to 3	INTRA TO INTER	% of 6 to 3	INTER TO INTER	% of 8 to 3	INTER TO INTRA	% of 10 to 3	Total %
1	2	3	4	5	6	7	8	9	10	11	12
1.	Total Flow	1816417706	17518722	0.95	105113004	5.79	256455425	14.12	1437439755	79.14	100
2.	Food Products	205666695	3717930	1.81	17064899	8.30	36804266	17.93	147999540	71.96	100
3.	Raw Mat. Min	424521674	771340	0.18	2002472	0.47	60599186	14.28	360948676	85.06	100
4.	Coal/Fuel	734154076	2762735	0.38	32591536	4.44	79552944	10.84	619246061	84.35	100
5.	Inp.Int.Agr.	130111189	798061	0.61	20470532	15.74	8592433	6.60	100244163	77.04	100
6.	Const.Mat.	136183492	804171	0.59	8301901	6.10	23110775	16.97	103966645	76.34	100
7.	Ind.Prodts.	122631776	4821792	3.93	15720539	12.82	29144577	23.77	72945068	59.48	100

and population factors, it is to be expected that H-H flows would account for the largest share. Thus almost 79% of the Indian freight is accounted for by H-H flows.

4.3.2 A study of table IV.4.1 reveals as stated earlier, that the maximum flow is accounted by the H-H flows in all the groups and the least is accounted by the N-N flows. Out of a total national flow of 1816 million quintals, 79% is accounted for by H-H flows, 14% is accounted for by H-N flows, 6% by N-H flows and hardly 1% by N-N flows. A similar pattern is found in every commodity group excepting for the commodity group - inputs into agriculture. In this case, the dominant flow is again H-H flows, but the second largest is through N-H flows whereas in other commodities normally it is H-N flows.

4.3.3 Among the flows accounted for by the H-H in terms of percentages from table IV.4.1 the largest flow is that of raw materials from primary sources. The next largest being coal/fuel (84%). The minimum is of industrial products (60%). Among the H-N flows the largest proportion is to be noticed in the exchange of industrial products followed by food products. N-H

flows obviously show largest proportions against inputs into agriculture. What is however surprising is the dominant flow of industrial products from hinterland to metropolitan centres.

4.3.4 Having analysed the four typesof flows with reference to the national flows, it would be rewarding to analyse the composition of commodities within each type of flows. Such an analysis would establish the conceptual relations between them that were discussed in section IV§.1. of this chapter.

4.3.5 Table IV.5.1 records the percentage of different commodities in M-M, H-M and H-H types of flows. The study of the table reveals that inter-metropolitan flows are strongest through industrial products, thus reiterating the earlier findings that regional industrial specialitiies are exchanged between the metropolitan centres. The second strongest metro-politan ties are through food products (21%) and fuel (16%) both of which are hinterland products, and therefore this represent the re-distributive role of the metropolitan centres. This is also indicated by the fact that the largest metropolitan hinterland flows are represented by fuel (31%), and also significant

TABLE NO.IV.5.1

COMMODITY COMPOSITION OF METROPOLITAN-HINTERLAND EXCHANGES

S.No.	Names	Total flow (in qts.)	Food Prodt. (in qts)	% of 4 to 3	Raw Frm Prm(in qts)	% of 6 to 3	Coal/Fuel (in qts)	% of 8 to 3	Inp.Int. Agr.(in qts)	% of 10 to 3	Const. Mat(in qts.)	% of 12 to 3	Ind. Prod. (in qts)	% of 14 to 3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	MET TO MET	17518722	3717930	21.47	771340	4.45	2762735	15.95	798061	4.61	804171	4.64	4821892	27.84
2.	MET TO HINT	105113804	17064899	16.23	2002472	1.91	32591536	31.01	20476532	19.48	8501901	7.90	15720339	14.96
3.	HINT TO MET	256495425	36884266	14.38	60599186	23.63	79952944	31.02	8592433	3.35	23110775	9.01	29144577	11.36
4.	HINT TO HINT	1437489755	147099540	10.30	350948676	25.11	619246061	43.08	100244163	6.97	103966645	7.23	72945068	5.07

flows by food products (15%). Since coal/fuel dominate the railway in general they represent the dominant flows in all types of ties, viz., M-M, M-H, H-H and H-M. Raw materials from primary sources obviously are significant in H-M flows (24%).

Metropolitan and Hinterland Flows with Reference to Size and Population

4.4.1 As mentioned earlier, the magnitude of flows in the above cases strictly speaking are incomparable because of large size, population and the number of stations in the hinterlands. The differences can be removed by expressing these flows as proportions of population and the number of stations in the eight cells of the flow matrices. Proportions of flows per unit area may be considered as being represented through differences in number of stations and population sizes. Thus we may express the flows as a proportion to the product of the originating and the receiving cells (a) population and (b) the number of nodes.

4.4.2 Since the total interaction depends on the potentials of a place to interact, which in turn depends on the population size or similar variables at the two ends of the interacting dyads, we may use the product of the population size, number of nodes etc., in analysing the actual flows in relation to potentials of

interaction. Thus we may express flows as a proportion of the product of population at metropolitan centres and hinterlands and also as a proportion of the product of number of stations in the hinterlands and metropolitan centres.

4.4.3 Tables IV.6.1 to IV.6.7 and Tables IV.7.1 to IV.7.7 represent the flows in relation to population size and number of hinterland stations respectively for various commodities and for M-H, H-M and H-H flows. Since in the present case the relative positions of each type of flows for various commodities remain same whether we consider flows as ratios of population or number of stations, the interpretation of one set of tables hold good for the other set also.

4.4.4 It is apparent from tables IV.6.1 to table IV.6.7 that the inter-metropolitan flows are dominant on the basis of per unit of population interactions (refer figures 4.1 to 4.4). A study of the table No. IV.6.1 indicates that Bombay-Delhi-Kanpur, Calcutta-Madras and Madras-Calcutta have the largest flows. Among the M-H interactions one finds the largest supply is from the metropolitan centre to its own hinterland. The only exception here being Delhi-Kanpur. The H-H flows on the other hand are the largest to its own metropolis

TABLE No.IV.6.1

AVERAGE TRIPS (IN KMS.) PER MILLION OF POPULATION

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00931	.04071	.10929	.02130	.08496	.00265	.05372	.00746	.32940
B.Hinter	.03541	-	.00111	-	.00074	-	.02606	-	-
Delhi Kanpur	.03691	.09122	.01452	.01044	.03564	.00141	.01731	.00068	.20813
DK Hinter	.01251	-	.01128	-	.03579	-	.00863	-	-
Calcutta	.00122	.01348	.06457	.00700	.06310	.01816	.11369	.00496	.28618
C.Hinter	.01597	-	.02422	-	.11085	-	.00970	-	-
Madras	.05336	.00610	.02116	.00071	.12421	.00478	.10528	.00717	.38567
M.Hinter	.01106	-	.00302	-	.00833	-	.11277		
Totals (R)	.17575		.24917		.46592		.44776		
Grand Totals (O+R)	.50515		.45730		.75210		.83343		

TABLE NO. IV.6.2

AVERAGE FLOW (IN [illegible]) PER MILLION OF POPULATION ([illegible])

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00010	.00802	.02125	.00161	.01010	.00059	.00436	.00065	.04668
B.Hinterland	.00715	-	.00425	-	.00607	-	.00202	-	-
Delhi Kanpur	.01402	.00092	.00009	.00015	.02438	.00078	.00300	.00062	.09002
DK Hinterland	.00602	-	.00466	-	.02967	-	.16080	-	-
Calcutta	.00685	.00064	.00410	.00063	.01734	.00339	.00009	.00011	.03313
C.Hinterland	.00049	-	.00040	-	.00629	-	.02130	-	-
Madras	.01687	.00278	.00149	.00010	.06088	.00004	.04902	.00019	.13137
M.Hinterland	.00240	-	.00066	-	.00405	-	.00285	-	-
Totals (R)	.05388		.03688		.15878		.24344		
Grand Totals (O+R)	.10056		.12690		.19191		.37481		

TABLE NO.IV.6.3

AVERAGE MEAN (IN SEC.) PER ~~UNIT~~ million OF POPULATION

(RAW MATERIAL FROM ALL SOURCES)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00044	.00039	.00205	.00035	.00136	.00003	.00051	.00030	.00563
B.Hinterland	.00661	-	.00119	-	.00632	-	.00132	-	-
Delhi Kanpur	.00123	.00005	.00034	.00041	.00122	.00003	.00593	.00001	.00922
DK Hinterland	.00225	-	.00260	-	.00264	-	.00044	-	-
Calcutta	.00334	.00022	.00189	.00043	.01312	.00040	.00013	.00009	.01962
C.Hinterland	.00066	-	.00073	-	.03093	-	.00037	-	-
Madras	.00521	.00061	.00056	.00015	.00446	.00008	.00211	.00025	.01342
M.Hinterland	.00339	-	.00024	-	.00079	-	.08958	-	-
Totals (R)	.02318		.00960		.06084		.10039		
Grand Totals (O+R)	.02881		.01882		.08046		.11332		

TABLE NO. IV.6.4 million

AVERAGE HAUL (IN KMS.) PER TON ON POPULATION

(COAL / FUEL)

Receiving (R) / Originating (O)	Bombay	D.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00581	.01544	.03093	.00424	.00134	.00002	.00161	.00222	.06141
D.Hinterland	.00507	-	.00849	-	.00012	-	.02059	-	-
Delhi Kanpur	.00002	.00083	.01024	.00072	.00002	.0000001	.000005	.000002	.01783
DK Hinterland	.00002	-	.00053	-	.00001	-	.000003	-	-
Calcutta	.00113	.00076	.00365	.00178	.00513	.00411	.00099	.00018	.01773
C.Hinterland	.00248	-	.01342	-	.04568	-	.00405	-	-
Madras	.01404	.00013	.00390	.00013	.01212	.00009	.04331	.03401	.10773
M.Hinterland	.000003	-	.000001	-	.00001	-	.00382	-	-
Totals (R)	.02857		.07616		.06423		.07437		
Grand Totals (O+R)	.08998		.09399		.08196		.18210		

TABLE NO.IV.6.5

AVERAGE FLOW (IN MGD.) PER ~~UNIT OF POPULATION~~ million

(INPUT INTO AGRICULTURE)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00013	0.00664	.00422	.00603	.00041	.00043	.00108	.00155	.02049
B.Hinterland	.00530	-	0.00078	-	.00101		.00035	-	-
Delhi Kanpur	.00418	.00141	.00176	.00239	.00324	.00033	.00079	.00005	.01465
DK Hinterland	.00094	-	.00034	-	.00052	-	.000002	-	-
Calcutta	.00517	0.00039	.00253	.00113	.00031	.00304	.00177	.00008	.01522
C.Hinterland	.00041	-	.00007	-	.00105	-	.00011	-	-
Madras	.00314	.00080	.00011	.00009	.00219	.00018	.00544	.01583	.02783
M.Hinterland	.00128	-	.00002	-	.00013	-	.00142	-	-
Totals (R)	.02055		.00983		.00836		.01096		
Grand Totals (O+R)	.04104		.02448		.02408		.03879		

TABLE NO. IV.6.6

AVERAGE FLOW (TU (C.S.) PER million OF POPULATION

(CONSTRUCTION MATERIALS)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00014	.00358	.00927	.00374	.01181	.00069	.00138	.00022	.03083
B.Hinterland	.00497	-	.00375	-	.00208	-	.00018	-	-
Delhi Kanpur	.00007	0.00004	.00006	.00028	.00013	.00002	.00104	.00001	.00163
DK Hinterland	.00026	-	.00226	-	.00107	-	.00002	-	-
Calcutta	.00011	.00003	.00017	.00011	.00156	.00106	.0000007	.00002	.00306
C.Hinterland	.00129	-	.00032	-	.00840	-	.00040	-	-
Madras	.00044	.00038	.00006	.00002	.02001	.00153	.00037	.00379	.02665
M.Hinterland	.00135	-	.00139	-	.00208	-	.01232	-	-
Totals (R)	.00863		.01728		.04712		.01571		
Grand Totals (O+R)	.03946		.01891		.05018		.04236		

TABLE NO.IV.6.7

AVERAGE FLOW (MT KMS.) PER ~~UNIT~~ million OF POPULATION
(INDUSTRIAL PRODUCTS)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	.00089	.00391	.01809	.00206	.02824	.00064	.01354	.00108	.06925
B.Hinterland	.00244	-	.00099	-	.00222	-	.00104	-	-
Delhi Kanpur	.00705	.00005	.00073	.00029	.00335	.00004	.00256	.000003	.01405
DK Hinterland	.00215	-	.00029	-	.00099	-	.00019	-	-
Calcutta	.04754	.00454	.03834	.00523	.01582	.00604	.07304	.00413	.19468
C.Hinterland	0.00412	-	.00408	-	.01429	-	.00460	-	-
Madras	.00865	.00114	.01043	.00009	.02107	.00089	.00212	.00285	.04722
M.Hinterland	.00078	-	.00046	-	.00075	-	.00161	-	-
Totals (R)	.07358		.07421		.00673		.09070		
Grand Totals (O+R)	.14283		.08826		.28141		.14592		

METROPOLITAN-HINTERLAND INTERACTIONS

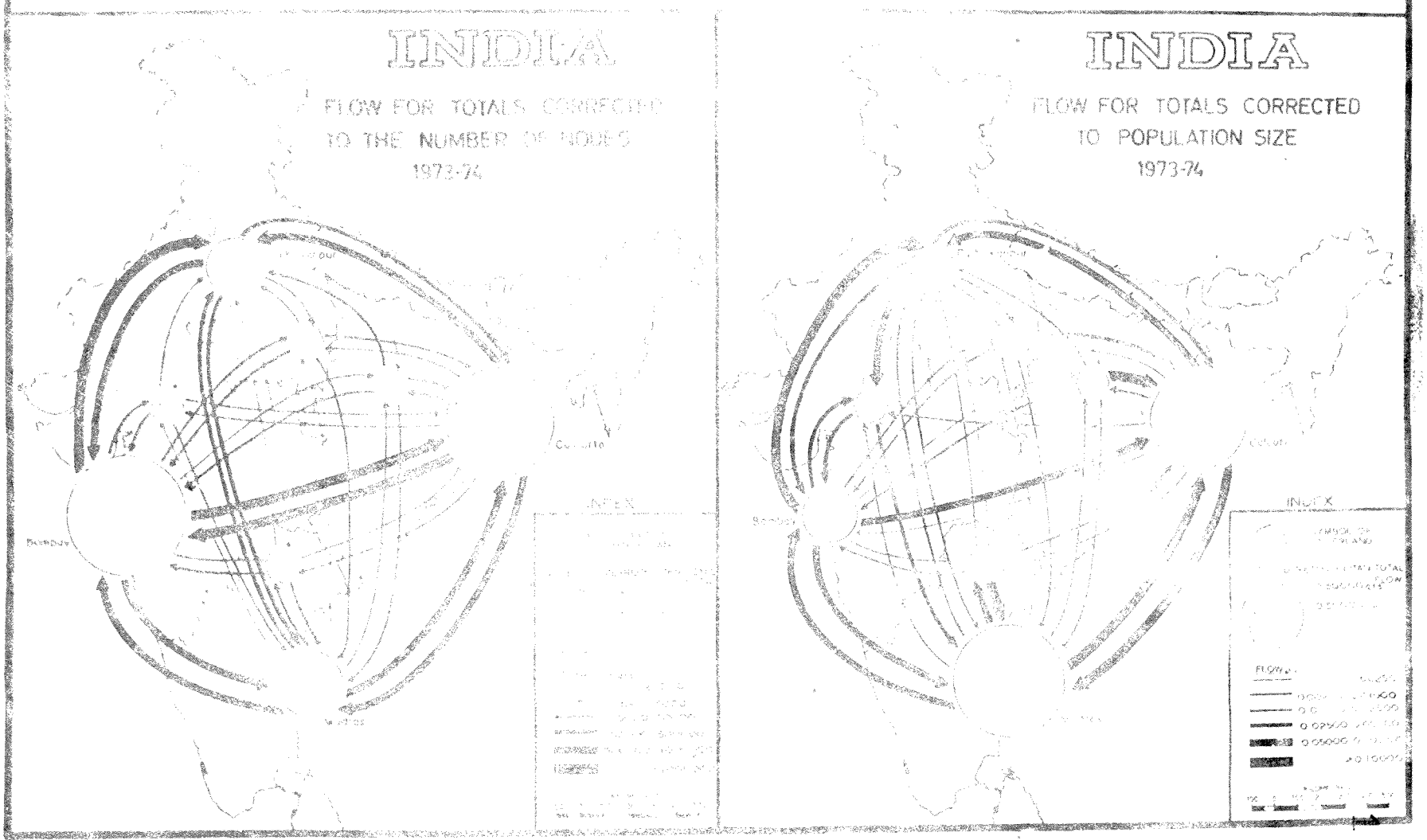
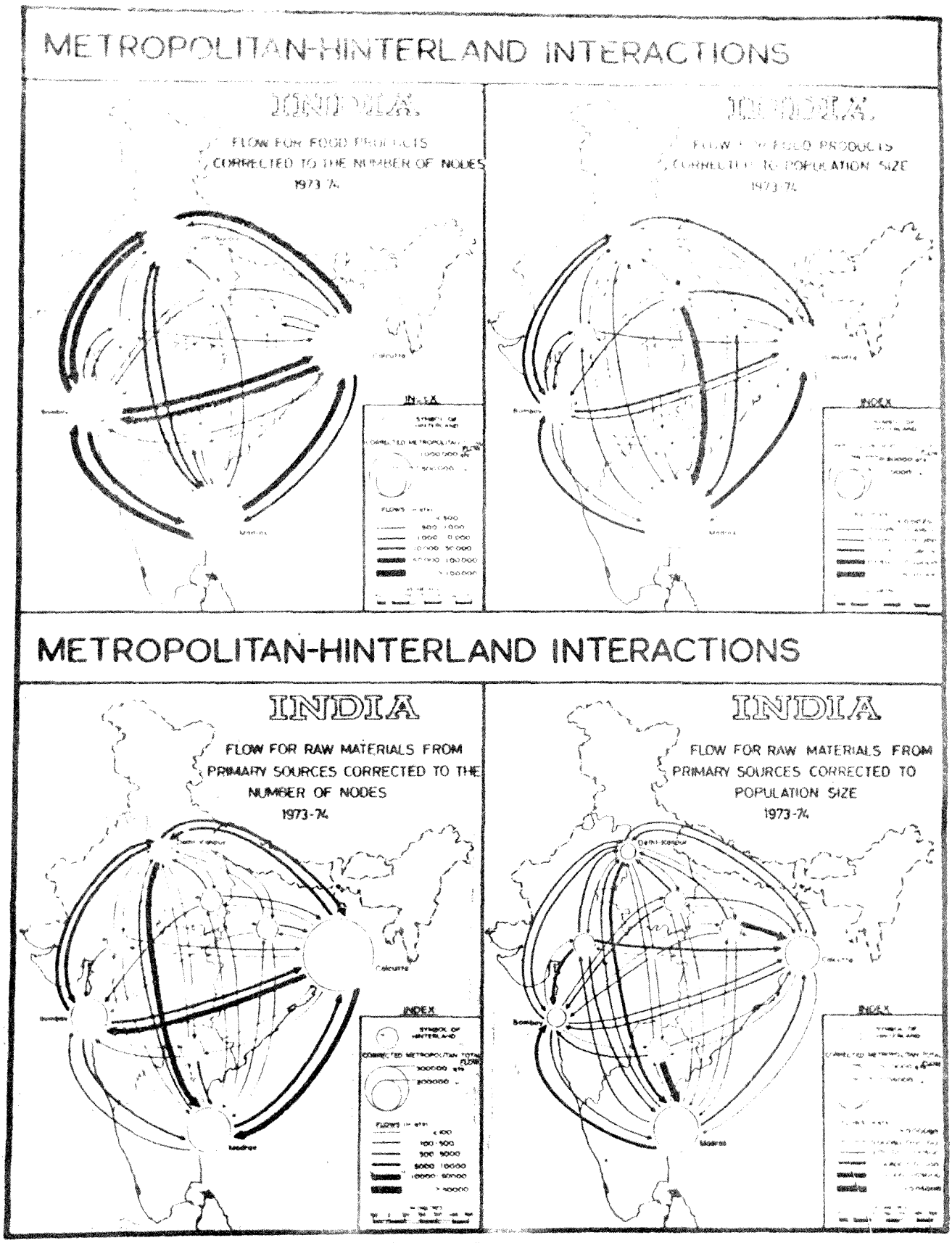


Fig.4.1


METROPOLITAN-HINTERLAND INTERACTIONS
INDIA
FLOW FOR FOOD PRODUCTS CORRECTED TO THE NUMBER OF NODES 1973-74
INDEX
INDIA
FLOW FOR FOOD PRODUCTS CORRECTED TO POPULATION SIZE 1973-74
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METROPOLITAN-HINTERLAND INTERACTIONS
INDIA
FLOW FOR RAW MATERIALS FROM PRIMARY SOURCES CORRECTED TO THE NUMBER OF NODES 1973-74
INDEX
INDIA
FLOW FOR RAW MATERIALS FROM PRIMARY SOURCES CORRECTED TO POPULATION SIZE 1973-74
INDEX

Fig. 4.2

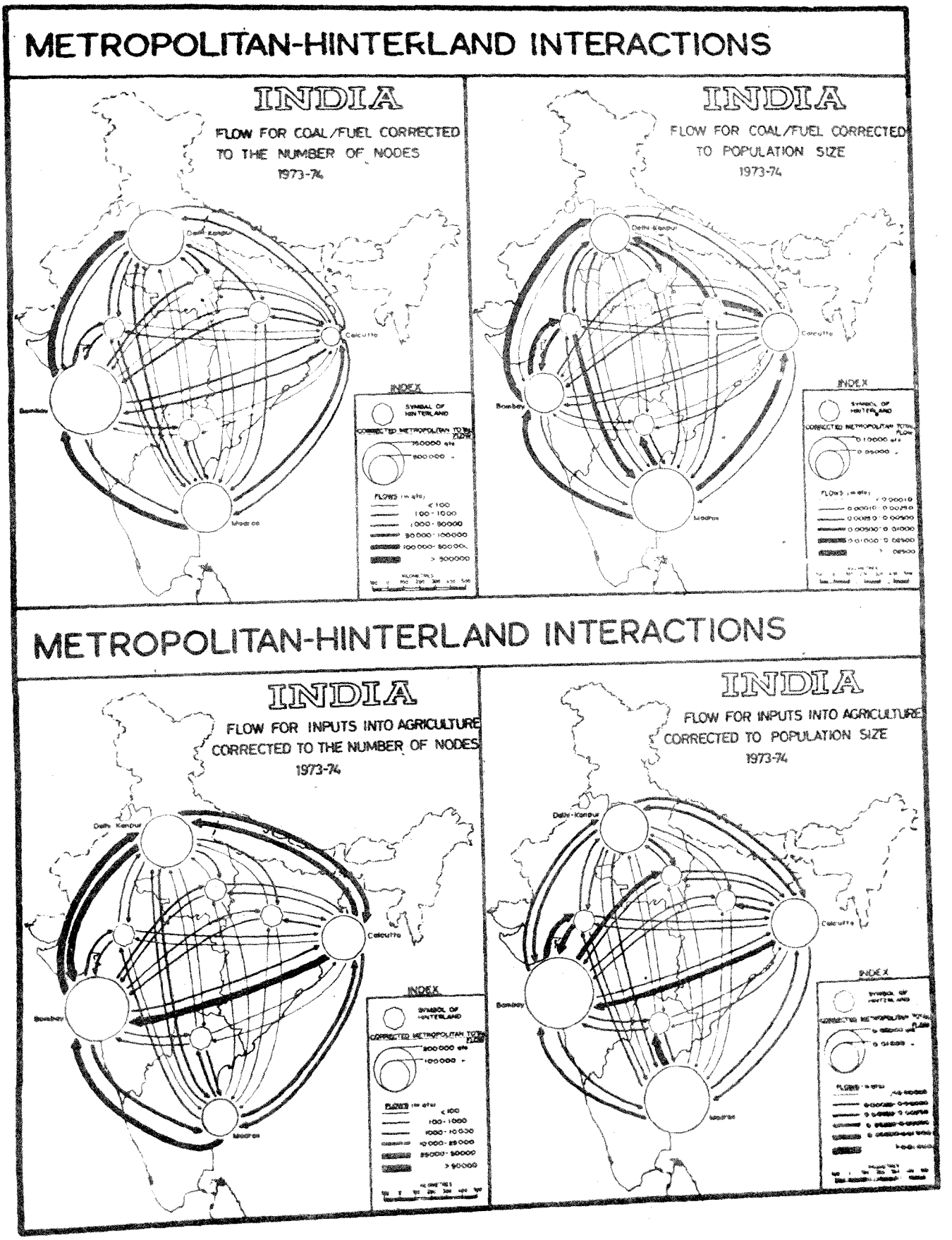
METROPOLITAN-HINTERLAND INTERACTIONS
INDIA
FLOW FOR COAL/FUEL CORRECTED TO THE NUMBER OF NODES
1973-74
INDIA
FLOW FOR COAL/FUEL CORRECTED TO POPULATION SIZE
1973-74
METROPOLITAN-HINTERLAND INTERACTIONS
INDIA
FLOW FOR INPUTS INTO AGRICULTURE CORRECTED TO THE NUMBER OF NODES
1973-74
INDIA
FLOW FOR INPUTS INTO AGRICULTURE CORRECTED TO POPULATION SIZE
1973-74
Delhi-Kanpur
Calcutta
Bombay
Madras
INDEX

Fig.4.3

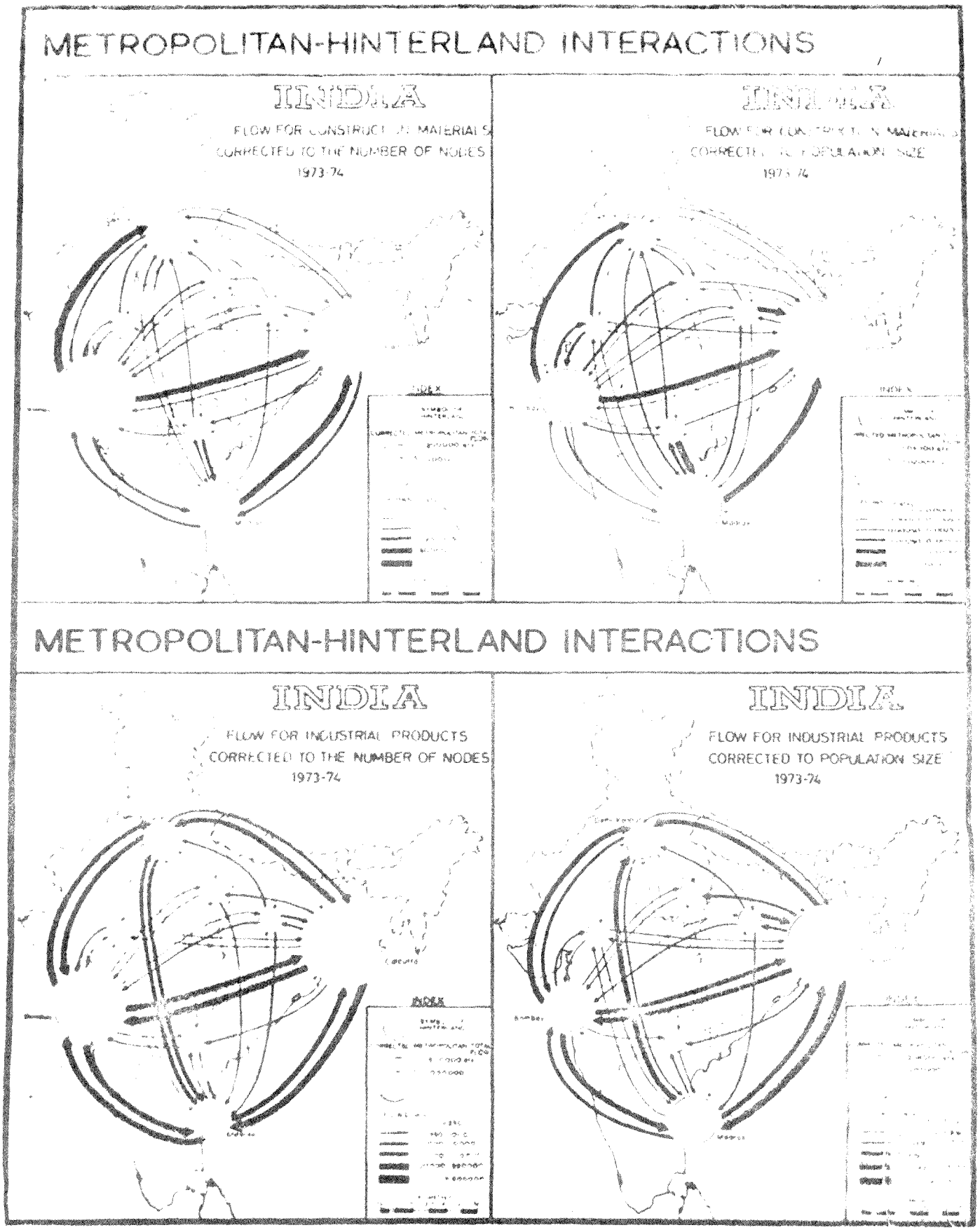
METROPOLITAN-HINTERLAND INTERACTIONS
INDIA
FLOW FOR CONSTRUCTION MATERIALS
CORRECTED TO THE NUMBER OF NODES
1973-74
INDIA
FLOW FOR CONSTRUCTION MATERIALS
CORRECTED TO POPULATION SIZE
1973-74
METROPOLITAN-HINTERLAND INTERACTIONS
INDIA
FLOW FOR INDUSTRIAL PRODUCTS
CORRECTED TO THE NUMBER OF NODES
1973-74
INDIA
FLOW FOR INDUSTRIAL PRODUCTS
CORRECTED TO POPULATION SIZE
1973-74

Fig.4.4

TABLE NO.IV.7.1

AVERAGE FREIGHT (IN £'S.) PER STATION

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	299335	12995	2180529	9481	1517195	1412	752161	3843	4784951
B.Hinterland	11304	-	4152	-	3569	-	3705	-	-
Delhi Kanpur	739093	963	181037	2892	396260	466	150940	217	1471873
DK Hinterland	5560	-	3127	-	8047	-	1672	-	-
Calcutta	1386476	2389	718011	1730	625673	5383	883929	1419	3625010
C.Hinterland	8522	-	8047	-	32671	-	2253	-	-
Madras	747111	848	183492	137	986766	1110	641772	15059	2577795
M.Hinterland	5697	-	960	-	2382	-	25204	-	-
Totals (R)	3203106		3287360		3574871		2461716		
Grand Totals (O+R)	7980057		4759233		7199881		5039511		

TABLE NO.IV.7.2

AVERAGE FLOW (IN (P.) PER SEASON (FOOD PRODUCTS)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	MK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	3264	2559	425529	717	180325	514	61077	339	674124
B.Hinter	2285	-	841	-	1076	-	280	-	-
Delhi Kanpur	280734	183	1127	31	271059	260	26170	200	579774
MK Hinterland	2600	-	1295	-	7334	-	1148	-	-
Calcutta	121977	114	45568	155	171958	1006	42447	32	383257
C.Hinterland	260	-	134	-	1364	-	61	-	-
Madras	236155	306	12978	19	475300	411	298042	1854	1023945
M.Hinterland	1237	-	213	-	1159	-	640	-	-
Totals (R)	648590		487683		1106916		430665		
Grand Totals (O+R)	1522714		1067457		1490173		1454610		

TABLE NO.XV.7.3

AVERAGE FLOW (MT CMS.) PER STATION
(RAW MATERIALS MUCH PRIMARY SOURCES)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hinter	Calcutta	C.Hinter	Madras	M.Hinter	Totals (O)
Bombay	14201	127	41126	246	24347	16	7199	159	87421
B.Hinterland	2112	-	256	-	1120	-	124	-	-
Delhi Kanpur	24546	11	4252	114	13541	13	51661	3	94141
DK Hinterland	1000	-	722	-	655	-	84	-	-
Calcutta	59707	39	20982	108	130058	119	84503	26	295542
C.Hinterland	390	-	243	-	9166	-	85	-	-
Madras	73590	86	4060	30	34645	21	12879	58	125977
M.Hinterland	1774	-	77	-	228	-	20085	-	-
Totals (R)	177098		72478		213757		176700		
Grand Totals (O+R)	264479		166619		509299		302677		

TABLE NO.IV.7.4

AVERAGE LEAD (IN KMS.) PER SEASON

(COAL / FUEL)

Receiving (R) / Originating (O)	Bombay	B.Hint	Delhi Kanpur	DK Hint	Calcutta	C.Hint	Madras	M.Hint	Totals (O)
Bombay	186827	4929	619282	1889	20425	13	22536	1141	857042
B.Hinterland	1617	-	1607	-	22	-	2062	-	-
Delhi Kanpur	346	165	177634	1362	181	0.04	33	0.91	130221.95
DK Hinterland	7	-	147	-	1	-	0.65	-	-
Calcutta	20176	135	40612	439	50061	1219	7719	50	121211
C.Hinterland	1325	-	6121	-	13536		941	-	-
Madras	196585	19	33961	25	94225	21	264020	7624	596478
M.Hinterland	1	-	0.35	-	3	-	858	-	-
Totals (R)	406882		829444.35		179254		298969.65		
Grand Totals (O+R)	1263924		959666.30		300465		895447.65		

TABLE NO.IV.7.5

AVERAGE FLOW (IN CRS.) PER SECTION

(INPUTS INTO AGRICULTURE)

Receiving (R) / Originating (O)	Bombay	B.Hint	Delhi Kanpur	DK Hint	Calcutta	C.Hint	Madras	M.Hint	Totals (O)
Bombay	4064	2121	84499	2686	7259	251	15096	798	116734
B.Hinterland	1691	-	156	-	179	-	48	-	-
Delhi Kanpur	85779	281	21964	801	35982	109	6067	15	149798
DK Hinterland	417	-	94	-	129	-	5	-	-
Calcutta	92401	68	28124	200	3098	1136	13753	22	138802
C.Hinterland	219	-	24	-	313	-	27	-	-
Madras	43928	111	970	18	17049	43	35137	3560	98816
M.Hinterland	660	-	8	-	36	-	319		-
Totals (R)	227139		185839		64025		69252		
Grand Totals (O+R)	343093		285651		202907		168068		

TABLE NO.IV.7.6

AVERAGE FLOW (IN QTS.) PER STATION (CONSTRUCTION MATERIALS)

Receiving (R) / Originating (O)	Bombay	B.Hinter	Delhi Kanpur	DK Hint	Calcutta	C.Hint	Madras	M.Hint	Totals (O)
Bombay	4554	1142	185556	1666	210974	366	19309	114	423761
B.Hinterland	1536	-	746	-	360	-	25	-	-
Delhi Kanpur	1419	8	802	78	1278	6	168	2	3761
DK Hinterland	117	-	626	-	264	-	2	-	-
Calcutta	1960	5	1901	26	15432	315	3079	6	22724
C.Hinterland	691	-	105	-	2488	-	14	-	-
Madras	6139	52	409	3	155505	367	2253	850	165718
M.Hinterland	693	-	445	-	595	-	2761	-	-
Totals (R)	17159		190670		386984		27671		
Grand Totals (O+R)	440920		194431		409708		193309		

TABLE NO.XV.7.7

AVERAGE FLOW (IN QTS.) PER STATION
(INDUSTRIAL PRODUCTS)

Receiving (R) / Originating (O)	Bombay	B.Hint	Delhi Kanpur	DK Hint	Calcutta	C.Hint	Madras	M.Hint	Totals (O)
Bombay	20616	1249	378313	916	504307	341	189525	555	1103822
B.Hinterland	780	-	196	-	394	-	144	-	-
Delhi Kanpur	140735	9	9047	82	37296	12	22317	1	209497
DK Hinterland	997	-	82	-	245	-	368	-	-
Calcutta	848920	804	426291	1295	156919	1790	567907	1101	2005105
C.Hinterland	2196	-	1355	-	4236	-	1069	-	-
Madras	120892	158	90951	17	165778	206	12945	658	309585
Madras Hinterland	402	-	147	-	214	-	362	-	-
Totals (R)	1309214		906382		867389		794637		
Grand Totals (O+R)	2413036		1115879		2872494		1104222		

among all the metropolitan centres. Here again Delhi-Kanpur hinterland is an exception whose flows are more oriented to Calcutta metropolis.

4.4.5 While inter-metropolitan flows are dominant consistently in all commodity groups, metropolitan-hinterland, and hinterland metropolitan flows show cross movements in different commodities. With reference to food products such dominant cross movement are observed in the case of Delhi-Kanpur and Madras, both interacting more with Bombay hinterland through M-H flows, whereas H-M flows indicate orientation to other metropolitan centres. Similar to the pattern of actual flows, the set of tables (IV.6.1 - IV.6.7) indicate that cross movements of raw materials from primary source become dominant through flows from Calcutta hinterland consequently the interaction of Bombay and Madras with Calcutta hinterland is higher than the respective hinterlands. Fuel flows show consistently in all cases, that metropolitan-hinterland ties are stronger as compared to cross movements. Input into agriculture is the only group of commodities where even after scaling the flows by population, metropolitan-hinterland flows are most dominant. Although inter-metropolitan ties through exchange of construction

material is stronger than M-H or H-M flows, the gap between them is only marginal. Bombay and Madras indicate stronger ties through construction material freight with Calcutta and with their own hinterlands. Each hinterland tends to be oriented to their own metropolitan centres through H- M flows. Calcutta along with its hinterland dominate the flows of industrial products, with their heavy industrial base. Metropolitan ties get strengthened through flow from Calcutta. Inter-metropolitan ties is one of the strongest throughl industrial products. Cross movements of H-M and M-H flows are largely due to Calcutta hinterland and Bombay to some extent.

4.5.1 Summary .

1. Because of the hinterland sizes as compared to metropolitan centres in terms of population, area, number of nodes etc., absolute values of tonnage indicate the dominance of hinterland-hinterland flows.

2. Following this metropolitan-hinterland and hinterlands-metropolitan flows dominate the freight pattern, and intermetropolitan flows are minimal.

3. This pattern is also consistently brought out when different commodities are considered.

4. Cross movements are generally represented due to industrial product and fuel exchanges of Calcutta hinterland hinterland and food products in the case of Delhi-Kanpur hinterland.

5. Inter-metropolitan ties are strongly represented in the flow of industrial products, and flow of inputs into agriculture strengthen metropolitan-hinterland relationships.

6. If the absolute values of flows are expressed as ratios of population of respective interacting places, inter-metropolitan ties remain strongest for all commodities except inputs into agriculture, where metropolitan-hinterland flows persist to be dominant.

CHAPTER V

Summary of Conclusions

5.1.1 The fundamental role of commodity flows in understanding the nature of spatial integration of an economy cannot be underplayed. Apparently, the nature of spatial links that develop over time tends to stabilise and perpetuate historical patterns.

5.1.2 Although the significance of studying commodity flow patterns in widely recognised, empirical studies are meagre. Consequently no coherent body of literature on the subject is available and the theoretical concepts are poorly developed. This is partly because of paucity of organised data that could be utilised for meaningful study.

5.2.1 This exploratory study on the centrifugal and centripetal forces operating in the Indian space economy initially identifies the metropolitan nodes on the basis of the population sizes. Thus the nine million cities of India are taken as the organising nodes at macro level, following which the attempt at delineating their hinterland results in clear regional orientation of flows to three of the nine cities (Bombay, Calcutta and Madras). Delhi's hinterland fluctuates between Calcutta's and Bombay's hinterlands. Thus, Delhi is

treated as a bi-nodal system along with Kanpur. The other four cities are not in a position to define their own hinterlands.

5.2.2 The four hinterlands thus identified are of varying sizes: Bombay has the largest area within which its links are more dominant than other metropolitan centres followed by Calcutta, Delhi-Kanpur and Madras. However, in terms of population size of the hinterland, Calcutta hinterland has the largest population followed by Bombay, Madras and Delhi-Kanpur hinterlands. The four hinterlands are characterised by differing climatic and physiographic conditions and a variety of resource base. These characteristics are related to the type of links that develop and the nature of products exchanged.

5.3.1 The million cities of India dominate the railway freight of the country by handling a considerable proportion of various commodities, within which the four largest centres of Calcutta, Bombay, Madras and Delhi figure prominently. The freights of these centres tend to be diversified, being composed of a variety of commodities. However, within this diversified commodity composition, depending on the industrial base

and the nature of regional resource base different commodities account for a larger share in various cities.

5.3.2 Not only do the four large cities account for a significant proportion of the national freight but are also in a position to delineate well defined hinterland around them, which other million cities are not in a position to do. Of the four hinterlands, Delhi has the weakest inspite of combining it with Kanpur, consequently cross movements from and to their hinterland involving Calcutta, Bombay and the corresponding hinterlands are considerable. The analysis of the data in the previous sections indicate that the three major ports of Bombay, Calcutta and Madras have well-defined hinterlands with which they interact most in terms of magnitude of commodity movements. Delhi and Kanpur which were considered as a bi_nodal metropolitan centre do not have a well-defined hinterland of their own as it dwindles between Calcutta's influence on the one side and Bombay's on the other.

5.3.3. The million cities consistently show a receipt dominant pattern in all kinds of commodities, irrespective of their being produced in the urban places or the rural hinterlands. Only exception to

this receipt dominance is represented by inputs into agriculture of which the urban places have no use. This is an indication of the consumptive role of the centres. Since, all the commodities also occur as important items of shipments as well as receipts, the role of the centres as traders is also indicated.

5.4.1 The nature of commodities that move between metropolitan centres, from a metropolis to its hinterland and from the hinterlands to the metropolitan centres are evidently different. While the territorial division of labour may help to explain the large receipts of food products, raw materials and fuel at these centres, the same forces do not explain the excessive receipts of industrial products and construction materials. The large receipts of industrial products are mainly through inter-metropolitan exchanges of regional specialities.

5.4.2 Inter-metropolitan flows dominate when the freight is considered to the proportion of population and number of nodes. In other words, metropolitan hinterland flows are not strong enough given the size characteristic of the hinterlands. If one finds that almost 80% of the freight is accounted for by hinterland-hinterland flows it is only because of the size. Also

definitionally, metropolitan-hinterland ties are strong. However, if the size variation between the metropolis and its hinterland is considered inter-metropolitan exchanges are out of propertion to their sizes.

5.4.3 Added to the above phenomenon, inter-metropolitan exchanges are largely represented by industrial products, whereas hinterland-metropolitan exchanges are through raw materials, food products and fuel, which is collected by these metropolitan centres for consumption as well as re-distribution.

APPENDIX - I

COMMODITY CODE FOR MONTHLY AND ANNUAL RAILWAY TRADE, [illegible] AND INLAND TRADE [illegible]

COMMODITY	Code (Three Digited)
A. Revenue Earning Traffic	
I. Products of Agriculture	
1. Rice	
a) Rice in husk	011
b) i) Rice not in the husk	021
ii) Rice flour	022
iii) Rice parched	023
2. Gram and Pulses	
a) i) Gram including gram products except flour	031
ii) Pulses other than gram and gram products	032
b) Gram flour	041
3. Wheat	
a) Wheat	051
b) Wheat flour	061
4. Jowar and Bajra (including flour)	
a) Jowar	071
b) Jowar flour	072
c) Bajra	073
d) Bajra flour	074
5. Other Grains	
a) Maize	081
b) Millet	082
c) Barley	083
d) Ragi	084
e) Other grains	085
	086
f) Flour other than rice, wheat gram, jowar and bajra flour	087 088

6. Oil Seeds

a)i)	Groundnuts with shells	091
ii)	Groundnuts without shells	092
b)i)	Castor seeds	101
ii)	Cotton seeds	102
iii)	Linseed	103
iv)	Rape mustard seeds	104
v)	Till or jingilli seeds	105
vi)	Copra (coconut kernal)	106
vii)	Mohwa seeds	107
viii)	Other oil seeds	100

7. Cotton raw

a) Pressed

i)	Cotton raw full(Pressed India)	111
ii)	Cotton raw full (Pressed Foreign)	112
iii)	Cotton raw, ginned half-pressed (Indian)	113
iv)	Cotton raw, ginned half-pressed (Foreign)	114

b) Cotton raw unpressed

i)	Loose ginned (Indian)	121
ii)	Loose ginned (Foreign)	122
iii)	Loose unginned (Indian)	123
iv)	Loose unginned (Foreign)	124
v)	Cotton waste full pressed	120
vi)	Cotton waste half pressed	125
vii)	Cotton waste loose	126

8. Jute Raw

a)i)	Full pressed	131
ii)	Half pressed	132
b)i)	Unpressed	141
ii)	Waste and cuttings unpressed	140

9. Fruits and Vegetables Fresh

i)	Mango	151
ii)	Plantains	152
iii)	Oranges	153
iv)	Other fruits fresh	154
v)	Vegetable fresh	155
vi)	Cocoanuts fresh (as cocoanut) (Green or tender)	156

10. Sugar Cane 160

11. Fodder

a) Fodder booked under famine fodder concession rates	171
b) Bran	172
c) Husks of grains and pulses other than bran	173
d) Grass dry and grass green	174
e) Other fodder excluding oil cakes & items 11(a) to 11(d)	175
f) Oil cake	
i) Coconut oil cake	181
ii) Groundnuts oil cake	182
iii) Cotton seed oil cake	183
iv) Linseed oil cake	184
v) Sesamum oil cake	185
vi) Mustard oil cake	186
vii) Castor oil cake	187
viii) Other oil cakes	188

12. Tobacco country unmanufactured 191

II. Animal and products of Animals

1. Live Stock

i) Calves or sucklings carried free with parent animals	200
ii) Calves or sucklings	201
iii) Cattle excluding horned cattle	202
iv) Horned cattle	203
v) Horses, ponies and mules	204
vi) Wild animals	205
vii) Sheep and goats	206
viii) Other sorts	207
ix) Elephants	208
x) Camels	209

2. Hides and skins

i) Hides common dry	211
ii) Hides common wet	212
iii) Skin or pelts common dry	213
iv) Skin or pelts common wet	214

3. Bones

i) Bones raw	221
ii) Bones meal	220

III. Products of mines

1(A). Coal, coke and patent fuel for public and non-govt. Mlys.

a) Booked from collieries

I) for steel plants

i)	Bhilai	231
ii)	Rourkela	232
iii)	Durgapur	233
iv)	TISCO	234
v)	IISCO	235
vi)	Bhadravathy	236
vii)	Bokaro	237

II) For washeries 241

III) For other users

i)	Coking plants	251
ii)	Thermal power houses	252
iii)	Cement factories	253
iv)	Textile mills	254
v)	For Pakistan	255
vi)	For other exports	256
vii)	To ports for movement by sea to other ports in India	257
viii)	Others	250

b) Booked from other points

1(B). To steel plants from washeries

i)	Bhilai	261
ii)	Rourkela	262
iii)	Durgapur	263
iv)	TISCO	264
v)	IISCO	265
vi)	Bhadravathy	266
vii)	Bokaro	267

2. To steel plants from other points (from points other than collieries and washeries)

i)	Bhilai	271
ii)	Rourkela	272
iii)	Durgapur	273
iv)	TISCO	274
v)	IISCO	275
vi)	Bhadravathy	276
vii)	Bokaro	277

3. To other users

1.i)	Coking plants	281
ii)	Thermal power houses	282
iii)	Cement factories	283
iv)	Textile mills	284
v)	For Pakistan	285
vi)	For other exports	286
vii)	To ports for movement by sea to other ports in India	287
viii)	Others	288

2. Marble and stones

a) Marble

i)	Marble tiles	301
ii)	Marble powder, flour, etc.	302
iii)	Marble excluding marble tiles, chips, etc.	303
iv)	Marble (including Baroda green) ballast & chips	304
v)	Marble (including Baroda Green) carved, monuments, tablets per (memorial) ware NEC	305
vi)	Marble (including Baroda Green) in blocks, dressed	306
vii)	Marble (including Baroda Green) in block, rough or undressed, powder, slabs or tiles.	307

b) Lime Stone and Dolomite

1. Lime stone booked for steel plants

i)	Bhilai	311
ii)	Rourkela	312
iii)	Durgapur	313
iv)	TISCO	314
v)	IISCO	315
vi)	Bhadravathy	316
vii)	Bokaro	317

2. Dolomite booked for steel plants

i)	Bhilai	321
ii)	Rourkela	322
iii)	Durgapur	323
iv)	TISCO	324
v)	IISCO	325
vi)	Bhadravathy	326
vii)	Bokaro	327

3(A).Booked for other users

a) Dolomite

i) For glass factories 331
ii) For other users 332

b) Lime Stone

i) For glass factories 334
ii) For other users 335

c) Gypsum

i) To cement factories 341
ii) To fertilizer factories 342
iii) Other to others 343

d) Other stones

i) Ballast 351
ii) Grind stone including whet stone stone pumice, etc. 352
iii) Stone roller 353
iv) Other stone (NEC) 354
v) Stone ware pipes 355
vi) Other stone ware (NEC) 356

3(B).Metallic Ores

a) Manganese Ores 361

i) Booked for export
ii) Booked for steel plants
a) Bhilai 371
b) Rourkela 372
c) Durgapur 373
d) HSCO 374
e) IISCO 375
f) Bhadravathy 376
g) Bokaro 377

iii) Booked for other users 381

b) Iron ore

i) Booked for export 391
ii) Booked for steel plants
a) Bhilai 401
b) Rourkela 402
c) Durgapur 403
d) HSCO 404
e) IISCO 405
f) Bhadravathy 406
g) Bokaro 407
iii) Booked for other users 411

a) Other ores 421

4.	Rice	431
5.	Sand	441

IV. Mineral Oils

1.	Oil Fuel	
	a) Diesel Oil	
	i) in bulk	451
	ii) in tins	452
	b) Crude Oil	
	i) in bulk	453
	ii) in tins	454
	c) Liquid fuel	
	i) in bulk	455
	ii) in tins	456
	d) Other fuel oils	
	i) in bulk	457
	ii) in tins	458
2.	Kerosene	
	i) in bulk	461
	ii) in tins	471
	iii) in drums	472
	iv) in canes	473
3.	Petrol	
	i) in bulk	481
	ii) in tins	491
4.	Other mineral oils	
	i) Dangerous	501
	ii) Non-dangerous	502

V. Production of forests

1.	Fire wood and other fuel	
	i) Charcoal	510
	ii) Fire wood	520
	iii) Other fuel	521
2.	Wood unwrought	
	a) Bamboo	
	i) Bamboo	522
	ii) Bamboo chips, cut splints and other splints	523
	b) Other wood	
	i) Teak wood	524
	ii) Other timber	525

3.	Lac	
	i) Refined in Chollac	526
	ii) Unrefined	527
4.	Bidi leave	528
VI.	Manufactures	
1.	a) Sugar	
	i) Sugar excluding sugar candy and glucose	537
	ii) Sugar candy	538
	iii) Glucose	539
	b) Khandsari sugar	540
	c) Gur, Jaggree & Gurchakkar	541
	d) Molasses	
	i) in bulk	542
	ii) in tins	543
2.	Salt	
	i) Salt IOC	544
	ii) Other salt	545
3.	Tea	546
4.	Soap	547
5.	Matches	
	i) Safety	548
	ii) Non-safety	549
6.	Tobacco manufactures	
	i) Tobacco country manufactured	550
	ii) Cigrattes	551
	iii) Biddies	552
7.	Vegetable oils and other edible oils	
	a) Hydrogenated oils	554
	b) Non-hydrogenated oils	
	i) Groundnut oil	
	a) in bulk	555
	b) in tins	556
	ii) Mustard oil	
	a) in bulk	557
	b) in tins	558
	iii) Cocoanut oil	559

iv) Other edible oils
  a) Linseed oil
    i) in bottles 560
    ii) NOC 561
  b) Sesamum oil 562
  c) Cotton seed oil 563
  d) Castor oil
    i) in bottles 564
    ii) NOC 565
  e) Other edible oils excluding above mentioned oils
    Divn. A 566
    Divn. B 567
    Divn. C 568
    Divn. D 569

8. Cotton manufactured and other piece goods.

i) Cotton twist and yarn foreign, press packed 570

ii) Cotton twist and yarn foreign, not press packed 571

iii) Cotton twist and yarn Indian press packed 572

iv) Cotton twist and yarn Indian not press packed 573

v) Cotton piece goods, foreign press packed 574

vi) Cotton piece goods, foreign not press packed 575

vii) Cotton piece goods, Indian press packed 576

viii) Cotton piece goods, Indian not press packed 577

ix) Other cotton manufactured press packed 578

x) Other cotton manufactured not press packed 579

9. Jute manufactured
  a) Gunnies
    i) Gunnies sack 586
    ii) Hessain cloth 587
    iii) Other gunnies 588
    iv) Other manufacture 589

10.	Leather and leather manufactures	
	i) Hide and skin tanned	591
	ii) Other leather manufactures	592
	iii) Leather scrap	593
11.	Rubber	
	i) Rubber tubes and tyres	600
	ii) Rubber or synthetic rubber manufactured	601
	iii) Rubber goods (unserviceable)	602
12.	i) Woolen piece goods press packed in boxes or in bales	603
	ii) Woollen piece goods not press packed in boxes or cases	604
	iii) Artificial silk piece goods press packed in boxes or bales	605
	iv) Artificial silk piece goods not press packed in boxes or cases	606
	v) Silk piece goods	607
	vi) Coir rope/string	608
	vii) Other coir	609
13.	Cement	
	a) Cement	
	i) in bags	617
	ii) in casks	618
	iii) in bulk	619
	b) Cement manufactured	
	i) Asbestos cement products exeluding cement tiles	620
	ii) Cement tiles exeluding asbestos cement tiles	621
	iii) Other cement manufactured	622
14.	i) Bricks, common	623
	ii) Bricks refractory	624
	iii) Tiles common flooring	625
	iv) Tiles common roofing earthen	626
	v) Tiles glazed & ornamental	627
	vi) Tiles, glazed nor ornamental	628
	vii) China ware (Potteries)	629

15. Iron and steel wrought - Pig iron

a) Division 'A' (Booked from steel plants)

i)	Bhilai	631
ii)	Rourkela	632
iii)	Durgapur	633
iv)	TISCO	634
v)	IISCO	635
vi)	Bhadravathy	636
vii)	Bokaro	637

b) Division 'B' (Booked from steel plants)

i)	Bhilai	641
ii)	Rourkela	642
iii)	Durgapur	643
iv)	TISCO	644
v)	IISCO	645
vi)	Bhadravathy	646
vii)	Bokaro	647

c) Division 'C' (Booked from steel plants)

i)	Bhilai	651
ii)	Rourkela	652
iii)	Durgapur	653
iv)	TISCO	654
v)	IISCO	655
vi)	Bhadravathy	656
vii)	Bokaro	657

d) Pig Iron (Booked from steel plants)

i)	Bhilai	661
ii)	Rourkela	662
iii)	Durgapur	663
iv)	TISCO	664
v)	IISCO	665
vi)	Bhadravathy	666
vii)	Bokaro	667

e) Other iron & steel wrought (Booked from steel plants)

i)	Bhilai	671
ii)	Rourkela	672

iii) Durgapur 673
iv) [illegible] 674
v) [illegible] 675
vi) Bhadravathy 676
vii) Bokaro 677

f) Booked from other points

i) Division 'A' 681
ii) Division 'B' 682
iii) Division 'C' 683
iv) Pig Iron 684
v) Other iron and steel
1) Agricultural implements 685
2) Cycle & Cycle parts 686
3) Motor cars including tax cars 687
4) Motor cars including taxi cars booked in covered wagons 690
5) Iron & Steel Scrap 688
6) Others 689

16. Electrical goods

a) Electrical fans 692
b) Electrical motors (all sorts) and parts 693
c) Bulbs 694
d) Batteries 695
e) Division 'A' 696
f) Division 'B' 697
g) Division 'C' 698

17. Glass ware

i) Glass heavy Division 'A' 705
ii) Glass heavy Division 'B' 706
iii) Glass heavy Division 'C' 707
iv) Glass tiles Division 'C' 708
v) Glass light Division 'C' 709

18. Non-ferrous metals

a) i) Tin in the form of pellets, rods, plates, sheets, etc. 711
ii) Tin wares 712
iii) Tin scrap 713

b) i) Brass ingots 714
ii) Brass rods, sheets, etc. 710
iii) Brass ware 715
iv) Brass scrap 716

c) i)	Bell metal, ingots, sheets or slabs	717
ii)	Bell metal ware	718
iii)	Bell metal scrap	719
d) i)	Copper in the form of pellets, rods, plates, sheets, etc.	720
ii)	Copper ware	721
iii)	Copper scrap	722
e) i)	Zinc ingots or slabs	723
ii)	Zinc ware	724
iii)	Zinc scrap	725
f) i)	Lead ingots or slabs	726
ii)	Lead ware	727
iii)	Lead scrap	728
g)	Other non-ferrous metals	729
h)	Aluminium -	
i)	Aluminium ingots, or slabs	731
ii)	Aluminium ware	732
iii)	Aluminium scrap	733
iv)	Aluminium sheets	734

19. Papers -

i)	Paper NOS in cases	740
ii)	Paper NOS in rolls or reels	741
iii)	Paper ware (other than stationery) NOS	742
iv)	Paper waste & cuttings	743
v)	Pulp and pulp sheet	744
vi)	Pulp board in bales	745
vii)	Pulp board in cases	746
viii)	Paper or card board cones, cores, spools and tubes	747
ix)	New print	748
x)	Other including stationery	749

20. Paints and varnishes -

i)	Paints & Varnishes (removers inflammable nitrocelluose, etc.)	750
ii)	Paints and varnishes division 'A'	751
iii)	Paints and varnishes division 'B'	752
iv)	Paints thinners having a flash point below 24.4°	753
v)	Paints partly composed of inflammable liquids	754

21. Colours and dyes -

i)	Division 'A'	755
ii)	Division 'B'	756
iii)	Tanning extract of all kinds	757
iv)	Tanstuff NOC	758

22. Lime works 759

23.
i)	Soda caustic including caustic soda liquor	760
ii)	Soda ash	761

24. Medicines 762

25. Alcohol

i)	Industrial	763
ii)	Power	764
iii)	Absolute	765
iv)	Others	766

26. Acids -

i)	Sulphuric acid inc. diluted	767
ii)	Other acids	
	a) Acid nitric	768
	b) Acid chromic, cresylic hydrofluoric, perchloric, diluted and sulphurous (solution)	769
	c) Acid citric, medicinal vegetable NOC, tannic and tartaric	770
	d) Acid acetic, carbolic, hydrobromic diluted and phosphoric	771
	e) Acid boric	772
	f) Acid calcium, phosphate and stearic	773
	g) Citric	774
	h) Acid hydrochloric inc. diluted	775
	i) Acid lactic	776
	j) Acid oxalic	777
	k) Acid sludge	778
	l) Acid phosphoric	779

VII. Miscellaneous

1. Manure -

a) Chemical manure -

i)	Ammonium sulphate	806
ii)	Superphosphates	807
iii)	Other fertn. 'A'	808
iv)	Other fertn. 'B'	809

b) Organic manure oil cake

i)	Coconut oil cake	810
ii)	Groundnut oil cake	811
iii)	Cotton oil cake	812
iv)	Linseed oil cake	813
v)	Sesamum oil cake	814
vi)	Mustard oil cake	815
vii)	Castor oil cake	816
viii)	Other oil cake	817
c)	Fish dry (Manure)	818
d)	Other organic manure	819

2. Provision -

i)	Coffee	820
ii)	Fruits dried	821
iii)	Ghee	822
iv)	Meat	823
v)	Meat products (other than meat manures)	824
vi)	Eggs	825
vii)	Fish fresh	826
viii)	Fish dry	827
ix)	Pepper	828
x)	Turmeric	829
xi)	Chillies	830
xii)	Cardamom	831
xiii)	Ginger dry	832
xiv)	Other spices	833
xv)	Coconut dried	834
xvi)	Betal nuts	835
xvii)	a) Seeds other than oil seeds (common)	836
	b) Seed NOC	837
xviii)	Groceries	838
xix)	Other provisions	839

3. Military traffic 840

4.

i)	Liquid petroleum gas (commercial butane of propane)	841
ii)	Compressed gas (Methane, nitrogen, air-compressed)	842
iii)	Oxygen compressed	843
iv)	Liquid gas	844

5.	i) Coal tar	845
	ii) Bitumen	846

6. Other commodities -

i)	Wool raw (full pressed)	850
ii)	Wool raw (half pressed)	851
iii)	Wool raw (loose)	852
iv)	Silk raw	853
v)	Silk waste	854
vi)	Hemp & fibre full pressed	855
vii)	Hemp & fibre half pressed	856
viii)	Hemp & fibre, unpressed	857
ix)	Rubber crude, raw	858
x)	Rubber scrap	859
xi)	Dry grass including cubed grass (other than those included under fodder)	860
xii)	Myrobolam	861
xiii)	Mowha flowers	862
xiv)	Opium	863
xv)	Narcotic & narcotic drugs	864
xvi)	Drugs (crude or raw)	865
xvii)	Lime	866
xviii)	Petroleum coke	867
xix)	China clay	868
xx)	Timber wrought	869
xxi)	Cinematograph films	
	a) inflammable	870
	b) non-inflammable	871

7. Other commodities (not included above)

Container service	901
Freight forwarding service	901

32.5	910	95	941
27.5	912	100	943
30	913	105	944
50	914	110	945
35	915	115	946
37.5	916	120	947
40	917	130	949
42.5	918	150	951
45	919	87.5	952
47.5	920		
52.5	922*		
55	923		
57.5	926		
60	927		
62.5	928		
65	929		
67.5	931		
70	932		
75	934		
80	936		
85	938		

* Operative for invoices issued unto 15.4.1972

B. Non-revenue traffic

VIII. Railway Coal and Diesel oil

1. Iron collieries -

a) for home line	960
b) for other Government railways and manufacturing units like GRI, IOF, etc.	961

2. Sea-borne coal moved from ports -

a) for home line	962
b) for other Government railways and manufacturing units like GRI, IOF, etc.	963

3. From other points -

a) for home line	964
b) for other Government railways and manufacturing units like GRI, IOF, etc.	965

Diesel Oil

a) Diesel oil booked by companies for railway purposes in bulk	966
b) Diesel oil booked by companies for railway purposes in tins	967

IX. General stores and materials

1. Carried on other than departmental wagons and ballast trains -

a) for home line -

i) Iron and steel	971
ii) Cement	972
iii) Bricks	973
iv) Tiles	974
v) Lime and limestone	975
vi) Teak wood	976
vii) Other wood	977
viii) Kerosene oil	978
ix) Diesel oil	979
x) Other stores	970

b) For other government railways and manufacturing units like SAIL, ICI, etc.

i)	Iron and steel	981
ii)	Cement	982
iii)	Bricks	983
iv)	Tiles	984
v)	Lime and limestone	985
vi)	Coal wood	986
vii)	Other wood	987
viii)	Kerosene oil	988
ix)	Diesel oil	989
x)	Other stores	990

2. Carried by departmental wagons and ballast trains

a)	For home line	990
b)	For other government railways and manufacturing units like SAIL, ICI, etc.	991

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APPENDIX - II

COMMODITY GROUPS AND THE COMMODITIES INCLUDED IN EACH (2ND AND THIRD DIGIT CODES)

Group I : Food Products

(Two digit Codes)

10	Foodgrains	:	011, 021, 023, 031, 051, 071, 073, 032, 081, 083, 084, 085, 086, 061, 022, 041, 072, 074, 087, 088, 082.
11	Fruits and Vegetables, meat, fish, eggs & dairy products.	:	151, 152, 153, 154, 155, 156, 823, 824, 826, 827, 825, 822.
12	Spices provisions and salt	:	821, 820, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 544, 545.
13	Beverages	:	546, 820.
14	Sugar	:	537, 538, 539, 540, 541, 542, 543.
15	Edible oils	:	554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569.

Group II : Raw Materials from Primary Sources

21	Oilseeds	:	091, 092, 101, 102, 103, 104, 105, 106, 107, 100.
22	Fibres	:	111, 112, 113, 114, 121, 122, 123, 124, 120, 125, 126, 131, 132, 141, 140, 850, 851, 852, 853, 854, 855, 856, 857.
23	Sugarcane	:	160
24	Hides, skins and bones	:	211, 212, 213, 214, 221, 220.
25	Plantation Products	:	191, 863, 858, 859, 528.
26	Lime stone, dolamite, other stones, Chinese clay.	:	311, 312, 313, 314, 315, 316, 317, 321, 322, 323, 324, 325, 326, 327, 331, 332, 334, 335, 341, 342, 343, 351, 352, [illegible], 354, 355, 356, 868.

27	Iron Ore	:	391, 401, 402, 403, 404, 405, 406 407, 411
28	Manganese, mica and other ores	:	371, 372, 373, 374, 375, 376, 377, 381, 361, 431, 421
29	Metal scrap	:	688, 713, 716, 719, 722, 725, 728,733
30	Raw materials from the forest sector	:	526, 527, 524, 860, 861, 862, 869, 525

GROUP III : NON METALLIC ORES

31	Coal and Coke	:	231, 232, 233, 234, 235, 236, 237, 241, 251, 252, 253, 254, 255, 256, 257, 258, 261, 262, 263, 264, 265, 266, 267, 960, 961, 962, 963, 964, 965, 271, 272, 273, 274, 275, 276, 277, 281, 282, 283, 284, 285, 286, 287, 288
32	Oil, Kerosene, Petroleum, Other mineral oil and gases	:	451, 452, 453, 454, 455, 456, 457, 458, 461, 471, 472, 473, 481, 491, 867, 966, 967, 978, 979, 988, 989, 501, 502, 841
33	Firewood and other fuel	:	510, 520, 521

GROUP IV : INPUTS INTO AGRICULTURE

41	Fodder	:	171, 172, 173, 174, 175, 181, 182, 183, 184, 185, 186, 187, 188
42	Manure	:	810, 811, 812, 813, 814, 815, 816, 817, 819, 818
43	Chemical fertiliser	:	806, 807, 808, 809
44	Agricultural implements	:	685

GROUP V : CONSTRUCTION MATERIAL

51	Building materials- primary		866, 975, 985, 301, 302, 303, 304, 305, 306, 307, 522, 523, 976, 986, 977, 987, 441

52	Coal tar, bitumen, bricks & tiles	845, 846, 623, 624, 625, 626, 627, 628, 973, 974, 983, 984, 970, 980, 990, 991
53	Cement	617, 618, 619, 620, 621, 622, 972, 982

Sub-Group VI : Miscellaneous Consumer

60	Textiles	570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 587, 588, 589, 603, 604, 605, 606, 607
61	Electrical machinery and parts	692, 693, 694, 695, 696, 697, 698
62	Glassware, pottery, leather and leather products, other consumer goods	591, 592, 593, 705, 706, 707, 708, 709, 629, 547, 548, 549, 608, 609, 870, 871
63	Paper, printing, publishing	740, 741, 742, 743, 744, 745, 746, 747, 748, 749
64	Rubber	600, 601, 602
65	Chemicals and Chemical products	750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 842, 843, 844, 865, 864
66	Non-metallic mineral products	711, 712, 714, 710, 715, 717, 718, 720, 721, 723, 724, 726, 727, 729, 731, 732, 734
67	Basic metals and alloys	631, 632, 633, 634, 635, 636, 637, 971, 981, 641, 642, 643, 644, 645, 646, 647, 651, 652, 653, 654, 655, 656, 657, 661, 662, 663, 664, 665, 666, 667, 671, 672, 673, 674, 675, 676, 677, 689, 681, 682, 683, 684

68	Transport equipments and parts	:	686, 687, 690
69	Tobacco	:	550, 551, 552

GROUP VII : [illegible]

70	:	840

GROUP VIII : [illegible]

80		200, 201, 202, 203, 204, 205, 206, 207, 208, 209

GROUP X : [illegible]

90		910, 922, 938, 912, 923, 941, 913, 926, 943, 914, 927, 944, 915, 928, 945, 916, 929, 946, 917, 931, 947, 918, 932, 949, 919, 934, 951, 920, 936, 952, 901

APPENDIX - III

LIST OF STATIONS WITHIN BASE METROPOLITAN AGGLOMERATION

Sr.No.	Station Code	Name of the Station
Ahmedabad — 82200 (Station Code)		
1	82244	Ahmedabad Junction
2	82245	Ahmedabad City
3	82246	-
4	82306	Ahmedabad
5	82311	Ahmedabad City
6	82312	-
7	82317	Anand Amul Dairy
8	88201	Ahmedabad Junction
9	88202	Ahmedabad Junction
10	88227	Maliapur
11	88228	-
12	88229	Baroda
Bangalore — 66943 (Station Code)		
1	66954	Anekal Road
2	66955	Samandur Halt
3	66956	Food Corpn.of India Sdg.
4	66957	Indian Telephone Industries
5	66958	Krishnarajapuram
6	66959	New Government Electric Factory.
7	66960	Baiyyappannahalli

Sr.No.	Station Code	Name of the Station
8	66961	Vimanapura
9	66962	Bangalore East
10	66963	Bangalore Cantonment
11	66964	Bangalore City Booking
12	66965	Messrs Ram Mohan & Co.
13	66966	Messrs Thos. Cook & Son
14	66967	Bangalore City North Booking
15	66968	Bangalore City Goods Shed
16	66969	Santosa Halli Halt
17	66970	Bangalore Cantonment Market
18	66971	Bangalore Booking Office
19	66972	Bangalore Petta Booking Office
20	66973	Indian Tobacco Co. of India
21	66979	Bangalore City Junction

Bombay — 11003 (Station Code)

1	11004	Bombay (Mohd. Ali Road)
2	11006	Chinchpokli
3	11007	-
4	11009	Currey Road
5	11010	Sadi Bander
6	11012	Dadar
7	11013	Byculla
8	11014	Byculla
9	11015	Matunga

r.No.	Station Code	Name of the Station
10	11016	Chinchpokli
11	11017	Currey Road
12	11018	Parel
13	11019	Bombay
14	11020	Bombay
15	11021	Kadar
16	11022	Kadar
17	11023	Kadar
18	11024	Matunga
19	11025	Matunga Shops
20	11026	Sion
21	11027	Chunabhatti
22	11028	Kolvada
23	11029	Wadala Road
24	11030	Sion
25	11031	Wadala
26	11032	Alexandra Dock
27	11033	Haji Bunder
28	11034	Ballard Pier
29	11035	Cotton Depot
30	11036	Grain Depot
31	11037	Manganese Dept.
32	11038	Panton Bandar
33	11039	Manganese Depot

Sr.No.	Station Code	Name of the Station
34	11040	Stores Depot
35	11041	Victoria
36	11046	Sewri
37	11047	Cotton Green
38	11048	Reay Road
39	11049	Dockyard Road
40	11050	King's Circle
41	11051	Mahim (B.O.)
42	11052	Victoria Terminus
43	11065	-
44	11071	Bandra C.R.
45	11081	Calico Mills, Crumbay
46	11082	Kurla
47	11101	Kurla Junction
48	11102	Tankhurd Kurla
49	11103	Kurla (Naval Stores)
50	11104	Tankhurd (Royal)
51	11105	Tankhurd
52	11106	Deonar Sdg.
53	11107	Steel Yard Sdg.
54	11108	Kurla
55	11109	Metal Box (Kurla)
56	11110	Kurla Junction
57	11111	Kurla Junction

Sr.No.	Station Code	Name of the Station
58	11113	Mankhurd
59	11114	-
60	11115	-
61	11116	-
62	11117	[illegible] Wldg.
63	11118	Trombay
64	11119	Fert. Corp. Trombay
65	11120	Trombay
66	11122	-
67	11123	Chembur
68	11124	Govandi
69	11125	Mankhurd
70	11129	-
71	11130	Ghat Kopar
72	11131	-
73	11132	Ghat Kopar
74	11133	-
75	11134	Hindustan Co. Wldg.
76	11135	Vikhroli
77	11136	-
78	11137	Vikroli, Royal India Navy.
79	11138	Ghat Kopar
80	11140	Godrej & Boyce Mfg.
81	11143	Bhandup

Sr.No.	Station Code	Name of the Station
82	11144	Assisted Bdg.
83	11145	Mail Parcel Bdg.
84	11146	Bhandup Bdg.
85	11148	Mahur B.Bdg.
86	11152	Mulund
87	11153	Asbestos Bdg.
88	11154	Mulund
89	14001	-
90	14003	-
91	14005	-
92	14007	Kudi Mandar
93	14009	-
94	14077	-
95	81038	-
96	81041	Bombay - Carnac Bdg.
97	81042	Alexandra Dock
98	81043	Cotton Depot
99	81044	Grain Depot
100	81045	Liquid Fuel Depot
101	81046	Oil Depot
102	81047	Panton Mandar
103	81048	Stores Depot
104	81049	Manganese Depot
105	81050	Ballard Pier

Sr. No.	Station Code	Name of the Station
106	81051	Victoria Dock
107	81052	B. General Office
108	81053	B. Girgaum
109	81055	Kalbadevi Road
110	81056	Churchgate
111	81059	Grant Road
112	81060	Bombay Central
113	81061	Bombay Central (Local)
114	81062	Mahalakshmi
115	81063	Bombay
116	81064	Lower Parel
117	81065	Elphinstone Road
118	81066	Dadar
119	81067	Matunga Road
120	81068	Mahim Junction
121	81069	Mahim (B.O.)
122	81070	Wadala
123	81071	Bombay - M/S
124	81073	Bombay - M/S
125	81080	Bombay - M/S
126	81081	Bombay - M/s. Trade Wings Ltd.
127	81082	Bombay - M/s.
128	81083	Bombay - Carnac Bridge
129	81085	Bombay L.P.O.
130	81086	Bombay
131	81087	Bombay Central

Sr.No.	Station Code	Name of the Station
132	81088	Bombay Central
133	81091	Bandra
134	81092	Bandra
135	81100	-
136	81101	Khar
137	81102	-
138	81103	-
139	81104	Andheri
140	81105	Jogeshwari
141	81110	-
142	81140	-
143	81149	Jogeshwari
144	81150	-
145	81151	-
146	81152	Andheri
147	81154	Vile Parle
148	81227	Fort Songhad
149	81503	Kalbadevi
150	85225	Piprala
151	87342	Lalpur
Calcutta — 24400 (Station Code)		
1	24401	Belur
2	24426	Bally
3	24427	Uttarpara
4	24428	Mind Motor

Sr.No.	Station Code	Name of the Station
5	24429	Konnagar
6	24430	Lohra
7	24431	Serampore
8	24432	Sheoraphuli Junction
9	24433	Baidyabati
10	24434	Bhadreswar
11	24435	Mankundu
12	24436	Chandan Nagar
13	24437	Chuchura
14	24438	Hooghly
15	24462	Garifa
16	24463	Hooghly Ghat
17	24464	Ganesh Baria
18	24547	Belur Iron & Steel
19	24548	Belur G.T.Road
20	24549	Belur Goran Yard
21	24550	Triveni Tissue Sdg.
22	24551	Hind Motor Sdg.
23	24552	-
24	24553	-
25	24554	-
26	24555	-
27	24556	-
28	24557	-
29	24558	-

Sr.No.	Station Code	Name of the Station
30	24561	-
31	24563	-
32	24564	-
33	24565	-
34	24567	-
35	24569	-
36	24600	Howrah
37	24601	Calcutta Mara Bazar
38	24602	-
39	24603	Calcutta Fairlie Place
40	24604	Calcutta Cornwallis St.
41	24606	Calcutta Chowringhee
42	24607	Calcutta Kidderpore
43	24608	Calcutta Russoor Road
44	24609	Sankistopore
45	24610	Shibpurchar
46	24611	Salkea
47	24612	Howrah Punjab Line
48	24613	Howrah L.P.O.
49	24614	Howrah Coal Dump Sdg.
50	24616	-
51	24617	-
52	25429	Jadabpur
53	25430	Bhakuria
54	25431	Budge Budge
55	25432	Sangi

Sr.No.	Station Code	Name of the Station
56	25433	Akra
57	25434	Santoshpur
58	25435	Dum Dum Junction
59	25439	Khardaha
60	25440	Titagarh
61	25441	Barrackpore
62	25442	Kalta
63	25443	Ichhapur
64	25446	Kankinara Junction
65	25447	Kalicahar
66	25448	Kanchrapara
67	25449	Halyani
68	25468	Nainpur
69	25469	Code
70	25470	Ballygunge Ghat
71	25471	Dakhineswar
72	25472	Baranagar Road
73	25473	Dum Dum Cantt.
74	25474	Hirati
75	25475	New Barrackpore
76	25523	Krishnapur
77	25528	Kalisahar Storee
78	25529	-
79	25530	-
80	25531	-

r.No.	Station Code	Name of the Station
81	25532	-
82	25600	Sealdah
83	25601	Ultadanga Road
84	25602	Dalhousie Junction
85	25603	Kalighat
86	25604	Bagherat
87	25605	Lance Bridge
88	25606	Ultadanga
89	25607	Sealdahbazar
90	25608	Cossipore
91	25609	Cossipore Road
92	25610	Chitpur
93	25611	Chitpur Ghat
94	25612	Jelty
95	25613	Kantapukur
96	25614	Kidderpore Docks
97	25615	Mintollah
98	25616	Muthtolah
99	25617	Scheb Bazar
100	25618	Tea-Warehouse
101	25619	Narculdanga
102	25620	Chetla
103	25621	-
104	25622	-

Sr.No.	Station Code	Name of the Station
105	25624	-
106	25625	-
107	25626	-
108	25627	-
109	25628	-
110	25630	-
111	71101	Kidderpore Docks
112	71102	Kantapukur
113	71103	Jetty
114	71104	Chetla
115	71105	Tea warehouse
116	71106	-
117	71107	-
118	71108	Chitpur
119	71109	Calcutta G.P.O.
120	71110	Armenian Ghat
121	71112	Russa Road
122	71117	Ananda Bazar Patrika
123	71120	Radhanukur
124	71121	Kankinarpore
125	71122	Shalimar
126	71123	Howrah
127	71124	Silkiapura
128	71125	Salkia

Sr. No.	Station Code	Name of the Station
129	71126	Sibpurchar
130	71127	K. Docks East
131	71128	Shalimar L.P.C.
132	71136	-
133	71204	Andul Junction
134	71205	Sankrail
135	71206	Abada
136	71207	Nalpur
137	71208	Bauria Junction
138	71209	B. Jute Mill Sdg.
139	71215	Kulgachia

Delhi — 13901 (Station Code)

1	13902	Tughlakabad
2	13903	Okhla
3	13904	Nizamuddin
4	13905	Safdarjung
5	13906	New Delhi, Baroda House
6	13907	Delhi
7	13908	Chandni Chowk
8	13909	Karol Bagh
9	13910	Qazi Hauz
10	13911	Sadar Bazar
11	13912	Sabzi Mandi
12	13914	Connaught Place

Sr.No.	Station Code	Name of the Station
13	13916	Delhi
14	13920	Delhi
15	13921	Traffic Service
16	13922	New Delhi
17	13923	New Delhi
18	13924	Traffic Electric Service
19	13926	-
20	13927	Nizamuddin [illegible]
21	13931	-
22	13932	-
23	13933	Pundhi
24	13934	-
25	13935	-
26	32801	Subzi Mandi
27	32802	Delhi Azadpur
28	32803	Badli
29	32804	Khera Kalan
30	32805	Narela
31	32806	Delhi Shahdra
32	32807	Delhi Kishanganj
33	32808	Daya Basti
34	32809	Daya Basti Side
35	32810	Shakur Basti
36	32811	Mundka Hall

Sr.No.	Station Code	Name of the Station
37	32812	Ghaziabad
38	32813	Ghoora
39	32814	Hapuleabad
40	32815	Hapuleabad Side
41	32816	Okhla
42	32817	Delhi Safdarjang
43	32818	Sarojini Nagar
44	32819	Lodi Colony
45	32820	Mewa Nagar
46	32821	Rajpat Nagar
47	32822	Hazrat Nizamuddin Jn.
48	32823	Pilak Bridge
49	32824	Minto Bridge
50	32825	New Delhi (S.C.)
51	32826	Delhi Junction
52	32827	Delhi Sdg.
53	32828	Delhi Cant.S.C.Yd
54	32829	Delhi Kishanganj
55	32830	Army Ware House
56	32832	Cement Co. Okhla
57	32833	Godrej & Boyce Mfg. Okhla
58	32834	Indian Iron & Stee Co. Okhla

Sr.No.	Station Code	Name of the Station
59	32835	Tata Iron & Steel Co. RD
60	32836	Delhi Safdarjung (D.C.)
61	32837	Delhi Foodgrains Sdg.
62	32840	Delhi Chandni Chowk
63	32841	New Delhi C. Place.
64	32842	Karolbagh
65	32843	Rasi House
66	32844	Sadar Bazar
67	32845	Subzi Mandi
68	32846	Lodi Colony
69	32848	C.P. Reservation
70	32849	Shakurbasti Sdg.
71	32850	Shakurbasti Oil Sdg.
72	32851	Parliament
73	32852	Electric Power House Sdg.
74	32853	Reservation - Petrol Sdg.
75	32854	Central Storage Sdg.
76	32855	C.O.D. Cantt.Sdg.
77	32856	Engineering Park
78	32857	Military Sdg.
79	32858	Kalamki Melan
80	32859	Delhi Junction
81	32860	Delhi Cantt. Sdg.
82	32861	Nizamuddin Sdg.

Sr.No.	Station Code	Name of the Station
83	32862	Hindustan Steel Hdq.
84	32863	Indarpur Power Project
85	32864	New Delhi Hq.
86	32865	Nizamuddin Hdq.
87	32866	Safdarjung Hdq.
88	32867	Shahdara Hq.
89	32868	Saleem Garh Hq.
90	36801	Delhi
91	36802	Lahori Gate
92	36803	Queens Road
93	36804	Safdar Nagar
94	36805	Sarai Rohilla
95	36806	Patel Nagar
96	36807	Delhi Cantt.
97	36808	Delhi Goodsyrain Hdq.
98	36809	Delhi Cant. Hdq.
99	36810	Delhi Defence Cantt.
100	36811	Petrol Hdq.
101	36812	Engineering Hdq.
102	36813	Palam
103	36816	Bijwasan
104	36817	Chandni Chowk (N.G.)
105	36819	Kazi Kaun (N.G.)
106	36820	Sadar Bazar (N.G.)

S.No.	Station Code	Name of the Station
107	36821	[illegible] (H.C.)
108	36822	C.Place (H.C.)
109	36824	[illegible] Colony (H.C.)
110	36826	[illegible] (H.C.)
111	36827	[illegible] (H.C.)
112	36828	[illegible]

Hyderabad — 95525 (Station Code)

1	95528	[illegible]
2	95529	[illegible]
3	95530	[illegible] Heavy Plant.
4	95535	[illegible] Jdg.
5	95536	Hyderabad Metal Works
6	95537	[illegible] Jdg.
7	95538	Synthetic Drugs Jdg.
8	95539	Hyderabad Asbestos Jdg.
9	95541	-
10	95544	Begumpet
11	95545	Hyderabad Deccan
12	95546	Hyderabad Deccan
13	95547	Hyderabad City
14	95552	Hyderabad Deccan
15	95553	Secunderabad
16	95554	Secunderabad Junction

Sr.No.	Station Code	Name of the Station
17	95555	Bushirabad (B.G.)
18	95556	Secunderabad Military Sdg.
19	95557	Secunderabad Goods Office
20	95560	Mettuguda
21	95561	-
22	95566	Secunderabad Town
23	95567	Lallaguda Sdg.
24	95568	Integrated Milk Project
25	95569	-
26	95589	Ippaguda
27	95597	-
28	95643	-
29	95644	-
30	95646	Dendukur
31	95652	Vynchipet
32	95662	Pot Kapalli
33	95667	Kottapalli
34	95668	Sandepalli
35	95672	Nitmal
36	95676	Hyderabad Chemicals
37	99501	Secunderabad Junction
38	99502	Secunderabad Goods Office
39	99503	Sitafalmandi

Sr.No.	Station Code	Name of the Station
40	99504	Kacheguda
41	99505	Vidyanagar
42	99506	Kacheguda Fuel Depot Edp.
43	99507	Hyderabad City
44	99508	Arts College
45	99516	Kacheguda
46	99518	Kacheguda
47	99520	Kacheguda
48	99521	Uddanagar
49	99522	Nimmapur
50	99556	-
51	99560	-
52	99562	Bogelu
53	99567	Secunderabad Town
54	99568	Nashimabad
55	99570	Lallaguda
56	99571	Lallaguda Gate
57	99577	Alwal
58	99637	Naula - Ali (M.G.)
Kanpur — 13825 (Station Code)		
1	13826	Kanpur Juhi
2	13827	-
3	13828	Kanpur Central Goods Shed
4	13829	Kanpur Central
5	13830	Kanpur Town
6	13831	Kanpur Mall Road

Sr.No.	Station Code	Name of the Station
7	13832	Kanpur Moolganj
8	13833	Kanpur Sisamau
9	13834	-
10	13838	-
11	31055	Kanpur Central
12	31056	Goods Shed
13	31057	Chingi(har
14	31058	Goods Depot
15	31059	Ordnance Sdg.
16	31060	Kanpur Juhi
17	31061	Govindpuri
18	31062	Panki
19	31152	I.E.L. Sdg.Panki
20	31153	I.O.C.Sdg.Panki
21	31154	Thermal Power Sdg.
22	31166	Mool Ganj
23	31167	Mall Road
24	31168	Sisa Mau
25	31169	Kanpur L.P.O.
26	31201	Atherton West & Co.
27	31202	Oil Storage Co.
28	31203	Cooper Allen & Co.
29	31204	Elgin Mills
30	31205	Elgin Mills Sdg.
31	31206	Ganesh Flour Mills

Sr.No.	Station Code	Name of the Station
32	31207	Ganesh Flour Mills
33	31208	Hindustan Steel Ltd.
34	31209	Engineering Works
35	31210	J.K.Jute Mills
36	31211	Juggi Lal Cotton Mfrs.
37	31212	Juggi Lal Iron & Steel
38	31213	Chemical Works Sdg.
39	31214	Electric Supply Sdg.
40	31215	Electric Supply Power Sdg.
41	31216	Kanpur Mills Sdg.
42	31217	Kanpur Woolen Sdg.
43	31218	Gautiya Sugar Mills
44	31219	Laxmi Ratan Cotton Mills
45	31220	Muir Mills Sdg.
46	31221	Stores Dump Sdg.
47	31223	Ordnance Sdg.
48	31224	Regional Sdg.
49	31225	Engineering Works Sdg.
50	31226	Arms Sdg.
51	31227	S.M.Ginning & Flour Mills
52	31228	Vaccum Oil Co.
53	31229	Swadeshi Cotton Mills
54	31230	Tata Iron & Steel Sdg.
55	31231	Cawnpore Industrial Corpn.

Sr.No.	Station Code	Name of the Station
56	31232	U.P.Sugar Mills
57	34103	Bridge Left Bank
58	43580	Sadabahnagar Paper Mills
59	43581	Burhwal Sugar Factory
60	43582	Burhwal Sugar Mills Sdg.
61	43583	Chingighar
62	43584	D.Nadi & Co's Sdg.
63	43585	Hindustan Sugar Mills
64	43587	Industrial Area
65	43588	J.K. & Co's Cotton Mills
66	43589	J.K.Jute Mills
67	43590	Nagarwara Bone Mills
68	43591	Oudh Sugar
69	43592	Srivenkateshwar Mill
70	43593	Unnao Sugar Works
71	43594	-

Madras — 62000 (Station Code)

1	62001	Egmore
2	62002	Madras L.P.O.
3	62003	Salt Cotaurs
4	62004	Washermanpet
5	62005	G. (P.B.O.)
6	62006	G. George Town
7	62007	G. George Town

Sr.No.	Station Code	Name of the Station
8	62008	Esplanade S.O.
9	62009	Esplanade S.O.
10	62010	Basin Bridge Junction
11	62011	Madras Central
12	62013	Messrs The Orient Exp.
13	62016	Madras Mylapore Town
14	62017	Madras Triplicane S.O.
15	62018	Madras Theagarayanagar
16	62019	Madras Mount Road
17	62020	Madras Mount Road
18	62021	Madras Mill Sdg.
19	62022	Perambur
20	62023	Perambur Carriage Works
21	62024	Perambur Loco Works
22	62025	Perambur Works
23	62026	Villivakkam
24	62027	Korattur
25	62028	Ambattur
26	62029	Madi
27	62030	Korukkupet
28	62031	Tondiarpet Caltex Sdg.
29	62032	Tondiarpet Sdg.
30	62033	Tondiarpet Jerricane Sdg.
31	62034	Tondiarpet Metal Box Sdg.

Sr.No.	Station Code	Name of the Station
32	62036	Tube Products of India Sdg.
33	62037	Madras Central
34	62038	Indian Oil Corpn.Sdg.
35	62039	Guindy Industrial City
36	62040	Tenn Standard Sdg.
37	62041	Koruklupet Terminals
38	62042	Ambattur Industrial Estate City
39	62043	Madras Refineries B.G.Sdg.
40	62044	Madras Fertilizers Ltd.B.G.
41	62045	Gagpal Ambadi Sdg.
42	62047	Tenn Standard Sdg.
43	62048	Burmah Shell Sdg.
44	62049	Caltex Sdg.
45	62050	Madras Beach Junction
46	62052	Madras Park
47	62053	Madras Egmore
48	62057	Tambaram
49	62058	Saidapet
50	62059	Guindy
51	62060	St.Thomas Mount
52	62061	Pinambakkam
53	62062	Pallavaram
54	62063	Chromepet
55	62065	Tambaram
56	62073	-

Sr.No.	Station Code	Name of the Station
57	62100	-
58	62200	Pattabiram East Jn.
59	62201	Pattabiram
60	62202	Pattabiram Military Jn.
61	62203	Avadi
62	62257	Thiruvotriyur
64	62241	Minjur
65	62243	Ponneri
66	62249	Madras Electricity Board
67	62250	-
68	62253	-
69	62274	-
70	62287	-
71	62300	-

Pune — 11238 (Station Code)

1	11239	Talegaon
2	11240	Shelarwadi
3	11241	Shelarwadi Dehu
4	11242	Dehu Road
5	11245	Shelarwadi
6	11250	Dehu Road
7	11251	-
8	11255	Chinchwad

Sr.No.	Station Code	Name of the Station
9	11256	Shivalwad
10	11257	Pisoni
11	11263	Kirkee
12	11264	Kirkee
13	11265	Kirkee
14	11266	Kirkee
15	11267	Kirkee
16	11270	-
17	11271	Pune Junction
18	11272	Ghorpuri
19	11273	Ghorpuri Godown
20	11274	Pune
21	11275	Pune
22	11276	Pune
23	11277	Ghorpuri
24	11278	-
25	11279	-
26	11281	-
27	94156	-
28	94157	Pune
29	94158	Ghorpuri
30	94159	Ghorpuri
31	96146	Ghorpuri
32	96154	Pune Junction
33	96157	-

APPENDIX - IV

BURDEN OF STATIONS BY CLASS IN THE [illegible]

S.No.	Districts Names	Distt. Codes	Total No.of Stations	Total U_1 Stations	Total U_2 Stations	Total U_3 Stations	Total U_4 Stations	Total U_5 Stations	Total U_6 Stations	Total Stations
1	2	3	4	5	6	7	8	9	10	11
Bombay Hinterland										
1	Adilabad	016	17	-	-	4	1	2	-	10
2	Jamnagar	049	36	1	-	-	6	1	-	28
3	Rajkot	050	55	1	3	3	1	5	-	42
4	Surendranagar	051	36	-	1	1	1	2	-	31
5	Bhavnagar	052	51	1	-	4	4	4	-	38
6	Amreli	053	28	-	-	1	4	2	-	21
7	Junagadh	054	44	1	2	1	5	6	-	29
8	Kutch	055	27	-	1	3	2	3	-	18
9	Banaskantha	056	37	-	-	1	1	2	-	33
10	Sabarkantha	057	13	-	-	1	2	1	-	9
11	Mehasana	058	72	-	2	4	5	-	-	60
12	Ahmedabad	059	53	1	-	2	3	1	-	46
13	Kaira	060	51	1	2	4	5	2	-	37
14	Punch Mahals	061	38	-	2	-	3	-	1	32
15	Baroda	062	80	1	-	3	1	2	-	73

1	2	3	4	5	6	7	8	9	10	11
16	Broach	063	41	-	2	2	1	1	-	35
17	Surat	064	62	1	2	1	5	3	2	48
18	Dangs		NO		O B S E R V A T I O N					
19	Mandsaur	097	14	-	1	1	2	1	1	8
20	Ratlam	098	17	1	-	1	-	-	-	15
21	Ujjain	099	29	1	-	1	2	1	-	24
22	Jhabua	100	7	-	-	-	-	-	-	7
23	Dhar	101	2	-	-	1	-	-	-	1
24	Indore	102	15	1	1	-	-	-	-	13
25	Dewas	103	1	-	1	-	-	-	-	-
26	West Nimar	104	3	-	-	-	2	-	-	1
27	East Nimar	105	27	1	1	-	1	-	-	24
28	Shajapur	106	14	-	-	-	2	1	-	11
29	Rajgarh	107	NO		O B S E R V A T I O N					
30	Vidhisha	108	9	-	-	2	-	1	-	6
31	Sehore	109	16	1	-	1	-	-	-	14
32	Raisen	110	6	-	-	-	-	-	-	6

1	2	3	4	5	6	7	8	9	10	11
33	Hoshangabad	111	30	-	-	3	2	3	-	22
34	Betul	112	12	-	-	1	2	-	-	9
35	Sagar	113	22	-	-	1	1	-	-	20
36	Damoh	114	9	-	1	-	-	1	-	7
37	Jubalpur	115	38	1	-	-	2	1	-	34
38	Narsinghapur	116	10	-	-	-	2	-	-	8
39	Chhindwara	118	31	-	1	2	2	1	-	25
40	Seoni	119	14	-	-	1	-	-	-	13
41	Balaghat	120	13	-	-	1	2	1	-	9
42	Greater Bombay	140	1	1	-	-	-	-	-	-
43	Thana	141	28	2	-	-	3	-	1	22
44	Kolaba	142	14	-	-	1	2	2	1	8
45	Ratnagiri	143								
46	Nasik	144	22	1	-	3	1	1	-	16
47	Dhulia	145	18	1	1	2	-	1	-	13
48	Jalgaon	146	35	2	1	2	3	1	-	26
49	Ahmadnagar	147	20	1	-	1	-	-	-	18
50	Poona	148	33	1	-	3	3	-	1	25
51	Satara	149	16	-	1	-	-	-	-	15

1	2	3	4	5	6	7	8	9	10	11
52	Sangli	150	17	1	-	-	-	-	-	16
53	Sholapur	151	43	1	1	1	3	1	-	36
54	Kolhapur	152	11	1	1	-	2	-	-	7
55	Aurangabad	153	16	1	1	-	-	-	-	14
56	Parbhani	154	32	-	1	2	5	-	-	24
57	Bhir	155	6	-	-	1	2	-	-	3
58	Nanded	156	19	1	-	-	1	2	-	15
59	Osmanabad	157	13	-	1	1	2	-	-	9
60	Buldhana	158	9	-	1	3	-	-	-	5
61	Akola	159	31	1	-	4	-	-	-	26
62	Amravati	160	13	1	1	2	1	-	-	8
63	Yeotmal	161	9	-	1	1	2	1	-	3
64	Wardha	162	12	-	1	3	-	1	-	7
65	Nagpur	163	42	1	-	1	5	2	-	33
66	Bhandra	164	27	-	1	2	2	-	-	22
67	Chandrapur	165	22	-	1	1	-	1	-	19
68	Belgam	178	23	1	-	3	4	-	-	14
69	Bijapur	179	21	-	1	3	4	-	-	13

1	2	3	4	5	6	7	8	9	10	11
70	N. Kanara	180	6	-	-	3	-	-	-	3
71	Dharwar	181	39	1	1	2	5	-	-	30
72	Gulburga	182	18	1	-	3	-	-	1	13
73	Bidar	183	8	-	-	-	1	-	-	7
74	Hissar	198	39	-	2	4	1	4	-	28
75	Karnal	201	20	-	2	2	3	1	-	12
76	Bhatinda	213	26	-	2	3	2	2	2	15
77	Gangpur	214	40	-	-	6	2	4	-	28
78	Mahendragarh	216	13	-	-	1	2	1	1	8
79	Ganganagar	217	53	-	2	1	4	1	1	44
80	Bikaner	218	23	1	-	-	-	2	-	20
81	Churu	219	28	-	1	3	1	-	-	23
82	Jhunjhunu	220	13	-	-	2	1	1	-	9
83	Alwar	221	16	1	-	-	2	-	1	12
84	Jaipur	224	50	1	-	2	6	-	-	41
85	Sikar	225	24	-	1	2	2	-	-	19
86	Ajmer	226	25	1	1	2	1	2	-	18
87	Jaisalmer	228	9	-	-	-	2	1	-	6

1	2	3	4	5	6	7	8	9	10	11
88	Jodhpur	229	35	1	-	-	5	-	-	29
89	Nagaur	230	43	-	-	3	5	2	-	33
90	Pali	231	32	-	-	-	-	1	-	31
91	Barmer	232	28	-	-	1	1	-	-	26
92	Jalor	233	14	-	-	-	1	-	-	13
93	Sirohi	234	12	-	-	1	2	1	-	8
94	Bhilwara	235	11	-	1	-	-	2	-	8
95	Udaipur	236	32	1	-	-	1	1	-	29
96	Chitorgarh	237	17	-	-	1	2	3	-	11
97	Durgapur	238	6	-	-	-	2	-	-	4
98	Banswara	239	1	-	-	1	-	-	-	-
99	Bundi	240	8	-	-	1	1	-	-	6
100	Kota	241	23	1	-	1	1	1	1	18
101	Jhalawar	242	5	-	-	1	1	-	-	3
102	Laccadive Miniocy	321		NO	S T A T I O N					
103	Dadar & Nagar Haveli	324		NO	S T A T I O N					
104	Goa	325	15	-	-	1	-	-	-	14
105	Daman	326		NO	S T A T I O N					
106	Diu	327		NO	S T A T I O N					
	Grand Total		2363	41	51	130	174	91	15	1853

1	2	3	4	5	6	7	8	9	10	11
Calcutta Hinterland										
1	Srikkakulam	001	35	-	-	4	3	2	-	26
2	Visakhapatnam	002	28	1	3	-	2	1	-	21
3	East Godavari	003	23	2	-	4	1	1	-	15
4	Goalpara	021	32	-	-	2	1	1	-	28
5	Kamrup	022	26	1	-	-	2	4	1	18
6	Darrang	023	33	1	-	-	2	4	1	25
7	Lakhimpur	024	55	2	-	1	4	3	1	44
8	Nowgong	025	35	-	1	2	1	-	-	31
9	Sibsagar	026	51	-	-	1	2	1	2	45
10	Cachar	027	32	-	1	1	3	-	-	27
11	Garo Hills	028	NO	O B S E R V A T I O N S						
12	United K.J.Hills	029	3	1	-	-	-	-	-	2
13	United K & K.C.Hills	030	25	-	-	-	1	1	-	23
14	Mizo Hills	031	1	-	-	1	-	-	-	-
15	Patna	032	39	2	-	2	2	1	-	32
16	Gaya	033	39	1	-	2	2	1	-	33

1	2	3	4	5	6	7	8	9	10	11
17	Shahabad	034	29	-	1	4	1	-	-	23
18	Saran	035	39	-	-	1	3	1	-	34
19	Champaran	036	43	-	1	2	3	-	1	36
20	Muzaffarpur	037	34	1	-	2	1	-	-	30
21	Darbhanga	038	40	1	-	2	1	-	-	36
22	Monghyr	039	51	1	1	5	2	1	-	41
23	Bhagalpur	040	29	1	-	-	2	2	-	24
24	Saharsa	041	18	-	-	2	1	1	-	14
25	Purnea	042	51	-	2	3	-	2	-	44
26	Santal Parganas	043	25	-	-	[illegible]	2	3	-	17
27	Palamau	044	27	-	-	1	1	1	-	24
28	Hazaribagh	045	30	1	1	5	1	1	-	21
29	Ranchi	046	35	1	-	-	1	2	-	31
30	Dhanbad	047	43	2	-	2	1	-	-	38
31	Singhbhum	048	43	1	-	2	2	4	2	32
32	Rewa	094	2	-	1	-	-	-	-	1
33	Shahdol	095	23	-	-	1	1	2	-	19
34	Sidhi	096								

1	2	3	4	5	6	7	8	9	10	11
35	Mandla	117	7	-	-	1	1	-	-	5
36	Surguja	121	14	-	-	1	1	2	-	10
37	Bilaspur	122	32	1	-	1	3	1	-	26
38	Raigarh	123	8	-	-	1	-	1	-	6
39	Durg	124	16	1	1	-	1	1	-	12
40	Raipur	125	33	1	-	2	1	1	-	28
41	Bastar	126	2	-	-	-	1	-	-	1
42	Kalahandi	185	8	-	-	-	-	3	-	5
43	Koraput	186	11	-	-	2	1	-	-	8
44	Sambalpur	187	17	1	-	1	-	-	-	15
45	Bolangir	188	9	-	-	-	2	-	-	7
46	Band-Khomandal	189	1	-	-	-	1	-	-	-
47	Ganjam	190	17	1	-	1	3	1	-	11
48	Sundergarh	191	18	1	-	2	-	-	-	15
49	Dhenkanal	192	6	-	-	-	1	-	-	5
50	Puri	193	18	1	1	-	1	-	-	15
51	Keonjhar	194	4	-	-	1	-	-	-	3
52	Cuttack	195	19	1	-	1	1	-	-	16

1	2	3	4	5	6	7	8	9	10	11
53	Mayurbhanj	196	15	-	-	1	1	-	-	13
54	Balasore	197	18	-	-	2	-	1	-	15
55	Allahabad	271	38	1	-	1	-	2	-	34
56	Bahraich	282	18	-	1	-	1	-	-	16
57	Gonda	283	27	-	1	1	1	1	-	23
58	Faizabad	285	20	1	-	1	1	1	-	16
59	Sultanpur	286	20	-	-	1	-	-	-	19
60	Pratapgarh	287	16	-	-	-	-	-	-	16
61	Basti	288	15	-	-	1	1	-	-	13
62	Gorakhpur	289	28	1	-	-	-	-	-	27
63	Deoria	290	27	-	-	1	1	1	-	24
64	Azamgarh	291	20	-	-	1	2	2	-	15
65	Jaunpur	292	22	-	1	-	1	1	-	19
66	Ballia	293	17	-	-	1	2	-	-	14
67	Ghazipur	294	23	-	-	1	-	-	-	22
68	Varanasi	295	40	1	-	1	-	3	-	35
69	Mirzapur	296	29	1	-	-	3	3	1	21
70	Darjeeling	297	26	-	1	2	1	-	-	22

1	2	3	4	5	6	7	8	9	10	11
71	Jalpaiguri	298	44	-	1	-	1	2	-	40
72	Cooch Bihar	299	15	-	1	-	1	1	1	11
73	West Dinajpur	300	18	-	1	1	-	1	-	15
74	Malda	301	14	-	1	-	-	-	-	13
75	Murshidabad	302	34	-	-	5	2	2	-	25
76	Nadia	303	30	-	2	1	2	1	1	23
77	24-Parganas	304	55	-	3	2	2	-	-	48
78	Calcutta	305	1	1	-	-	-	-	-	-
79	Howrah	306	11	-	-	2	1	-	-	8
80	Hooghly	307	43	-	-	-	2	1	-	40
81	Burdwan	308	66	3	-	4	3	1	-	55
82	[illegible]	[illegible]	31	-	-	3	2	1	-	25
83	Bankura	310	6	-	1	1	-	-	-	4
84	Midnapur	311	36	1	1	2	2	4	-	26
85	Purulia	312	31	-	1	-	2	-	-	28
86	Andaman & Nicobar	313	NO STATION							
87	Manipur	322	1	1	-	-	-	-	-	-
88	Tripura	323	5	-	-	-	-	-	-	5

1	2	3	4	5	6	7	8	9	10	11
89	Yanam	331			NO STATIONS					
90	Kohima	332	5	-	-	-	1	-	-	4
91	Mokokchung	333			NO STATION					
92	Tuensang	334			NO STATION					
93	Sikkim	335	2	-	-	-	1	-	-	1
	Grand Total		2126	36	30	105	104	79	11	1758
Delhi-Kanpur Hinterland										
1	Anantnag	066	1	-	-	1	-	-	-	-
2	Srinagar	067	1	1	-	-	-	-	-	-
3	Baramulla	068			NO STATIONS					
4	Ladakh	069			NO STATION					
5	Doola	070			NO STATION					
6	Udhampur	071	1	-	-	-	1	-	-	-
7	Jammu	072	7	-	1	-	-	1	-	5
8	Kathua	073	1	-	-	-	1	-	-	-
9	Poonch-Rajouri	074	2	-	-	-	-	-	1	1
10	Morena	084	26	-	-	1	1	-	-	24
11	Bhind	085	7	-	-	1	1	-	-	5
12	Gwalior	086	14	1	-	1	-	-	-	12

1	2	3	4	5	6	7	8	9	10	11
13	Datia	087	5	-	-	1	-	-	-	4
14	Shivpuri	088	5	-	1	-	-	-	-	4
15	Guna	089	9	-	-	1	2	-	-	6
16	Tikamgarh	090	4	-	-	1	-	-	-	3
17	Chhatarpur	091	2	-	-	1	-	-	-	1
18	Panna	092	NO OCCUPATION							
19	Satna	093	8	-	1	-	1	1	-	5
20	Rohtak	199	15	1	1	1	-	1	-	11
21	Gurgaon	200	22	-	1	2	3	3	-	13
22	Ambala	202	20	3	-	1	1	1	-	14
23	Simla	203	19	-	2	-	1	-	3	13
24	Kangra	204	21	-	-	-	1	1	5	14
25	Lahaul & Spiti	205	NO OCCUPATION							
26	Hoshiarpur	206	33	-	1	-	4	2	1	25
27	Jullundhar	207	35	1	-	-	5	3	1	25
28	Ludhiana	208	19	1	-	2	-	1	-	15
29	Ferozpur	209	42	-	3	3	1	1	1	33
30	Amritsar	210	28	1	-	1	2	2	1	21

1	2	3	4	5	6	7	8	9	10	11
31	Gurdaspur	211	16	-	2	1	2	3	-	8
32	Kapurthala	212	9	-	1	1	-	1	-	6
33	Patiala	215	23	1	-	3	3	-	-	16
34	Bharatpur	222	26	-	1	1	2	1	-	21
35	Swai Madhopur	223	16	-	-	4	-	-	-	12
36	Tonk	227	11	-	1	-	2	-	-	8
37	Uttar Kashi	243	1	-	-	-	-	1	-	-
38	Chamoli	244	4	-	-	-	-	2	-	2
39	Pithoragarh	245	3	-	-	-	1	-	-	2
40	Tehri Garwal	246	1	-	-	-	-	1	-	-
41	Garwal	247	6	-	-	-	1	3	-	2
42	Almora	248	3	-	-	1	1	-	1	-
43	Nainital	249	24	-	1	3	1	1	-	18
44	Bijnor	250	25	-	-	5	-	-	-	20
45	Moradabad	251	36	1	3	-	3	-	-	29
46	Budaun	252	12	-	1	1	-	-	-	10
47	Rampur	253	9	1	-	-	-	-	-	8
48	Bareilly	254	22	1	-	2	-	-	-	19

1	2	3	4	5	6	7	8	9	10	11
49	Pilibhit	255	13	-	1	-	2	-	-	10
50	Shahjhanpur	256	17	1	-	1	1	-	-	14
51	Dehra Dun	257	10	1	-	-	2	1	-	6
52	Saharanpur	258	27	1	2	1	1	-	-	22
53	Muzaffarnagar	259	8	1	-	2	-	-	-	5
54	Meerut	260	26	2	1	3	2	1	-	17
55	Bulandshahar	261	14	-	2	-	2	1	-	9
56	Aligarh	262	17	1	1	1	1	2	-	11
57	Mathura	263	17	1	-	1	2	-	-	13
58	Agra	264	24	2	-	-	3	-	-	19
59	Etah	265	22	-	-	2	4	-	-	16
60	Mainpuri	266	10	-	-	2	-	1	-	7
61	Farrukhabad	267	17	1	-	1	1	1	-	13
62	Etawah	268	11	-	1	1	2	-	-	7
63	Kanpur	269	29	1	-	-	-	-	-	28
64	Fatehpur	270	13	-	1	-	2	-	-	10
65	Jhansi	272	27	1	-	2	1	3	-	20
66	Jalaun	273	6	-	-	3	-	-	-	3

1	2	3	4	5	6	7	8	9	10	11
67	Hamirpur	274	20	-	-	2	2	1	-	15
68	Banda	275	13	-	1	-	2	1	1	8
69	Kheri	276	26	-	-	2	-	-	-	24
70	Sitapur	277	22	-	1	-	3	-	-	18
71	Hardoi	278	20	-	-	2	-	1	-	17
72	Unnao	279	19	-	-	1	-	-	-	18
73	Lucknow	280	19	1	-	-	-	1	-	17
74	Rae Bareli	281	19	-	-	1	2	1	-	15
75	Bara Banki	284	19	-	-	2	1	-	-	16
76	Delhi	314	1	1	-	-	-	-	-	-
77	Chamba	315	3	-	-	-	1	1	-	1
78	Mandi	316	6	-	-	2	-	-	1	3
79	Bilaspur	317	1	-	-	-	-	1	-	-
80	Mahasu	318			NO STATION					
81	Sirmur	319	1	-	-	-	1	-	-	-
82	Kinnaur	320			NO STATION					
	Grand Total		1091	28	32	72	79	47	16	817

1	2	3	4	5	6	7	8	9	10	11
Madras Hinterland										
1	West Godavari	004	36	1	1	7	-	-	-	27
2	Krishna	005	28	2	1	2	-	2	-	21
3	Guntur	006	50	2	-	6	5	2	-	35
4	Nellore	007	49	2	2	3	4	1	-	37
5	Chitoor	008	32	-	2	2	2	2	-	24
6	Cuddapah	009	21	-	2	1	-	1	-	17
7	Anantapur	010	37	-	2	6	1	1	-	27
8	Kurnool	011	36	1	2	-	1	3	-	29
9	Mahbubnagar	012	17	-	1	2	1	-	-	13
10	Hyderabad	013	19	1	-	-	2	-	-	16
11	Medak	014	8	-	-	-	1	-	-	7
12	Nizamabad	015	16	1	-	1	3	-	-	11
13	Karimnagar	017	9	-	-	1	1	1	-	6
14	Warangal	018	15	1	-	-	3	-	-	11
15	Khammam	019	20	-	1	-	1	1	-	17
16	Nalgonda	020	4	-	-	1	-	-	-	3
17	Cannanore	075	25	-	2	5	2	2	-	14

1	2	3	4	5	6	7	8	9	10	11
18	Kozhikodo	076	25	1	1	2	2	-	-	19
19	Palghat	077	22	-	1	3	1	-	-	17
20	Trichur	078	15	-	1	3	2	1	-	8
21	Ernakulam	079	10	2	-	2	2	-	-	4
22	Kottayam	080	7	-	1	2	1	-	-	3
23	Allappay	081	7	1	1	2	1	-	-	2
24	Quillon	082	17	1	-	1	2	-	-	13
25	Trivandrum	083	8	1	-	1	-	2	-	4
26	Madras	127	1	1	-	-	-	-	-	-
27	Chinglepot	128	32	1	-	1	2	1	-	27
28	North Arcot	129	45	1	5	4	3	-	-	32
29	South Arcot	130	50	1	3	5	3	-	-	38
30	Salem	131	41	1	-	3	2	1	-	34
31	Coimbatore	132	33	3	3	3	2	-	-	22
32	Nilgiri	133	12	-	2	1	-	-	-	9
33	Madurai	134	35	2	2	2	2	-	-	27
34	Tiruchirappali	135	50	1	2	1	4	2	-	40
35	Thanjavur	136	90	2	2	3	6	4	-	73
36	Ramanathpuram	137	39	-	6	5	2	1	1	24

1	2	3	4	5	6	7	8	9	10	11
37	Tirunoveli	138	44	2	2	5	2	1	-	32
38	Kanya Kumari	139	1	1	-	-	-	-	-	-
39	Banglore	166	41	1	-	3	1	-	-	36
40	Tumkur	167	14	-	1	1	-	2	1	9
41	Chitradurg	168	16	1	1	1	-	2	1	10
42	Kolar	169	15	-	-	3	3	1	-	8
43	Bellary	170	21	1	1	-	1	-	-	18
44	Mysore	171	19	1	-	2	1	1	-	14
45	South Kanara	172	2	1	-	1	-	-	-	-
46	Coorg	173	1	-	-	-	1	-	-	-
47	Hassan	174	8	-	1	1	1	-	-	5
48	Shimoga	175	20	2	-	-	-	-	1	17
49	Chikmagalur	176	9	-	-	2	2	1	-	4
50	Mandya	177	10	-	1	-	3	-	-	6
51	Raichur	184	9	-	1	1	-	1	-	6
52	Pondichery	328	1	1	-	-	-	-	-	-
53	Karaikal	329	2	-	-	1	-	-	-	1
54	Mahe	330	1	-	-	-	-	1	-	-
	Grand Total		1195	41	54	102	79	58	4	877

[illegible]IX – 7(A)

[illegible]

Receiving → / Originating →	Bombay (in qts.)	Bombay Hinterland (in qts.)	Delhi Kanpur (in qts.)	Delhi-Kanpur Hinterland (in qts.)	Calcutta (in qts)	Calcutta Hinterland (in qts.)	Madras (in qts.)	Madras Hinterland (in qts.)
Bombay	299335	30694244	4377058	10325714	1517195	3000647	752161	4508440
Bombay Hinterland	26700834	-	19614769	-	8429625	-	8752380	-
Delhi-Kanpur	1478186	4549084	724238	6299488	792536	1984598	301879	518978
Delhi-Kanpur Hinterland	6064068	-	6810383	-	9634071	-	1821174	-
Calcutta	1386476	5643323	1436023	188~~5~~4066	625673	11438649	883929	1694763
Calcutta Hinterland	18109151	-	34198611	-	69424941	-	4787333	-
Madras	747111	2001864	366984	149194	988266	2359331	641772	17981421
Madras Hinterland	6802470	-	2311744	-	2844402	-	30189469	-

ANNEXURE- V (B)

[illegible] (FOOD PRODUCTS)

Receiving / Originating	Bombay (in qts)	Bombay Hinterland (in qts)	Delhi-Kanpur (in qts)	Delhi-Kanpur Hinterland (in qts)	Calcutta (in qts)	Calcutta Hinterland (in qts)	Madras (in qts)	Madras Hinterland (in qts)
Bombay	3264	6044089	851058	700635	180325	666795	61077	405166
Bombay Hinterland	5391590	-	3972486	-	2541278	-	662525	-
Delhi-Kanpur	561468	864316	4509	80620	542117	1103106	52339	478344
Delhi-Kanpur Hinterland	2918022	-	2815564	-	7936321	-	1250245	-
Calcutta	121977	269588	91137	168461	171950	2136908	42447	37691
Calcutta Hinterland	553192	-	568381	-	3961465	-	129825	-
Madras	236155	911748	25957	21012	473300	374362	298842	2214058
Madras Hinterland	1476916	-	508637	-	1303815	-	764004	-

APPENDIX- V(C)

INTER METROPOLITAN AND METROPOLITAN-HINTERLAND FLOW MATRIX:(TYC MATERIALS FROM PRIMARY SOURCES)

Receiving / Originating	Bombay (in qts)	Bombay Hinterland (in qts)	Delhi-Kanpur (in qts)	Delhi-Kanpur Hinterland (in qts)	Calcutta (in qts)	Calcutta Hinterland (in qts.)	Madras (in qts)	Madras Hinterland (in qts)
Bombay	14201	299634	82252	267530	24347	34208	7199	190116
Bombay Hinterland	4987617	-	1114017	-	2645804	-	433764	-
Delhi-Kanpur	49092	54103	16929	247896	27083	56164	103362	8854
Delhi-Kanpur Hinterland	1089541	-	1571455	-	711645	-	91924	-
Calcutta	59707	93046	41964	117375	130058	253605	84503	30829
Calcutta Hinterland	742932	-	1034388	-	19477371	-	180981	-
Madras	73398	203534	9721	32206	34645	44010	12879	69362
Madras-Hinterland	2082571	-	183276	-	270918	-	23930982	-

APPENDIX - V(D)

INTER METRO-CITIES AND METRO-AREAS-HINTERLANDS FLOW MATRIX (COAL/ROAD)

Receiving / Originating	Bombay (in qts)	Bombay Hinterland (in qts)	Delhi-Kanpur (in qts)	Delhi-Kanpur Hinterland (in qts)	Calcutta (in qts)	Calcutta Hinterland (in qts)	Madras (in qts)	Madras Hinterland (in qts)
Bombay	186827	11643162	1238564	2056579	20425	26893	22536	1362321
Bombay Hinterland	3819980	-	7968884	-	51332	-	6760907	-
Delhi-Kanpur	691	779248	510537	4055447	361	150	66	2168
Delhi-Kanpur Hinterland	7274	-	320195	-	1377	-	707	-
Calcutta	20176	318137	81229	477854	50861	2590242	7719	60141
Calcutta Hinterland	2815864	-	26013040	-	28763328	-	1999198	-
Madras	196583	43865	67921	26702	94225	45211	264020	9103416
Madras Hinterland	1619	-	841	-	3666	-	1024732	-

APPENDIX- V(2)

INTER METROPOLITAN AND HINTERLAND TRADE FLOWS: (EXPORTS INTO AGRICULTURE)

Receiving / Originating	Bombay (in qts)	Bombay Hinterland (in qts)	Delhi-Kanpur (in qts)	Delhi-Kanpur Hinterland (in qts)	Calcutta (in qts)	Calcutta Hinterland (in qts)	Madras (in qts)	Madras Hinterland (in qts)
Bombay	4064	5009648	168998	2924732	7239	490758	15096	952393
Bombay Hinterland	3995004	-	735972	-	423595	-	114135	-
Delhi-Kanpur	167557	1326372	87856	1743489	71964	463376	13734	36040
Delhi-Kanpur Hinterland	454220	-	204064	-	140777	-	4927	-
Calcutta	92401	161389	56248	305282	3098	2415028	13753	26529
Calcutta Hinterland	465361	-	103227	-	664182	-	56644	-
Madras	43928	261082	1939	19267	17049	91065	33137	4250082
Madras Hinterland	787843	-	18163	-	42995	-	381324	-

ANNEXURE- V(F)

INTER METROPOLITAN AND METROPOLITAN-HINTERLAND FREIGHT FLOWS (000 MILLION TONNE KM)

Receiving / Originating	Bombay (in qts)	Bombay Hinterland (in qts)	Delhi-Kanpur (in qts)	Delhi-Kanpur Hinterland (in qts)	Calcutta (in qts)	Calcutta Hinterland (in qts)	Madras (in qts)	Madras Hinterland (in qts)
Bombay	4554	2697543	371112	1813785	210974	777656	19309	135542
Bombay Hinterland	3746848	-	3525484	-	869554	-	59031	-
Delhi-Kanpur	2839	39116	3206	169248	2555	24275	336	4999
Delhi-Kanpur Hinterland	127263	-	1363235	-	287499	-	1632	-
Calcutta	1960	12764	3802	28824	15432	669378	3079	6724
Calcutta Hinterland	1468573	-	447233	-	5287337	-	29210	-
Madras	6139	123684	977	3228	155585	780139	2233	1014946
Madras Hinterland	827874	-	1061684	-	710330	-	3297188	-

APPENDIX- V(C)

INTER METROPOLITAN AND METROPOLITAN-HINTERLAND FLOWS: (INDUSTRIAL PRODUCTS)

Receiving / Originating	Bombay (in qts)	Bombay Hinterland (in qts)	Delhi-Kanpur (in qts)	Delhi-Kanpur Hinterland (in qts)	Calcutta (in qts)	Calcutta Hinterland (in qts)	Madras (in qts)	Madras Hinterland (in qts)
Bombay	28616	2950198	756625	997523	504307	723938	189525	662240
Bombay-Hinterland	1842712	-	926560	-	929952	-	359873	-
Delhi-Kanpur	281465	42679	36186	177584	74591	49812	44634	2513
Delhi-Kanpur Hinterland	1041716	-	177584	-	266883	-	400582	-
Calcutta	848920	1899217	852581	1407629	156919	3804467	567907	1410394
Calcutta Hinterland	4667095	-	5759380	-	9001491	-	2272471	-
Madras	120852	373507	181901	18665	163778	438237	12945	761736
Madras Hinterland	479780	-	350317	-	255901	-	432280	-

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