COMMODITY FLOWS AND THE SPATIAL ORGANIZATION OF THE ECONOMY A CASE STUDY OF PUNJAB

SUBMITTED IN PARTIAL FULFILMENT
OF THE DEGREE OF
MASTER OF PHILOSOPHY

BY
NIRA RAMACHANDRAN

CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
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DECEMBER, 1975

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I certify that the dissertation entitled "Commodity Flows and the Spatial Organization of the Economy - A case study of Punjab"; submitted by Mrs Nira Ramachandran in partial fulfilment of the Degree of Master 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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Contents

	Page
ACKNOWLEDGEMENTS	i
LIST OF TABLES	ii
LIST OF ILLUSTRATIONS	iii
The Problem Posed	1 - 8
CHAPTER I	
Background to the Study Area ..	9 -15
CHAPTER II	
Shippers and Receivers - Spatial Patterns	16-25
CHAPTER III	
Shippers and Receivers - Spatial Relations	26-32
CHAPTER IV	
Shippers and Receivers - Integration of Local, Regional and National Markets.	33-39
CHAPTER V	
Summing Up	40-42
APPENDICES	43-49
BIBLIOGRAPHY	50-53

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LIST OF TABLES

1. Punjab - Population Densities and Urban Population.

2. Distribution of Towns.

3. Distribution of Rural Settlements.

4. Commodity Composition - Intra and Inter-regional Comparisons.

5. Dominant Commodity group of Shippers.

6. Shippers and Receivers - Correlation Matrix.

7. Commodity Grouping.

8. Shipments and Receipts of Commodities.

9. Classification of Shippers.

LIST OF ILLUSTRATIONS

1. Railway Network
2. Shipment of Commodities - Total
3. Shipment of Commodities - Group I
4. Shipment of Commodities - Group II
5. Shipment of Commodities - Group III
6. Shipment of Commodities - Group IV
7. Shipment of Commodities - Group VI
8. Shipment of Commodities - Group VII
9. Shipment of Commodities - Group IX
10. Receipts of Commodities - Total
11. Receipts of Commodities - Group I
12. Receipts of Commodities - Group II
13. Receipts of Commodities - Group III
14. Receipts of Commodities - Group IV
15. Receipts of Commodities - Group VI
16. Receipts of Commodities - Group VII
17. Receipts of Commodities - Group IX
18. Commodity Flows - Group I
19. Commodity Flows - Group II
20. Commodity Flows - Group III
21. Commodity Flows - Group IV
22. Commodity Flows - Group VI
23. Commodity Flows - Group IX
24. Hierarchy of Local, Regional and National Centre
25. Local, Regional and National Components of Shipments.

The Problem Posed

Any economy can be studied in two ways - in terms of sectoral distribution and the association between the sectors, and in terms of spatial distribution and spatial association. However, these two aspects of the economy are not mutually exclusive, but are reciprocally related. Whereas the former has been the object of intensive study, of scholars both in India and abroad, in terms of input-output analysis, the latter has received little attention if not been altogether ignored.

The concept of economic regions presupposes, the organization of the national economy in space.[1] This spatial organization of the economy takes place around a system of nodes where the economic activities of national, regional and local importance occur in agglomeration. It is therefore possible to view the economy of a nation in terms of regional sub-systems which exchange ideas, people and commodities with each other in the process of economic interaction. Since the economic system is composed of settlements, an economy can by viewed as a system of settlements which are linked with each other by the exchange of commodities. The settlements can be of local, regional or national importance, or a combination of these.

Although an understanding of the basic characteristics of spatial exchange of commodities in an economy is recognised as fundamental in understanding the economy itself, it has received only scant attention from scholars. However, a few significant studies of commodity flows and structure of economy do exist.

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1. Bhatt L.S. and R.G. Gidadhubli, Economic Regions and Regional Flows, Economic and Socio-Cultural Dimensions of Regionalisation, Census of India, 1971.

In the United States, the work of Ullman[2] on American commodity flows is a significant one. In his study, Ullman has tried to focus attention on commodity traffic by rail and water 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, and has identified the gross features of these linkages, that hold the United States economy together, in terms of a series of inter-state commodity flow maps. Duncan[3] and his associates describe the United States 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 alone.

In Germany, significant studies regarding transportation are contained in the "Raum and Verkher Series". In the first volume prepared by W. Linden, the author examines the role of railroads in the economic development of Germany. The second volume is concerned with the movement of commodities, while the third volume of the series contains five essays dealing with the relationships between economy, circulation and transportation.[4]

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2. Ullman G.L., American Commodity Flow, University of Washington Press, 1957.

3. Duncan O.P., et.al., Metropolis and the Region, Johns Hopkins Press, 1960.

4. 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.

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 - Probst,[5] Alampaev,[6] Bedenkova,[7] and Kistanov.[8]

Berry,[9] in his study of Indian commodity flows stops short at bringing out the dominance of the four metropolitan centres - Bombay, Calcutta, Madras and Delhi in the organization of the space economy. While this obvious fact is beyond dispute, the serious lacuna in the study is that the emerging sub-nodes in the post-independent economy, which are increasingly becoming suppliers of basic manufactured and engineering goods, and which have developed well-defined hinterlands over a period of about three decades of independence, have not been brought out. This has resulted because the data used by Berry pertains to Trade Blocks which are too large a unit area for any meaningful spatial analysis.

Purpose of the Present Study

The survey of literature outlined above brings out the paucity of research in the field of commodity flows and spatial organization in general, and of the Indian economy in particular.

5. Probst A.E., Location of industry under Socialism (Theoretical Essays). EKONOMIZ AT, Moscow, 1962.

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

7. Bedenkova M.S., Rational Transport - Economic Link in the process of development of territorial devision of labour in USSR, Locations of Productive Forces and Development of Economic Regions, Moscow, 1964.

8. Kistanov V.V., Complex Development and Specialization of the Economies of Economic Regions, Ekonomika, Moscow, 1965.

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

The present study is intended to partly fill in this gap in the understanding of our economy. This is an attempt to answer some of the following questions which have long remained neglected. What is the pattern of spatial interaction in the Indian economy? What is the relationship between the local, regional and national market? Is it possible to delimit the local and regional interaction fields of nodes in the Indian economic system? Is there a hierarchy of these nodes?

The study would attempt to analyse the origin, destination and linear flow patterns of commodity movement. It would also bring out the nature of commodity exchange between rural and urban centres. Having formed the above base, an attempt will be made to identify the nodes which organise the economy, their nature and effective radii of influence. The scheme, thus evolved, will bring out functional hierarchies in the economy.

Theoretical Base

From the nature of the study outlined above, it is clear that we would be dealing with commodity flow matrices of large dimensions. It would be futile to wade through so enormous a body of flow data without tentative answers to some of the questions which are being raised in this study. We may test the following hypothetical statements while answering the questions raised earlier.

1. The interaction among the higher order nodes is stronger than that between lower and higher order centres.
2. Specific interaction fields of nodes exist which may be delineated by the magnitude, nature and linear of commodity movement.

3. The hierarchy of these nodes is distorted.

Data Base and Associated Problems

The purpose of the study and the theoretical base outlined in the previous sections warrant data pertaining to the flow of individual commodities, through all modes of transportation, between the settlements that constitute the entire economic system. Although in practice, there are several modes of transportation, roads and railways are by far the most significant under Indian conditions, as also in many of the developed countries. Of the two modes, the data required is available only for the railways. Thus the analysis in this study utilizes only railway data, though not by choice. In spite of the data base which has been built up by the Indian Railways, it is disheartening to note that it has yet remained unutilized for spatial analysis.

The present study will utilize the commodity flow data recorded by the Ministry of Railways which gives the origin and destination of commodities together with their quantity moved annually. The data pertains to the year 1973-74 during which period the railways carried, at national level, 75% of all commodities moved in India by all modes of transportation.

Area of Study

While it is realized that the study outlined above would be more meaningful in the context of the national economic system, which may be considered a closed system to a greater extent than any one part of it, the constraints posed by time and expense

limit the study area. The choice of the study area - Punjab - is not, however, incidental, but has been based on the following considerations. Firstly, the area is economically developed so that proper spatial integration is likely to have taken place. Following this, the chances of recovering from the vestiges of distorted nodal hierarchy of the colonial period are greater. Thirdly, the area has diverse production exchange possibilities, being developed in several sectors of the economy, such as agriculture, agro-based industries, engineering industries, textiles, etc. Fourthly, geographically speaking, the area presents a more or less homogenous unit.

Techniques of Analysis

Even with a restricted area of study which locates about three hundred observations (railway stations), it would be difficult to handle a data matrix of the required dimensions. The problem, however, assumes even greater dimensions when the study is undertaken at individual commodity level. Thus a further constraint, either on the number of stations or the number of commodities, is to be posed to answer the questions raised above within the given time and resource. The number of observations, which is already curtailed, is not further restricted in the study. Commodities, however, which number over four hundred are grouped, as far as possible within nine homogenous categories.

The nine categories of commodities are as follows:

Group No.	Commodity items under Group
1.	Food products - raw, semi-processed and processed.

2. Raw materials for manufacturing - of agricultural (and associated) origin.

3. Raw materials for manufacturing - minerals and semi-processed goods.

4. Inputs into agriculture.

5. Industrial feuls.

6. Manufactured consumer goods.

7. Construction materials.

8. Livestock.

9. Defence.

The individual commodities grouped under the above nine categories are listed at the end of the study (Appendix I).

The spatial distribution of the shippers and receivers of the above groups of commodities are presented on maps with located proportional circles. These reveal the importance of different centres with reference to the given commodity group. Furthermore, inter-commodity comparison is also made possible.

The interaction between the shippers and receivers is given in its spatial dimension by converting interaction matrics into flow maps. For obvious reasons, the flows do not follow the railway network, but are represented as linear/curvi-linear flows.

The behaviour of centres with reference to their capacities as shippers or receivers is brought out with the help of coefficients of correlation. These would indicate commodity combinations in the flow.

Finally, a numerical taxanomy has been putforward using regional norms and standard deviations from them to classify shippers and receivers as Local, Regional or National. The spatial

arrangements of these would establish the spatial hierarchies if any.

Organization of the Study

The study is arranged in five chapters. The first chapter stresses the areal homogeneity of the study area in terms of its geography and economy. It also deals with a brief history and the structure of the railway development in the area.

Chapter two brings out the spatial patterns of the two basic components of flows - shippers and receivers. It is supported by a series of maps adding spatial dimension to the problem.

In chapter three, the commodity combinations are exposed along with patterns of spatial interaction supported by a series of flow maps and matrices.

The fourth chapter attempts to identify nodes of local, regional and national importance, and to bring out their spatial ordering.

The closing chapter summarizes the text and conclusions arrived at in the earlier chapters which are brought out in relation to each other.

This is followed by appendices, and bibliography. Maps and illustrations are given wherever referred to; small tables directly relevant to the study are given with the text while the lengthy tables are included in the appendices.

Chapter I

Background to the Study Area

Homogeneity is the keyward of the region. The monotony of the plains with the accompanying climatic regime forms the base for uniformity of all other spatial characteristics. Directly emerging from this environmental homogeneity is the uniformity in the distribution of human habitats and economic activities. While a rigorous regional scheme may indicate sub-divisions of the state, as far example, the Himalayan foothill belt in the North East, the fertile interfluves of Central Punjab, and the semi-arid trackt of the South and West, none the less, at higher levels of generalization, the state may be taken as a homogenous region, more so, with the vivid contrast of the rugged, sparsely populated states of Jammu and Kashmir and Himachal Pradesh in the North, and the arid and semi-arid States of Rajasthan and Haryana in the South.

In the study of commodity flows, the barrier effect of political boundaries and restrictions on inter-state movements necessitate the selection of an independent administrative unit - the geographical necessity, in this case, is however, satisfied by the striking homogeneity in the environmental, economic, and socio-cultural characteristics of the region. It would not be out of place, therefore, to discuss briefly the spatial attributes of the region.

Natural Environment

From the physiographic point of view, the area presents a monotonous alluvial plain gradually merging with the Himalayan foothills in the North and an undulating arid expanse in the South. The

relief ranges from 220m to 300m with a gentle slope from North to South. Although numerous streams traverse the region, the agrarian economy owes much of its prosperity to the Sutlej and the Beas.

Variations in climatic conditions within the region are minimal, the climate being termed as the semi-arid monsoon type. It is characterized by extremes of temperature and deficiency of rainfall, together with a high rate of evaparation. While the greater part of the annual rainfall occurs in summer, a significant proportion is recorded during the winter season.

The fertile alluviam together with a well developed irrigation system has brought a very high proportion of land under plough. (78%) Consequently, only 3.4% of the area is under natural plant cover. Even this small proportion is confined to pockets in the districts of Hoshiarpur and Gurdaspur. In terms of quality, the natural vegetation is of low economic significance consisting largely of semi-arid bushes and plants.

Mineral resources in the region are at best nominal. Low value minerals such as slate, rocksalt and gypsum occur in small quantities.

Population and Settlement

Closely following the dictates of the natural environment, internal variations in the distribution of population are insignificant. The average density is about 250 per sq. km. (Table 1.1).

Table I.1

States/Districts	Total population	Density of population (per km.)	% Urban population
1. Punjab	13,551,060	269	24
2. Gurdaspur	1,229,249	345	20
3. Amritsar	1,835,500	361	29
4. Firozpur	1,905,833	188	20
5. Ludhiana	1,419,421	368	35
6. Jullundur	1,454,501	428	30
7. Kapurthala	429,514	263	23
8. Hoshiarpur	1,052,153	271	12
9. Ropar	545,005	261	15
10. Patiala	1,215,100	265	26
11. Sangrur	1,146,650	224	20
12. Bhatinda	1,318,134	188	20

Source: Compiled from Census of India (1971) Final Population Table.

As seen from the table, barring the extremes of 188 (Bhatinda) and 428 (Jullundur), the average density of 250 is representative of a more or less uniform destribution of population densities. Similarly, the proportion of urban population indicates little intra regional differences, excluding comparatively low proportions in Hoshiarpur and Ropar. The mean proportion of urban population is about 21%.

The urban population is distributed over 108 urban centres of varying sizes dispersed evenly over the region. (Table I.2). Whereas the distribution of towns is more or less uniform, variations in the size of the towns are noticeable. From the table it is clear that larger urban centres have significant impact on the location of smaller towns, eg. the districts which recorded Class I towns do not record any Class II towns. Thus there is in Punjab, an

evident urban primacy. Smaller towns, however, are equitably distribution over the region.

Table II.2

Distribution of Towns

S.No.	State/ Districts	Total	I	II	III	IV	V	VI
1.	Punjab	108	4	8	24	32	30	10
2.	Gurdaspur	10	0	2	1	3	3	1
3.	Amritsar	9	1	0	3	2	2	1
4.	Firozpur	14	0	3	3	3	4	1
5.	Ludhiana	6	1	0	2	1	2	0
6.	Jullundur	12	1	0	1	5	4	1
7.	Kapurthala	3	0	1	1	0	1	0
8.	Hoshiarpur	9	0	1	1	3	2	2
9.	Ropar	7	0	0	1	2	4	0
10.	Patiala	12	1	0	3	4	3	1
11.	Sangrur	12	0	0	4	5	3	0
12.	Bhatinda	14	0	1	4	4	2	3

Source: Compiled from Census of India (1971), Final Population Table.

The rural settlements, which are rooted in physiographic and climatic conditions, present a uniform pattern of distribution following the homogeneity of the environment. A study of table I.3. brings out the predominance of middle-size villages (population - 500 to 1000).

Table I.3

Distribution of Rural Settlements

Percentage of villages

S. No.	State/ District	Total	below 200	200-500	500-1000	1000-2000	2000-5000	5000-10000	above 10000
1.	Punjab	12188	15.5	27.0	29.0	19.6	8.0	0.0	0.0
2.	Gurdaspur	1526	17.5	35.0	30.0	13.0	0.0	0.0	0.0
3.	Amritsar	1181	12.0	18.0	31.0	25.0	12.0	0.0	0.0
4.	Firozpur	1483	15.0	21.0	27.0	23.0	12.0	0.0	0.0
5.	Ludhiana	969	13.0	22.0	29.0	24.0	1.0	0.0	0.0
6.	Jullundur	1209	15.0	24.0	31.0	23.0	1.0	0.0	0.0
7.	Kapurthala	556	28.0	30.0	23.0	14.0	4.0	0.0	0.0
8.	Hoshiarpur	1582	22.0	36.0	27.0	11.0	3.0	0.0	0.0
9.	Ropar	855	22.0	29.0	27.0	10.0	2.0	0.0	0.0
10.	Patiala	1434	13.0	32.0	34.0	14.0	2.0	0.0	0.0
11.	Sangrur	709	6.0	13.0	32.0	31.0	17.0	1.0	0.0
12.	Bhatinda	684	3.0	7.0	26.0	40.0	22.0	2.0	0.0

Source: Compiled from Census of India (1971), Final Population Table.

The Economy

The region is almost entirely agriculture based. In terms of area under cultivation, type of farming, crops produced, etc., there is a striking unformity within. About 76% of the area is sown under a variety of crops - Kharif - bajra, maize, jowar, cotton and sugarcane and Rabi - wheat, gram, barley and mustard. A preponderance of food over non-food crops is to be noticed throughout the region. However, over time, an increasing proportion of area under non-food crops can be noticed. In 1950-51, the area under food grain cultivation was 78% (of the total cultivated area), whereas in 1965-66, the food crop came down to 68%. This change has been accompanied by an increase in the area under production of sugar-cane and cotton.

Throughout, wheat acreage dominates although combinations of crops differ within the region. Three, crop-combination zones may be distinguished - wheat, rice, gram and maize in the North, wheat, gram, cotton and maize in Central Punjab, and wheat, cotton and bajra in the South.

As seen earlier, the mineral resources of the region are almost non-existant. On the face of this, it is not surprising that the development of heavy industries is absent. Industrial activity is in general poor throughout the region being represented by only small scale industries which are of fairly recent origin. However, a variety of industrial products are manufactured. Although manufacturing activities are clustered around major urban centres, the clusters are evenly distributed over space. Much of the industrial production is accounted for by textiles and light engineering which together account for 55% of the workers in manufacturing. The rest is distributed among sports goods, hoisery, agro-based industries and agricultural implements.

In short, the economy of the area is represented by a well developed agricultural sector which leads the country in the production of wheat, contributing 20% of cotton production and a significant proportion of sugarcane, gram and jowar, together with a dynamic industrial sector.

The Rail Net

Physical homogeneity, together with a uniform distribution of population, settlement and economic activities is conducive to a well developed transport network. Although the entire rail network in Punjab evolved before independence, the centrifugal forces

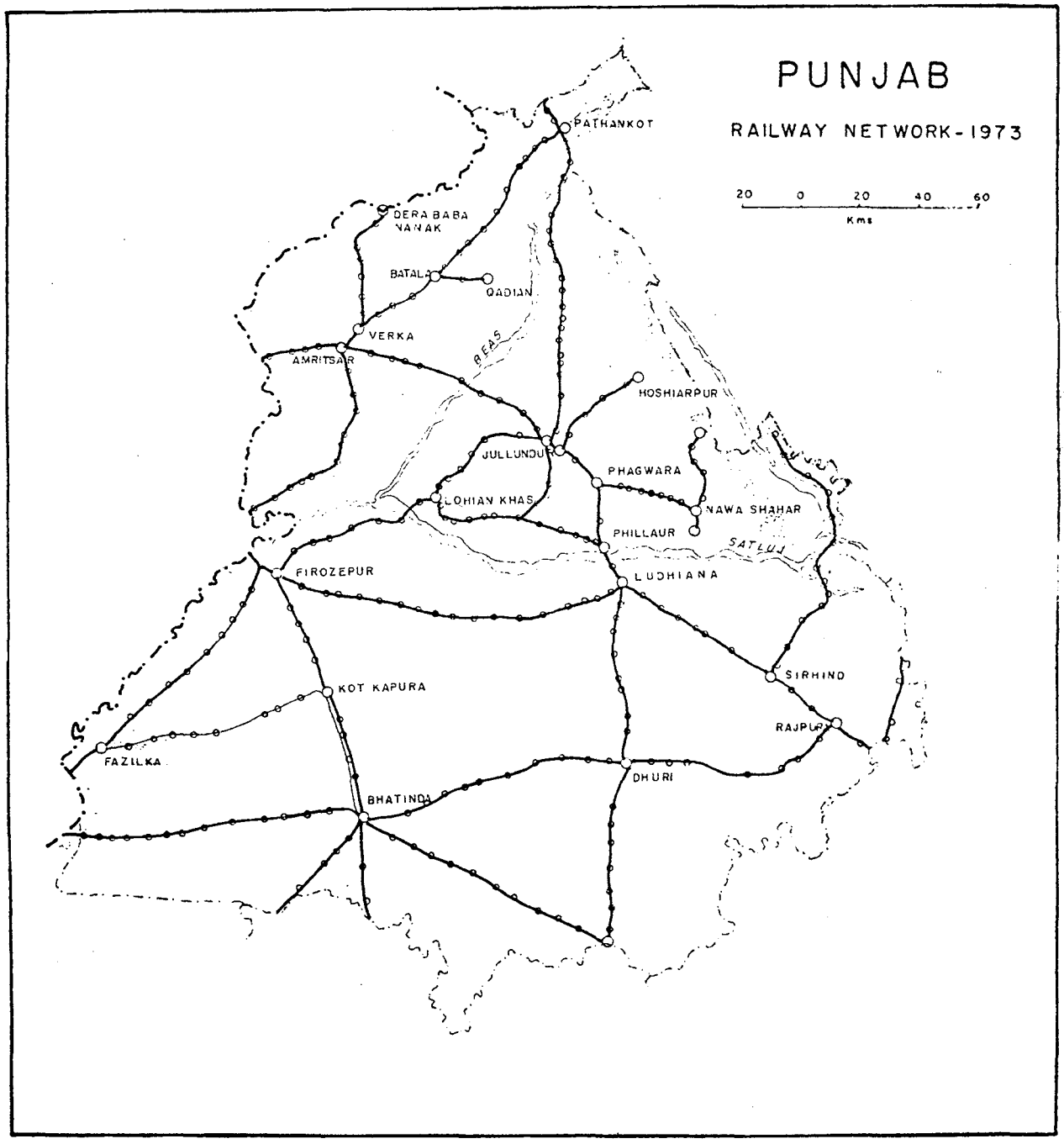
PUNJAB
RAILWAY NETWORK-1973
20 0 20 40 60
Kms
PATHANKOT
DERA BABA NANAK
BATALA
QADIAN
VERKA
AMRITSAR
BEAS
HOSHIARPUR
JULLUNDUR
PHAGWARA
LOHIAN KHAS
NAWA SHAHAR
PHILLAUR
SATLUJ
FIROZEPUR
LUDHIANA
KOT KAPURA
SIRHIND
RAJPURA
FAZILKA
DHURI
BHATINDA

FIG 11

operating during the colonial period had little impact on the development of the rail net. (the region being remote from the ports).

About 100 km. of railway track was laid after independence distributed over three sections. Of the three, the Mukerian-Pathankot (41 km.) and the Pathankot-Madhopur lines (12km.) were constructed to open up the Northern frontiers. While Ropar-Nangal line (56 km.) was geared to serve the Nangal fertilizer complex.

Perhaps a more significant feature of the railway development in this region is the near absence of multi-gauge problems. Except for a line connecting Bhatinda with Fazilka in the South West (metre-gauge), the rest of the railway tracks are in the broad gauge. Consequently, the interaction possibilities between the South Western parts of Punjab and the rest of the system is weak.

The network thus evolved connects about three hundred out of over ten thousand settlements. The sprawe of the rail net extends over the entire region in a radial pattern with a large number of junctions.

The brief outline of areal characteristics discussed above stresses the essential homogeneity in all aspects within the state. For all practical purposes, therefore, the study area can be taken as a homogenous region, not only from the physiographic point of view but also with reference to the social, linguistic and religious composition.

- -

Chapter II

Shippers and Receivers - Spatial Patterns

The fundamental components of movement are generators and absorbers of a given item. As an economy develops over time, the similarities in production profile of generators of movement tend to become obliterated and the similarities in consumption pattern of receivers increase. Consequently, fewer generators and a larger number of absorbers of a given commodity in an economy would indicate production specialization and development in general. Therefore, one of the more important lines of inquiry is to look at the spatial arrangements of the generators of goods/services and the receivers.

Although, intra-regional flows are of main concern in the present study, flows through railways being essentially characterized by long distance haulage of goods, it is necessary to consider the inter-action patterns of the region with the rest of the national system, at least as a preliminary. Again, the data constraints restrict the study to an analysis of only flows originating in the region and terminating elsewhere, and do not permit analysis of goods originating elsewhere and terminating within the region. Consequently, intra-regional flows are dealt with in greater detail with the help of a series of maps which bring out the spatial dimensions of shippers and receivers of commodities.

Commodity Composition - intra/inter-regional comparisons

Punjab shipped over 42.3 million quintals of a range of over

two hundred commodities in 1973-74. The commodity composition, in terms of the nine commodity groups outlined earlier, are tabulated in Table II.1.

Table II.1.

Commodity Composition - intra/inter-regional flows

Commodity group	Intra-regional		Commodities terminating without		Total origin in the region	
	Qt. in Qntls.	% to total	Qt. in Qntls.	% to total	Qt. in Qntls.	% to total
I	603788	37.521	37038925	87.560	37642713	88.990
II	75598	4.698	1097626	2.595	1173224	2.770
III	238241	14.805	514413	1.216	752654	1.780
IV	227793	14.156	625525	1.479	853318	2.020
V	2781	0.173	3682	0.009	6463	0.015
VI	41242	2.563	291386	0.689	332628	0.786
VII	24249	1.507	327995	0.775	352244	0.833
VIII	163	0.010	165399	0.391	165562	0.391
IX	395348	24.568	627290	1.483	1022638	2.417
Total:	1609202	100	40692133	96.196	423031335	100

A scrutiny of table II.1 brings out the following features:

1. The region has a large export base as only 3.8% of the total flows terminate within.

2. The export base is overwhelmingly composed of food products. (87%).

3. The entire range of commodities is pre-dominantly export oriented. As can be seen from the table, no where does the proportion of commodities terminating within the region exceed that of commodities terminating without.

4. Marked variations are noticed in the commodity composition of entra-regional and inter-regional flows. A comparison of

column 3 and column 5 brings out the fact that with the exception of proportions of food products which score high values in both columns, none of the others are comparable. Also, in the closed system, food products occupy only 37% as against 87% in the open system.

The first three points mentioned above are further strengthened by the fact that only about twenty out of a hundred and twenty four generators of commodities in Punjab record more than 40% of their flows within the region. Except for one station - Pathankot - the others contribute less than 0.2% of the total generation of commodities from the region (Appendix II).

The fourth statement made above is further testified by the fact that more than seventy out of the total generators of commodities in Punjab are dominated by commodities other than food products as can be seen from table II.2.

Table II.2.

Dominant Commodity group of shippers

First ranking commodity group	Frequency of shippers
1	49
2	13
3	11
4	24
5	0
6	0
7	6
8	0
9	14

Table II.2. also brings out a consistent feature, i.e., twenty four generators dominate as sources of inputs into agriculture.

It is also clear that industrial feuls, consumer goods, and livestock are not dominant commodities of any shipper. At least fourteen shippers indicate dominance of defence commodities which is in line with the locational aspects of the region. Whereas inter-regional flows of raw materials for manufacturing (minerals and semi-processed goods) are insignificant, a few shippers show a dominance of this commodity group at intra-regional level, thus indicating the process of industrialization at regional and sub-regional levels.

Spatial Pattern of Shippers

Although intra-regional flows account for less than 4% of the total commodities generated from Punjab, they constitute a considerable amount (1.6 million quintals). The total commodity generated from the region (including intra and inter-regional flows) is mapped in Fig. 2.1.).

The figure projects a pattern of generators of commodities which covers, more or less evenly, the entire space. However, the dominant shippers are located in Central Punjab, particularly along a central axis of rail network connecting Amritsar to Delhi.

As indicated by Fig. 2.1., Moga emerges as the most dominant shipper which accounts for over 6% of all commodities generated by Punjab. However, almost 99% of all the flows generated by this centre terminate outside the region. The remaining (less than 2%) is contained within the region with the dominant commodity group being defence.

In the next category, six centres emerge, each accounting for 3 to 6% of the commodities generated in the region. These centres

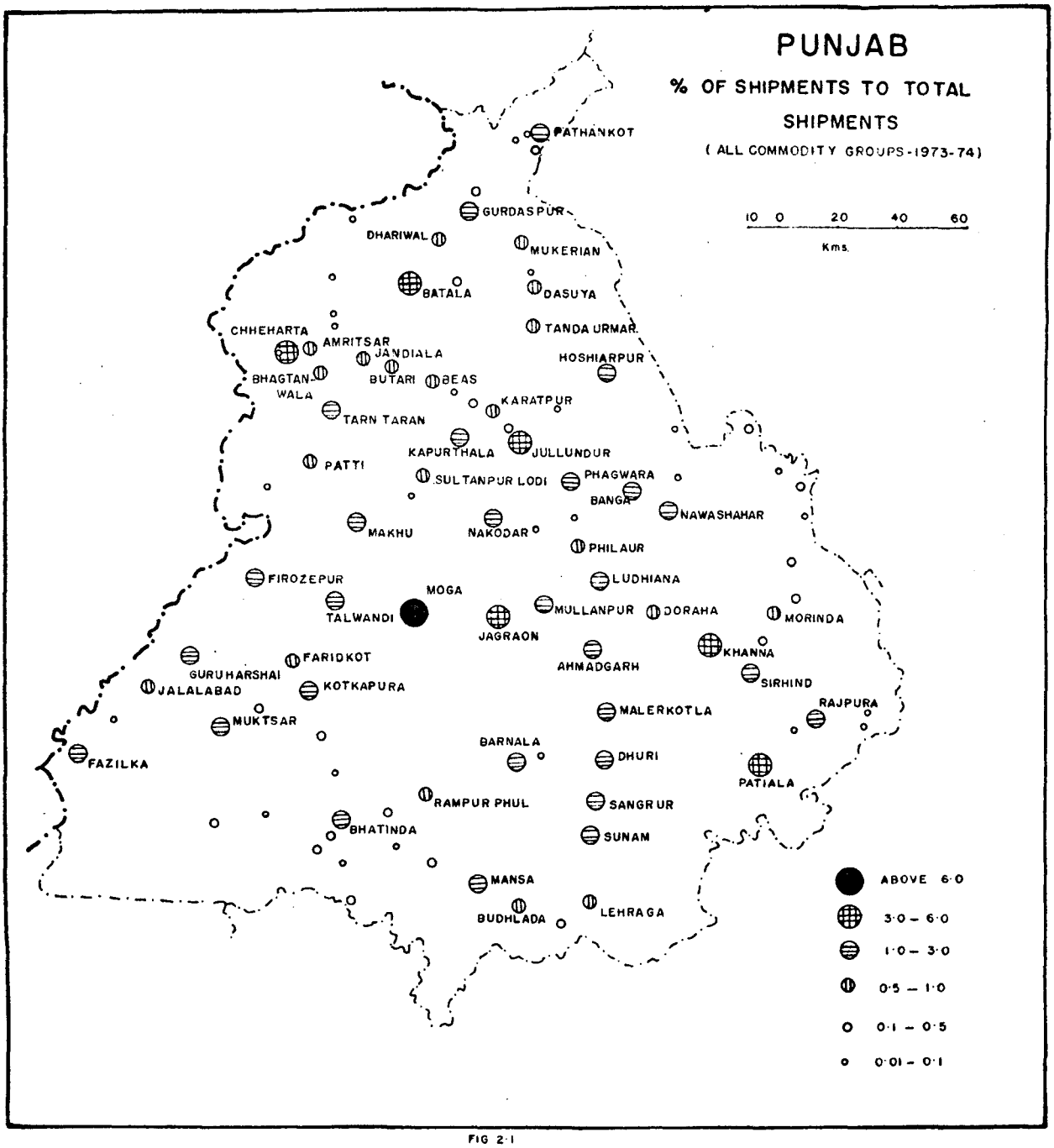
PUNJAB
% OF SHIPMENTS TO TOTAL SHIPMENTS
(ALL COMMODITY GROUPS-1973-74)
10 0 20 40 60
Kms.
PATHANKOT
GURDASPUR
DHARIWAL
MUKERIAN
BATALA
DASUYA
CHHEHARTA
AMRITSAR
JANDIALA
TANDA URMAR
HOSHIARPUR
BHAGTAN-WALA
BUTARI
BEAS
KARATPUR
TARN TARAN
KAPURTHALA
JULLUNDUR
PATTI
SULTANPUR LODI
PHAGWARA
BANGA
NAWASHAHAR
MAKHU
NAKODAR
PHILAUR
FIROZEPUR
MOGA
LUDHIANA
TALWANDI
MULLANPUR
DORAHA
MORINDA
JAGRAON
KHANNA
FARIDKOT
AHMADGARH
GURUHARSHAI
SIRHIND
JALALABAD
KOTKAPURA
RAJPURA
MALERKOTLA
MUKTSAR
BARNALA
FAZILKA
DHURI
PATIALA
RAMPUR PHUL
SANGRUR
BHATINDA
SUNAM
MANSA
BUDHLADA
LEHRAGA
ABOVE 6·0
3·0 – 6·0
1·0 – 3·0
0·5 – 1·0
0·1 – 0·5
0·01 – 0·1

FIG 2·1

are Patiala, Khanna, Jagraon, Jullundur, Cheharta and Batala. The composition of commodities of these six centres are not similar. Whereas Patiala, Batala and Jagraon dominate food product generation, Jullundur and Chhecharta dominate in defence goods, and Khanna in inputs into agriculture.

The overall pattern, as can be seen from the figure (2.1), brings out three basic features:

1. Urban dominance in generation is obvious.
2. Shadow effect of large urban centres is absent.
3. Network connectivity is unrelated with magnitude of generation.

The shippers of food products are shown in Fig. 2.2. which again brings out a spatial spread comparable to that of the originators as a whole. However, the number of shippers are much fewer. The dominant shippers of food products are about ten in number and these centres form a cluster in Northern Punjab (Batala, Dhariwal, Gurdaspur, Dasuya and Tanda Urmar). The remaining dominant centres are located in Central Punjab in a more even spread (Firozpur, Kapurthala, Nawashahr, Jagraon and Dhuri). We must, however, note that intra-regional flows of food products constitute only a third of all commodities shipped within the region.

The spatial pattern presented by the distribution of shippers of raw materials for manufacturing - of agricultural and associated origin (Fig. 2.3) is unlike the patterns brought out earlier. The South Western part of the region emerges in a cluster as the most dominant shipper of this commodity group. However, one departure from this pattern is represented by Ludhiana which is a dominant shipper outside this cluster. Obviously, the production of this

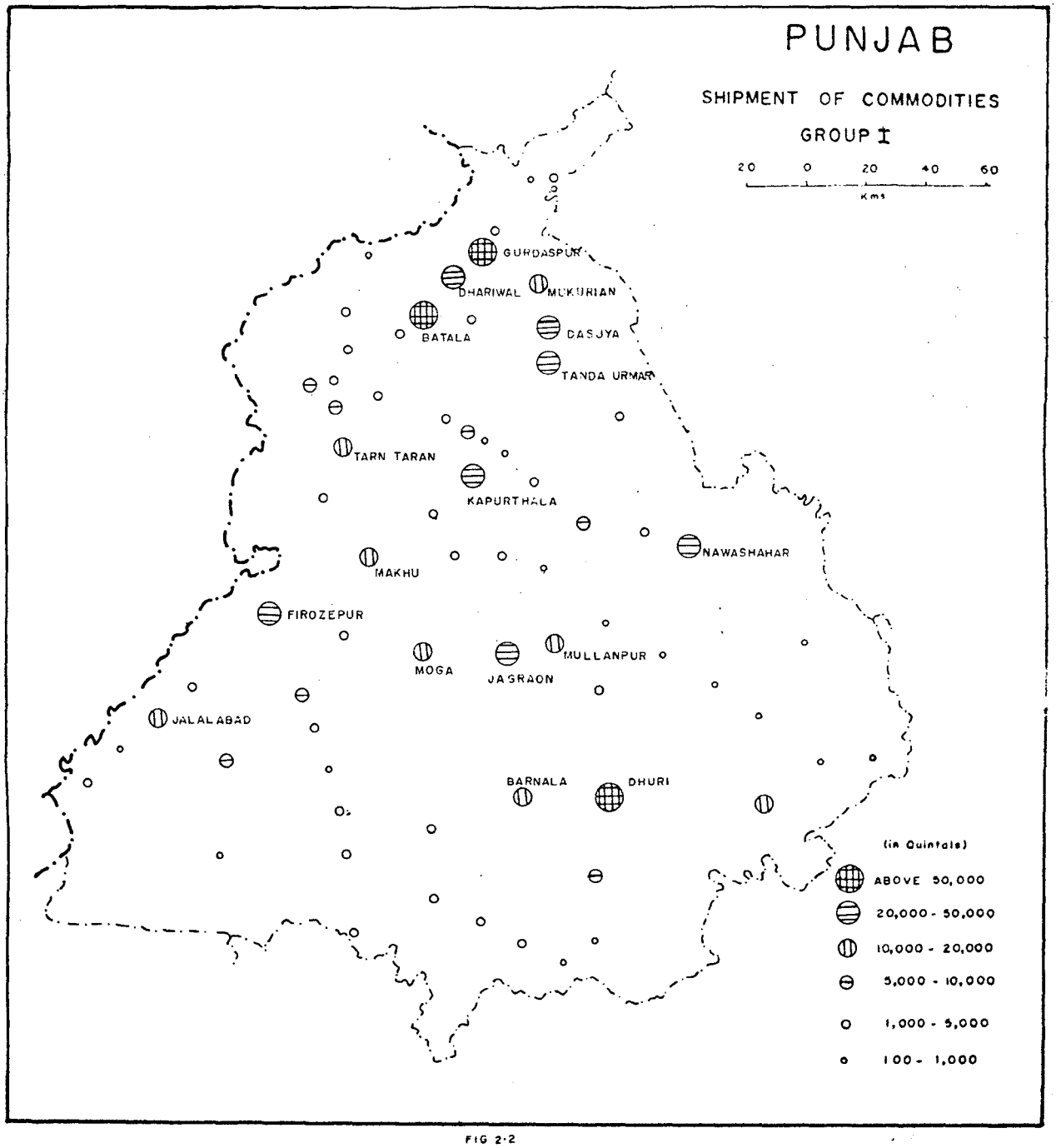
PUNJAB
SHIPMENT OF COMMODITIES
GROUP I
20 0 20 40 60
Kms
GURDASPUR
DHARIWAL
MUKURIAN
BATALA
DASUYA
TANDA URMAR
TARN TARAN
KAPURTHALA
NAWASHAHAR
MAKHU
FIROZEPUR
MOGA
JAGRAON
MULLANPUR
JALALABAD
BARNALA
DHURI
(in Quintals)
ABOVE 50,000
20,000 - 50,000
10,000 - 20,000
5,000 - 10,000
1,000 - 5,000
100 - 1,000

FIG 2·2

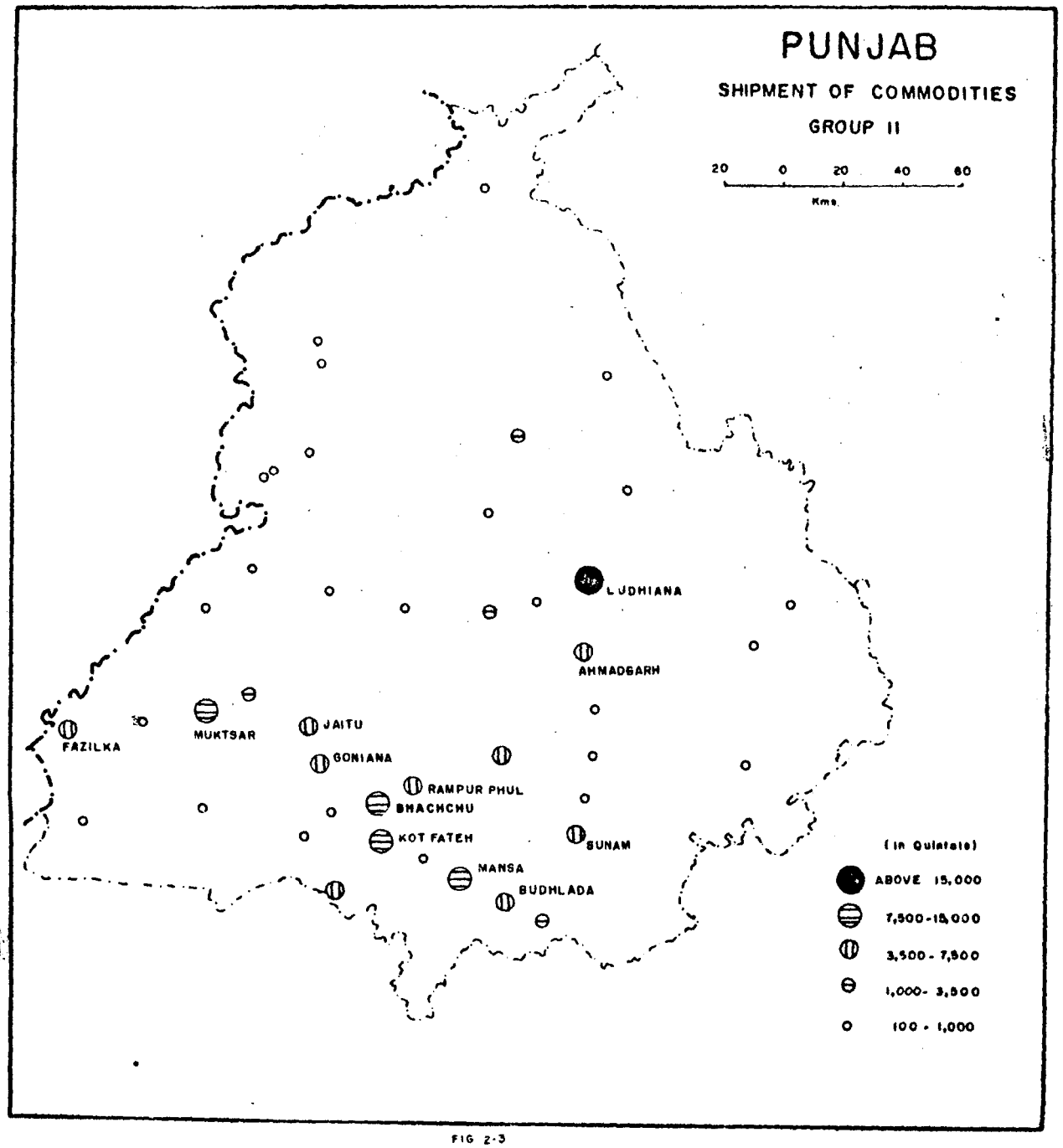
PUNJAB
SHIPMENT OF COMMODITIES
GROUP II
20 0 20 40 60
Kms.
LUDHIANA
AHMADGARH
FAZILKA
MUKTSAR
JAITU
GONIANA
RAMPUR PHUL
BHACHCHU
KOT FATEH
SUNAM
MANSA
BUDHLADA
(in Quintals)
ABOVE 15,000
7,500-15,000
3,500 - 7,500
1,000- 3,500
100 - 1,000

FIG 2-3

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commodity is not centred in Ludhiana or, for that matter, in Fazilka, Muktsar, Bhuchchu or Kot Fateh. However, they must be acting as collection and distribution centres. None the less, regional concentration is clearly brought out. This is further strengthened by the fact that very few centres generate this group of commodities.

The fourth group of commodities is represented by raw materials for manufacturing - minerals and semi-processed goods (Fig. 2.4). From the earlier chapters it is clear that mineral production in Punjab is only nominal. Consequently, semi-processed goods are the dominant commodity in this category. As can be seen from the figure, a clear break in the quantity generated by different centres exists - Pathankot emerges as the most dominant generator with over 100,000 quintals, whereas the next most dominant centre - Malerkotla generates less than 20,000 quintals.

Figure 2.5 brings out the spatial arrangement of generators of inputs into agriculture. The striking feature of the distribution is an even spread of small shippers throughout the region. Only six centres distributed in Central and Southern Punjab emerge as large shippers with over 10,000 quintals (Bhatinda, Dhuri, Barnala, Khanna, Ludhiana and Jullundur). A comparison of Fig. 2.5 and Fig. 2.3 indicates the correspondence of large shippers of inputs into agriculture and raw materials for manufacturing of agricultural and associated origin. The spatial pattern of distribution is in line with the more developed agricultural economy of the region.

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The intra-regional flows of consumer goods (Fig. 2.6) are meagre. The striking feature of the distribution pattern of shippers of this commodity group is that only two centres emerge

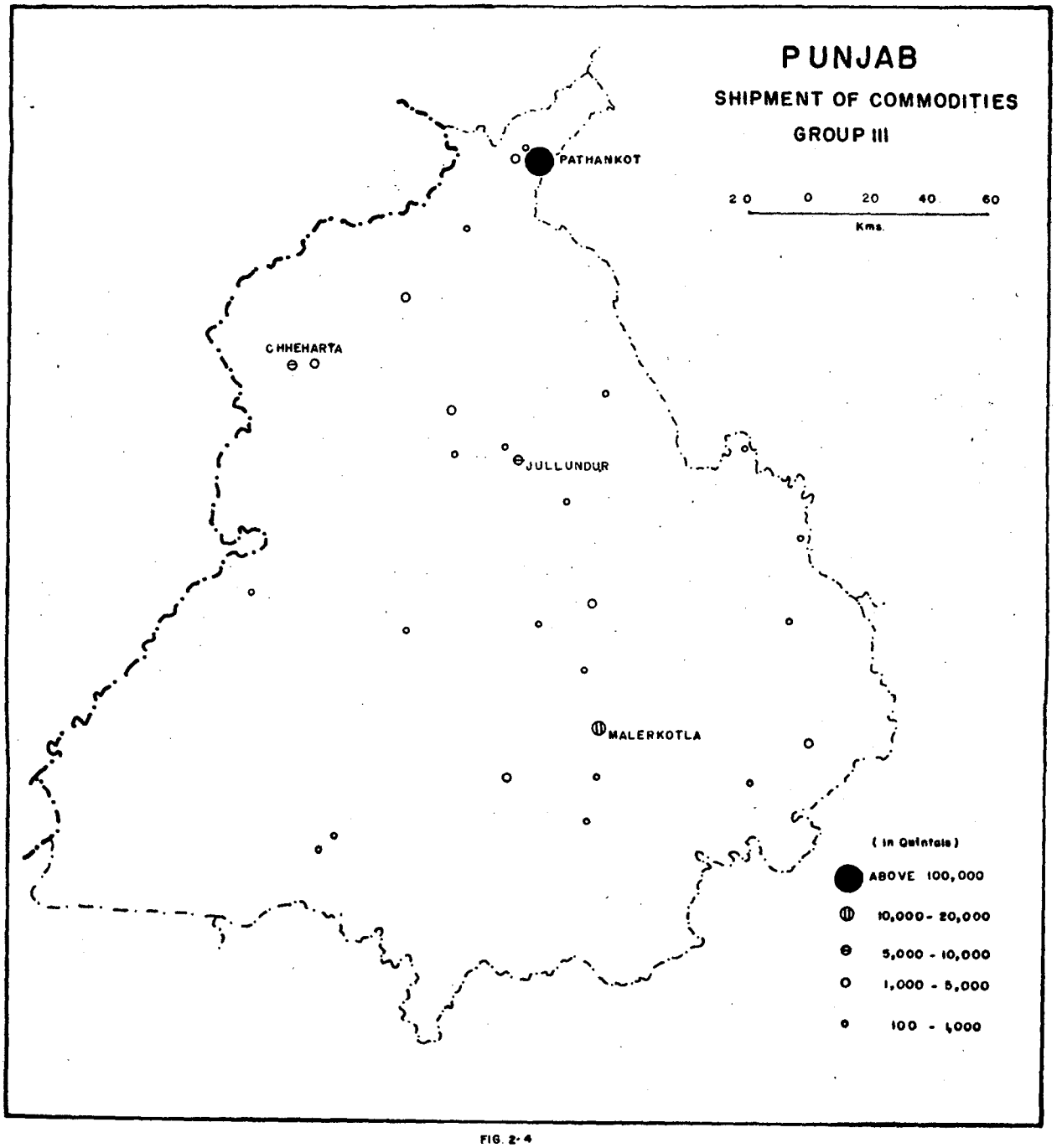
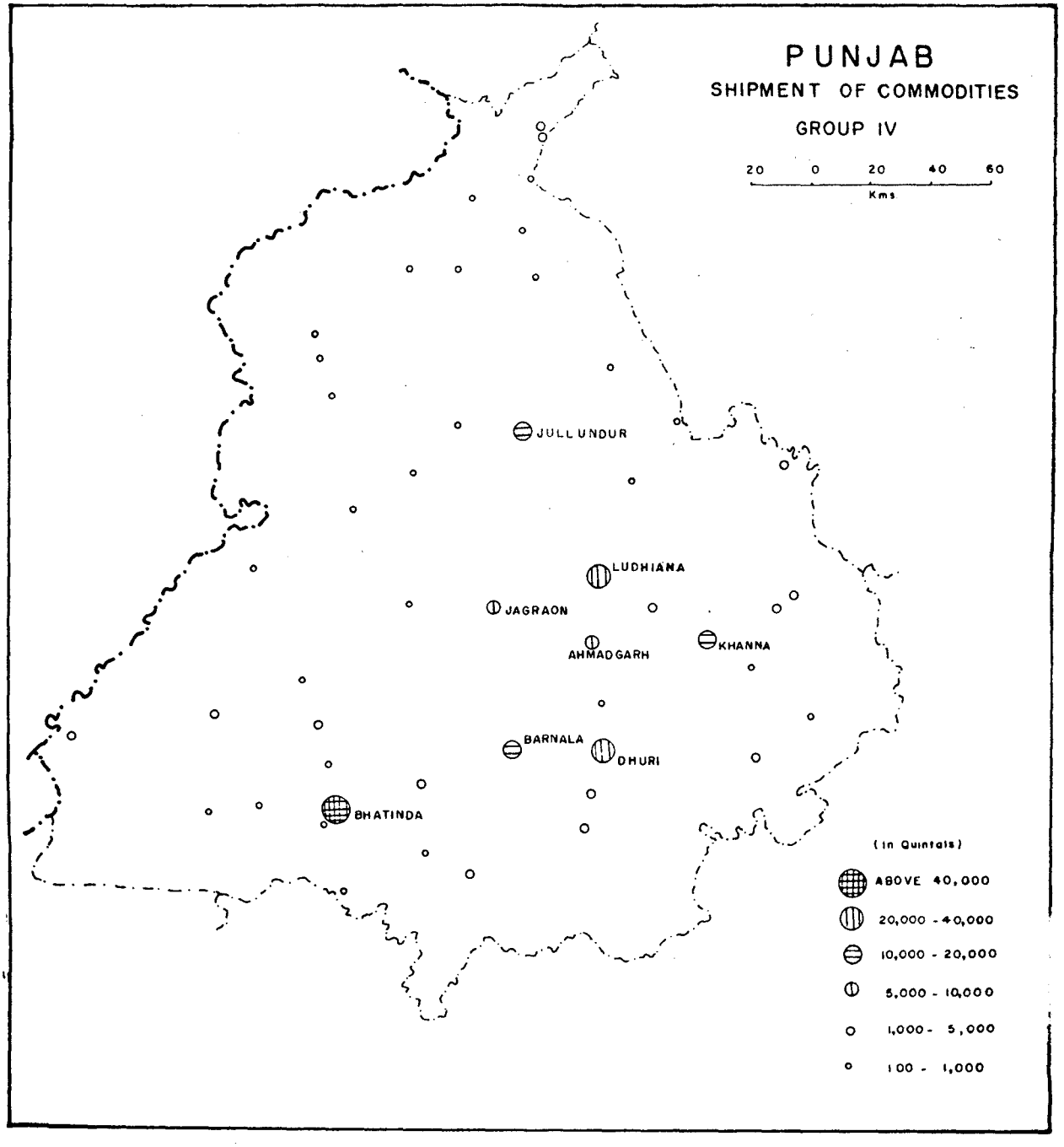

PUNJAB
SHIPMENT OF COMMODITIES
GROUP III
20 0 20 40 60
Kms.
PATHANKOT
CHHEHARTA
JULLUNDUR
MALERKOTLA
(in Quintals)
ABOVE 100,000
10,000 - 20,000
5,000 - 10,000
1,000 - 5,000
100 - 1,000

FIG. 2-4


PUNJAB
SHIPMENT OF COMMODITIES
GROUP IV
20 0 20 40 60
Kms
JULLUNDUR
LUDHIANA
JAGRAON
AHMADGARH
KHANNA
BARNALA
DHURI
BHATINDA
(In Quintals)
ABOVE 40,000
20,000 - 40,000
10,000 - 20,000
5,000 - 10,000
1,000 - 5,000
100 - 1,000

F.G.2-5

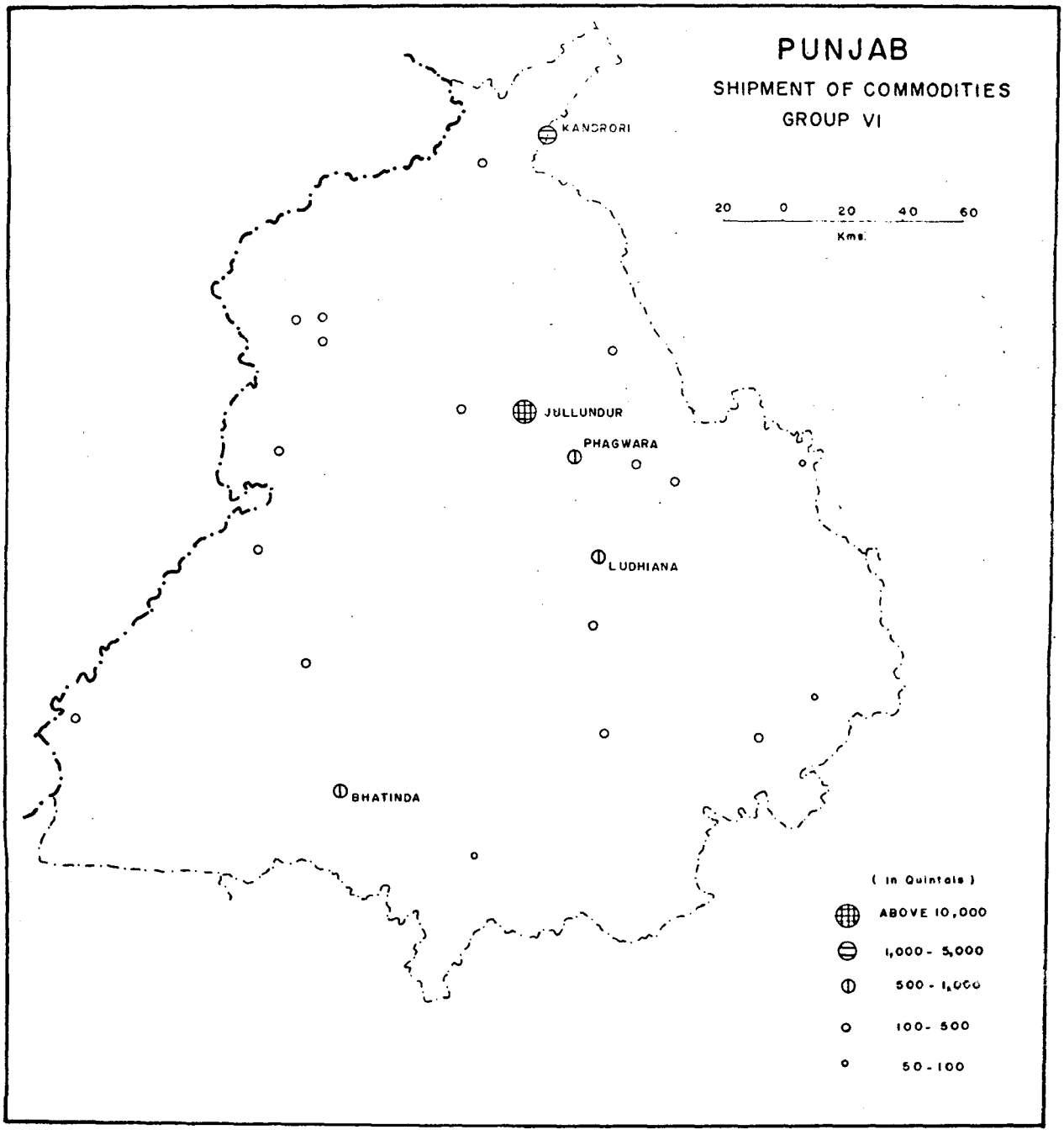

PUNJAB
SHIPMENT OF COMMODITIES
GROUP VI
KANDRORI
20 0 20 40 60
Kms.
JULLUNDUR
PHAGWARA
LUDHIANA
BHATINDA
(in Quintals)
ABOVE 10,000
1,000 - 5,000
500 - 1,000
100 - 500
50 - 100

FIG 2 6

as shippers. It would not be unrealistic to assume that these shippers are producers of this commodity. Thus specialization within the region is dicernible.

In magnitude, the generation of construction material (Fig. 2.7) is comparable to that of consumer goods, although the pattern of destribution is quite different. Small centres are distributed in Southern Punjab, and only two shippers (of over 5000 quintals) are to be noticed in the North (Pathankot and Nangal). The location of these two centres in the Himalayan foothills speaks for itself.

The last category of commodities is represented by defence goods (Fig. 2.8). The nature of this group of commodities is, however, indeterminate due to unspecified nature of data. However, the region being located on the frontier, a considerable proportion of this group of commodities is understandable, which is reflected by the fact that 24% of the intra-regional flows are accounted for by defence goods. Jullundur emerges as the most dominant shipper with over a 100,000 quintals. With a clear break in magnitude, the next category of centres (less than 50,000 quintals) are Bhatinda, Moga and Sura Nussi. Over forty small shippers are noticed along the periphery.

Spatial Pattern of Receivers

The distribution pattern of receivers is comparable to that of shippers. Over a hundred receivers are spread throughout the region. Dominant receivers occur in four clusters - one oriented to Pathankot, a second to Jullundur, and one each to Amritsar and Firozpur. A comparison of shippers and receivers (Figs. 2.1 and

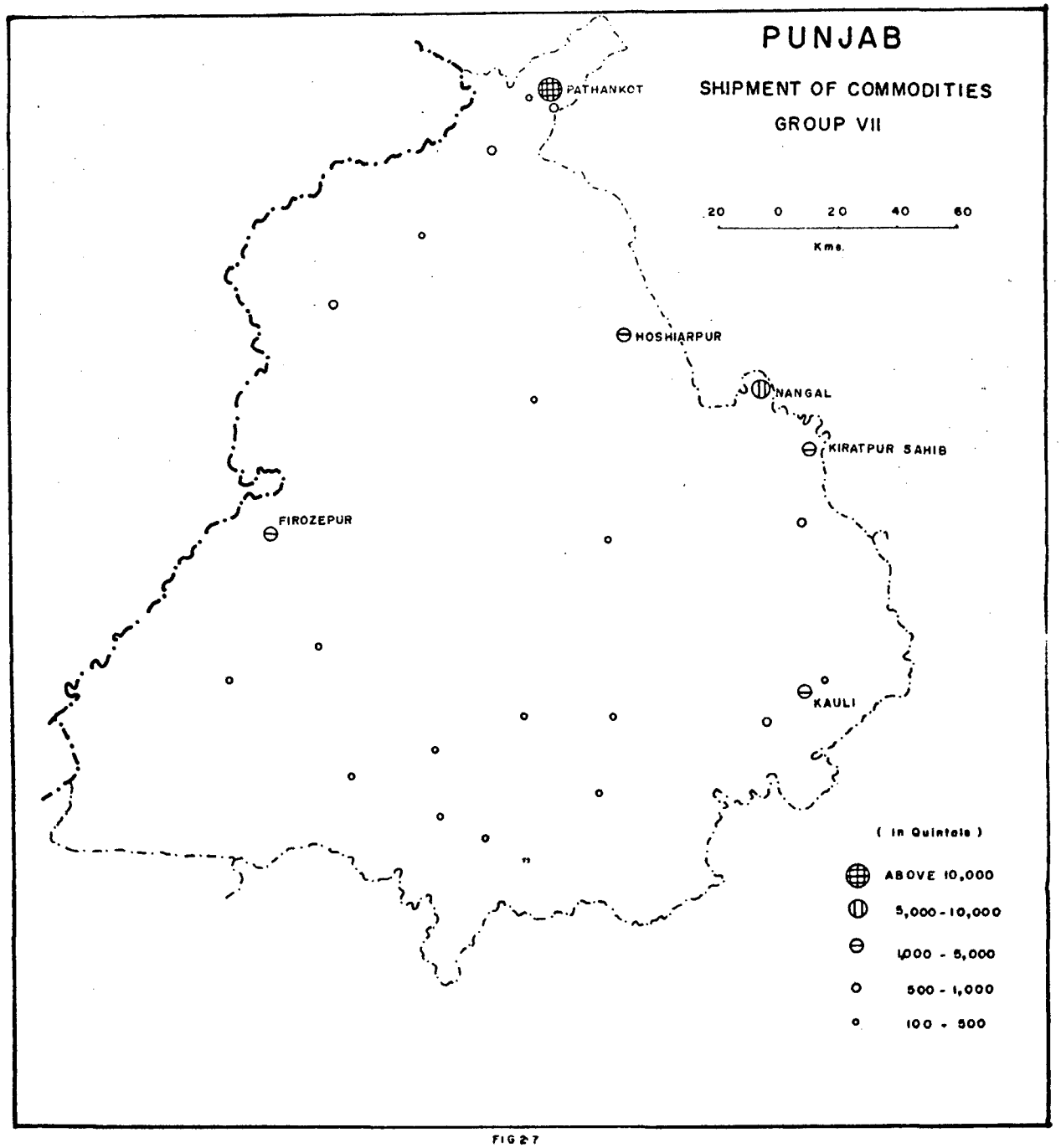

PUNJAB
SHIPMENT OF COMMODITIES
GROUP VII
20 0 20 40 60
Kms.
PATHANKOT
HOSHIARPUR
NANGAL
KIRATPUR SAHIB
FIROZEPUR
KAULI
(In Quintals)
ABOVE 10,000
5,000 - 10,000
1,000 - 5,000
500 - 1,000
100 - 500

FIG 2-7

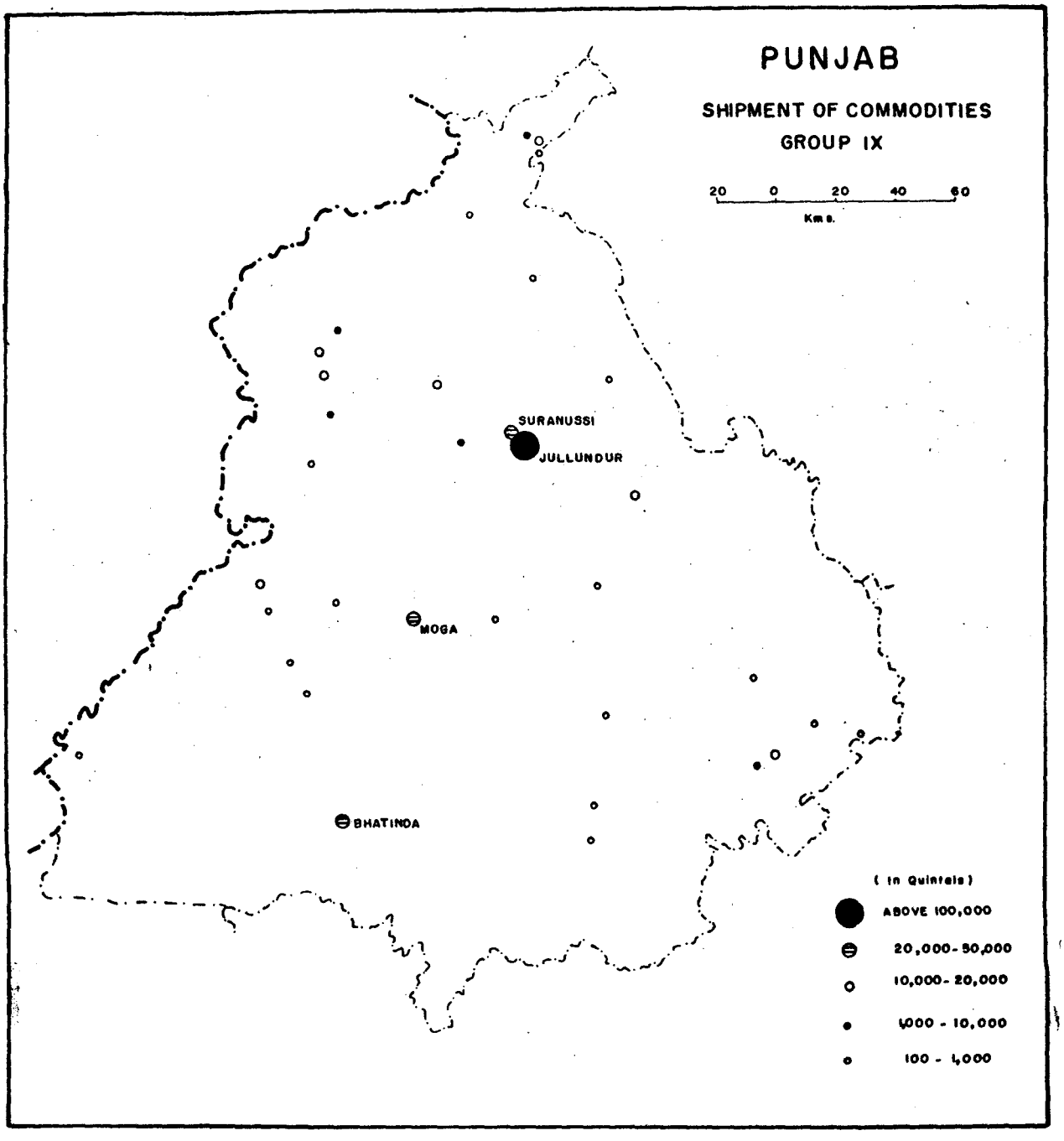
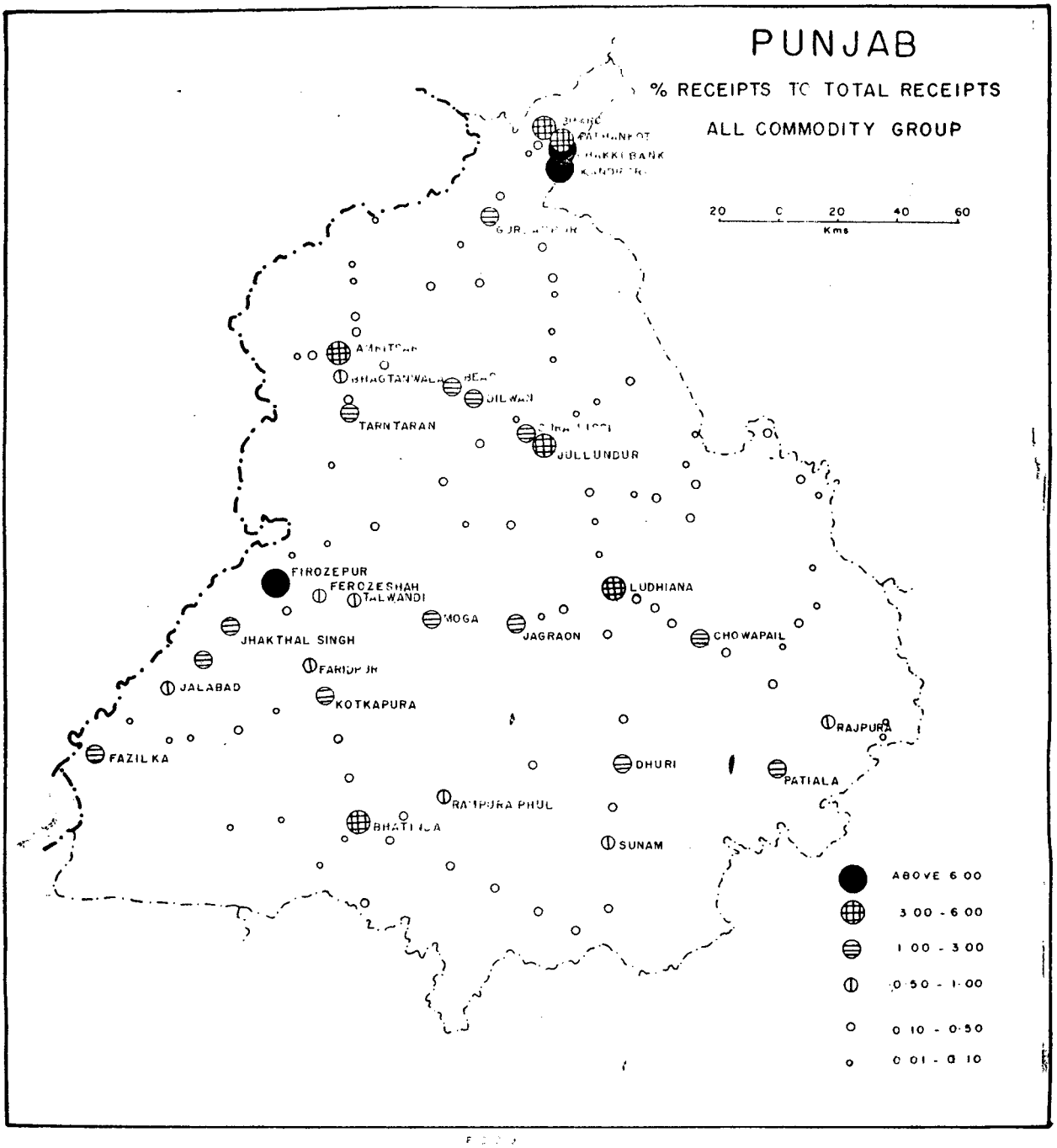

PUNJAB
SHIPMENT OF COMMODITIES
GROUP IX
20 0 20 40 60
Kms.
SURANUSSI
JULLUNDUR
MOGA
BHATINDA
(In Quintals)
ABOVE 100,000
20,000 - 50,000
10,000 - 20,000
4000 - 10,000
100 - 4,000

FIG. 2·8

2.9) shows spatial correspondance of the two patterns - the only noticeable departure being the Pathankot cluster of receivers. The Pathankot cluster of receivers includes Bharoli, Chakki Bank, Kandrori and Pathankot. It is obvious that the cluster acts as a collection and distribution centre of commodities between Punjab and Jammu and Kashmir and Himachal Pradesh on the other. This is further strengthened by the fact that the receipts of this cluster are almost entirely dominated by food products and defence commodities.

The receivers of food products are once again distributed throughout the state and, as mentioned earlier, the Pathankot cluster emerges as the dominant receiver of food products. A number of shippers of food products also appear as receivers of the same commodity group. Obviously, all such centres (Dhuri, Firozpur, Tarn Taran and Gurdaspur) are collection - distribution points. (Fig. 2.10).

Receivers of raw materials for manufacturing (agriculture and associated origin) are restricted to mainly Central and Southern Punjab. A number of small receiving centres (Fig. 2.11) are to be noticed in Southern Punjab. The larger receivers are Ludhiana, Chawapail, Rajpura and Patiala which receive more than 5000 quintals. A comparison of Figs. 2.3 and 2.11 brings out a complete contrast in the patterns of shippers and receivers of this commodity group. Whereas the Southern parts of the region present higher order shippers of raw materials (of agricultural origin), as receivers, this part of the region is more as less insignificant.


PUNJAB
% RECEIPTS TO TOTAL RECEIPTS
ALL COMMODITY GROUP
20 0 20 40 60
Kms
AMRITSAR
BHAGTANWALA
TARNTARAN
JULLUNDUR
FIROZEPUR
FEROZESHAH
TALWANDI
LUDHIANA
MOGA
JAGRAON
CHOWAPAIL
JHAKTHAL SINGH
FARIDKOT
JALABAD
KOTKAPURA
RAJPURA
FAZILKA
DHURI
PATIALA
RAMPURA PHUL
BHATINDA
SUNAM
ABOVE 6.00
3.00 - 6.00
1.00 - 3.00
0.50 - 1.00
0.10 - 0.50
0.01 - 0.10

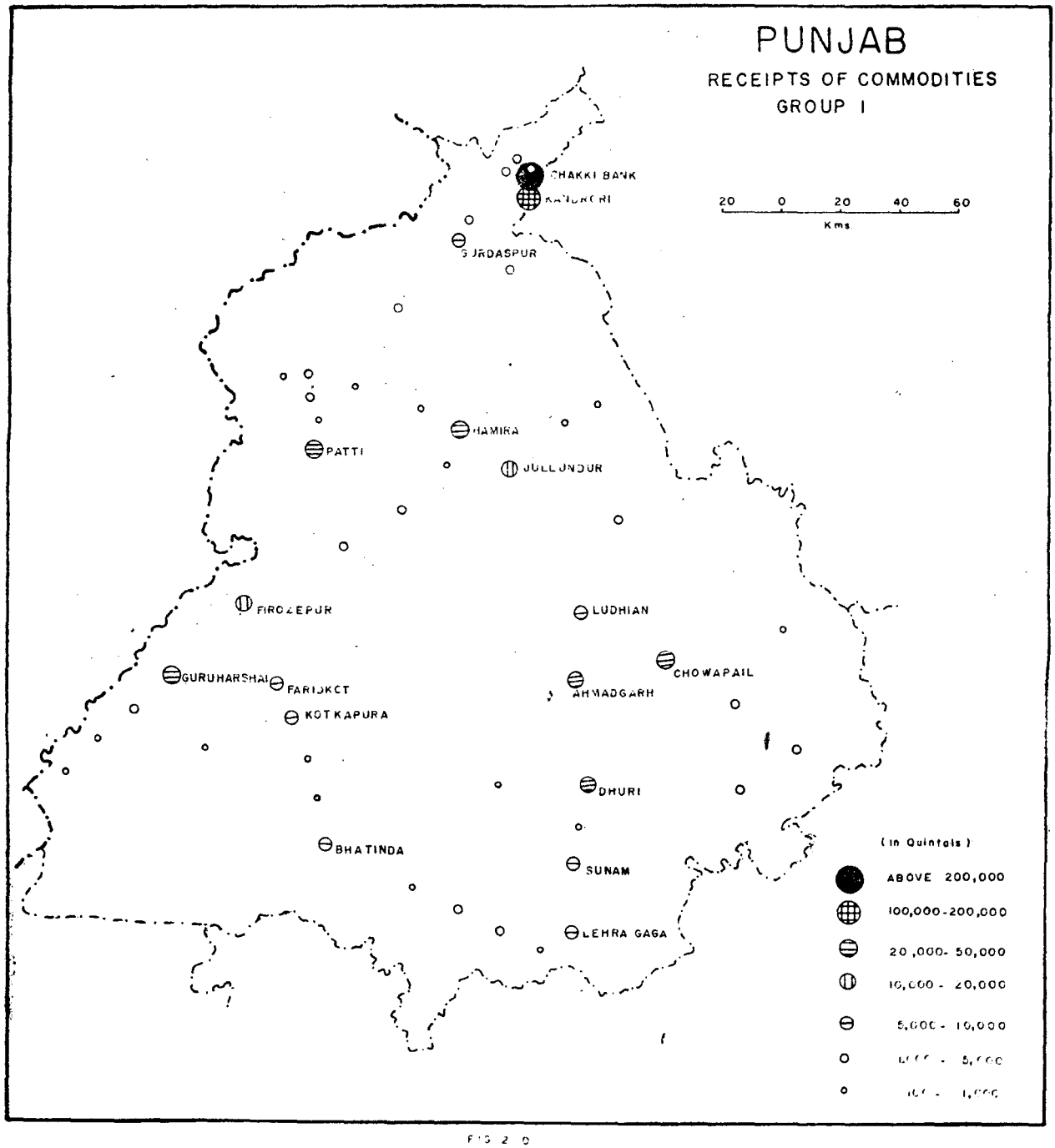

PUNJAB
RECEIPTS OF COMMODITIES
GROUP I
20 0 20 40 60
Kms
CHAKKI BANK
KANDORI
GURDASPUR
PATTI
JULLUNDUR
FIROZEPUR
LUDHIAN
GURUHARSHAI
FARIDKOT
KOTKAPURA
CHOWAPAIL
AHMADGARH
DHURI
BHATINDA
SUNAM
LEHRA GAGA
(In Quintals)
ABOVE 200,000
100,000-200,000
20,000- 50,000
10,000 - 20,000
5,000 - 10,000
1,000 - 5,000
100 - 1,000

FIG 2.0

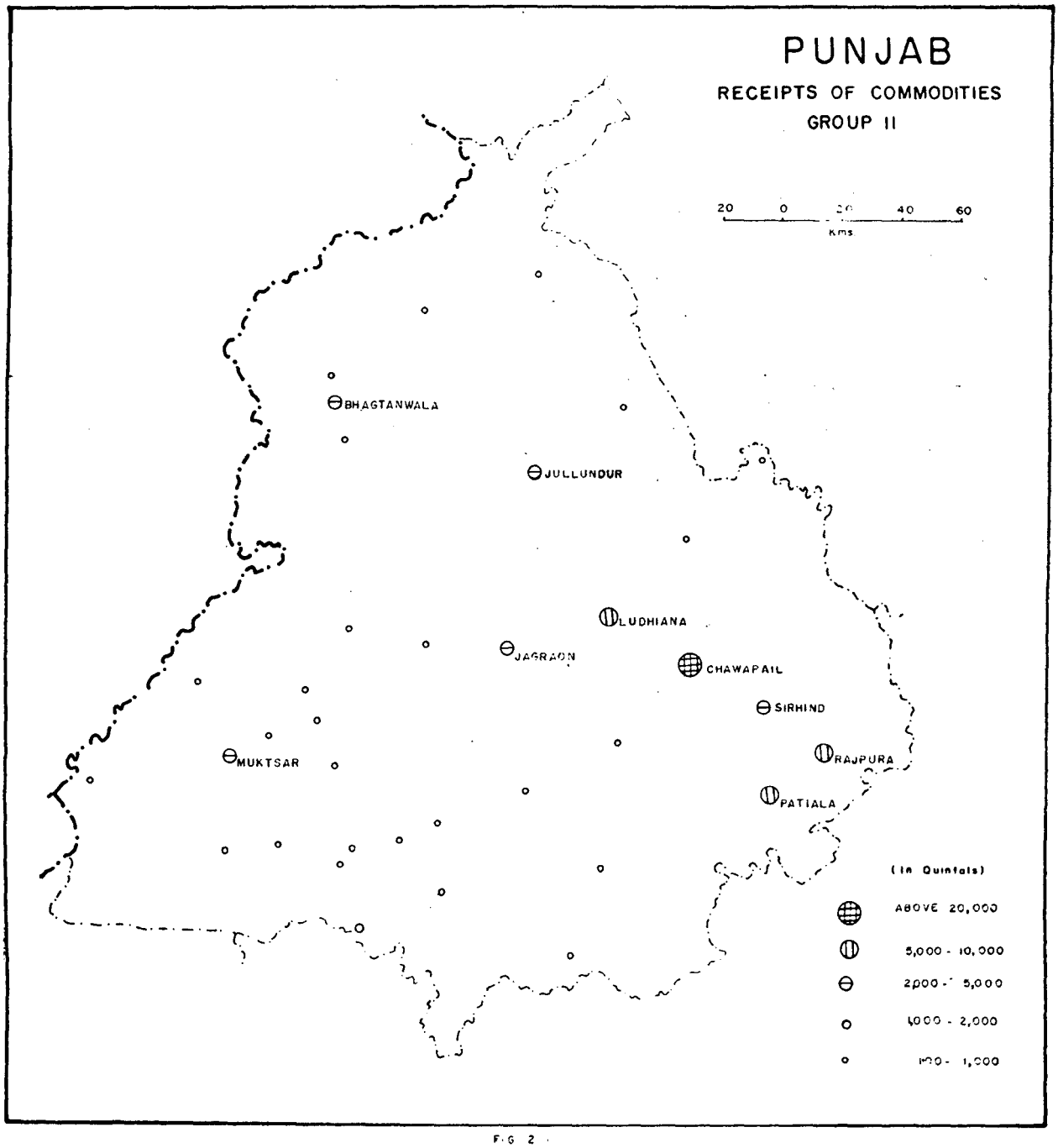

PUNJAB
RECEIPTS OF COMMODITIES
GROUP II
20 0 20 40 60
Kms
BHAGTANWALA
JULLUNDUR
LUDHIANA
JAGRAON
CHAWAPAIL
SIRHIND
MUKTSAR
RAJPURA
PATIALA
(In Quintals)
ABOVE 20,000
5,000 - 10,000
2000 - 5,000
1000 - 2,000
500 - 1,000

FIG 2

Although over forty receivers of raw materials for manufacturing - minerals and semi-processed goods - appear on the map (Fig. 2.12), a cluster of centres around Firozpur accounts for the bulk of the receipts. Smaller receivers appear to occur in restricted pockets (Bhatinda, Ludhiana, Jullundur, Amritsar and Gurdaspur). Unlike shipments of this commodity group, there is no clear break in the magnitude of receipts. It is interesting to note that a definite cluster of higher order receivers appears around Firozpur in Western Punjab, while as generators, this part of the region does not emerge.

Receivers of inputs into agriculture (Fig. 2.13) are spread throughout the state although the quantity of receipts is small. A comparison of shippers and receivers of this group of commodities brings out clearly and similarities in consumption pattern - about a hundred receivers as against about forty shippers.

A similar pattern emerges in the case of consumer goods. A few shippers restricted in their spatial locations may be compared with a large number of receivers spread throughout the region (Figs. 2.6 and 2.14).

In terms of quantity, construction materials are almost insignificant with less than 3% of the intra-regional flows. Small centres of receivers are noticed along two axes - Amritsar - Jullundur and Bhatinda - Bareta. (Fig. 2.15)

The spatial pattern of receivers of defence goods is self-evident. Four clusters of large receivers are noticed (Firozpur, Bhatinda, Jullundur and Pathankot), while about a dozen small centres are scattered in pockets. (Fig. 2.16)

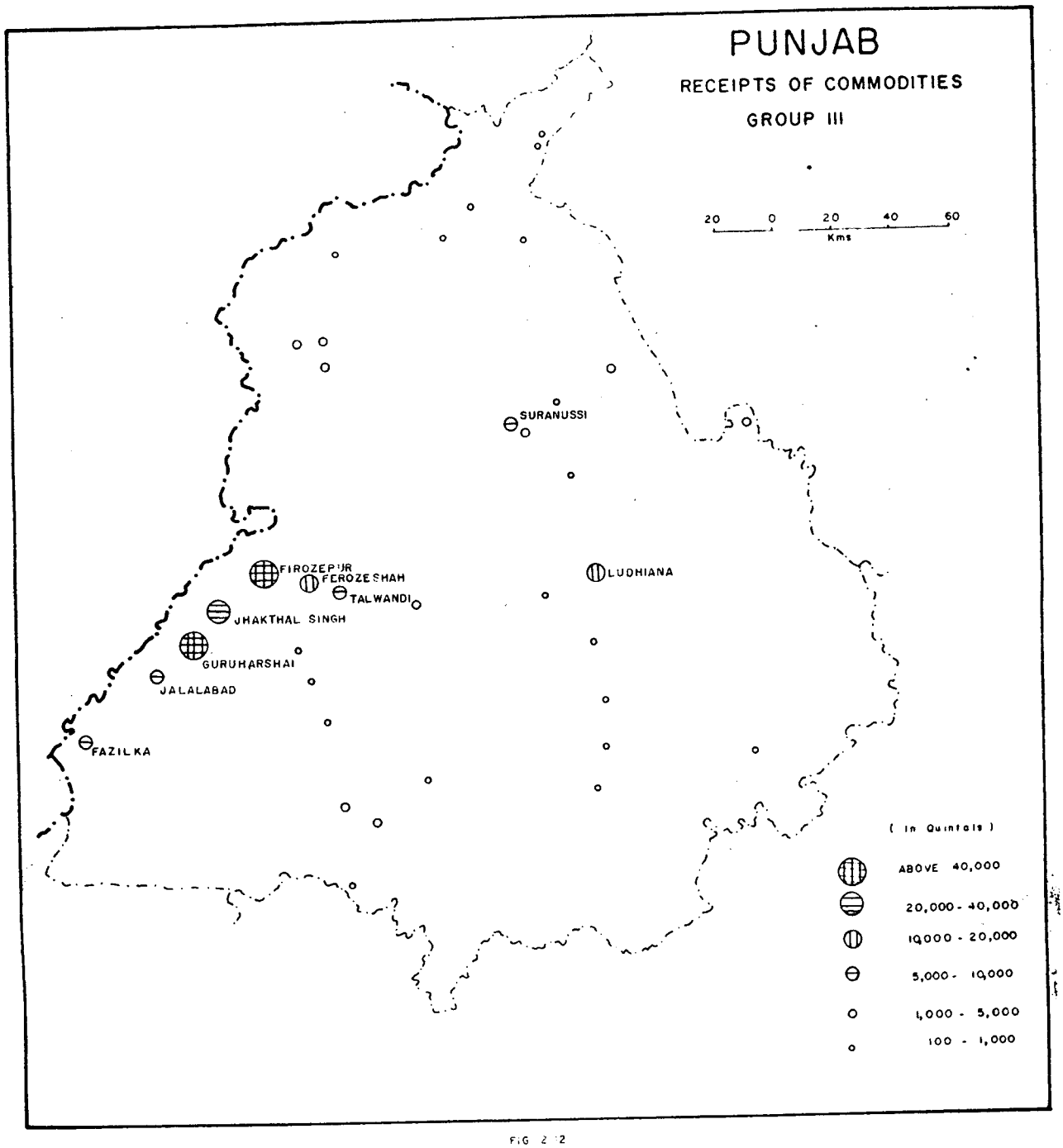

PUNJAB
RECEIPTS OF COMMODITIES
GROUP III
20 0 20 40 60
Kms
SURANUSSI
FIROZEPUR
FEROZESHAH
TALWANDI
LUDHIANA
JHAKTHAL SINGH
GURUHARSHAI
JALALABAD
FAZILKA
(In Quintals)
ABOVE 40,000
20,000 - 40,000
10,000 - 20,000
5,000 - 10,000
1,000 - 5,000
100 - 1,000

FIG 2.2

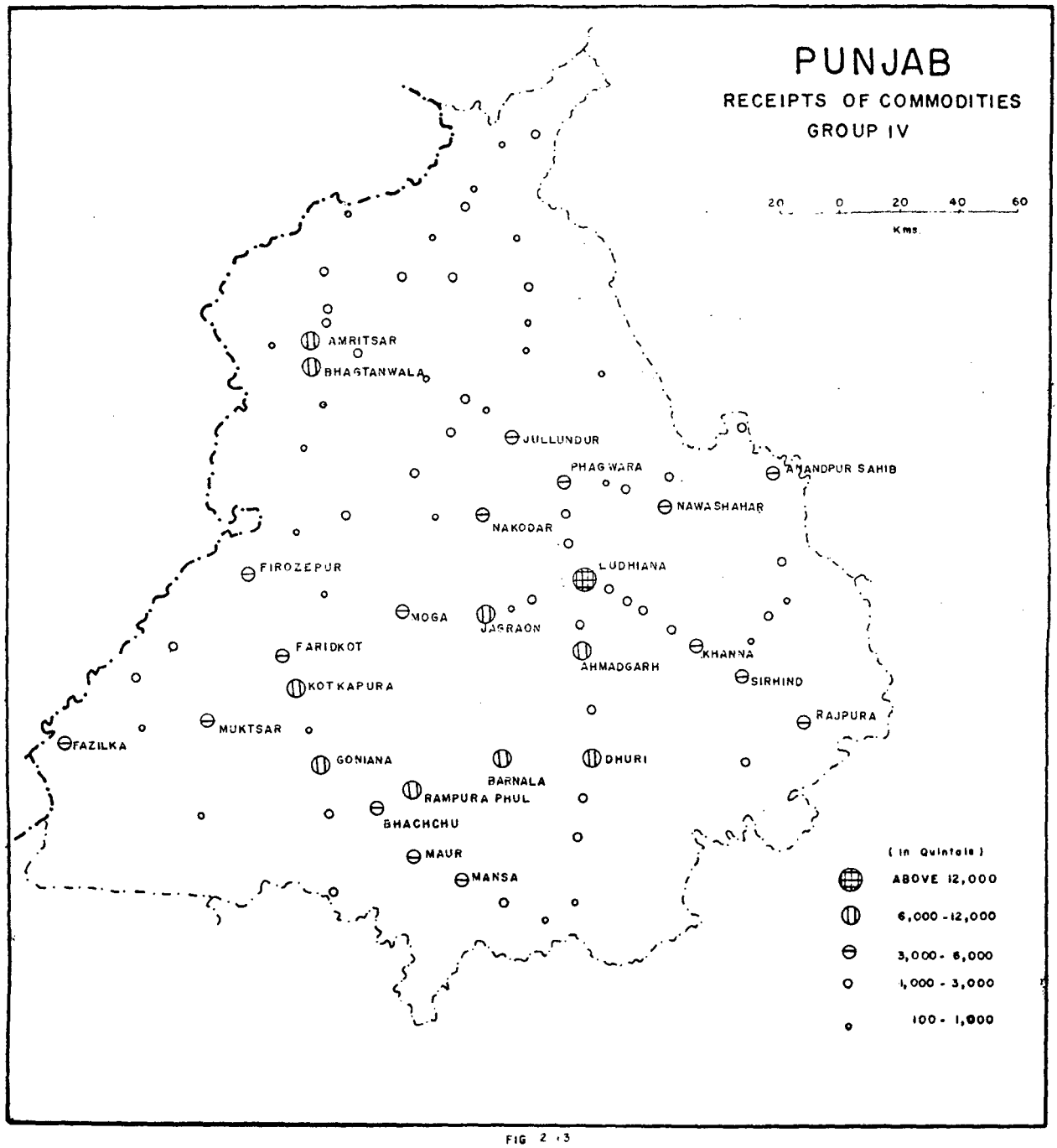

PUNJAB
RECEIPTS OF COMMODITIES
GROUP IV
20 0 20 40 60
Kms.
AMRITSAR
BHAGTANWALA
JULLUNDUR
PHAGWARA
ANANDPUR SAHIB
NAWASHAHAR
NAKODAR
FIROZEPUR
LUDHIANA
MOGA
JAGRAON
FARIDKOT
KHANNA
AHMADGARH
SIRHIND
KOTKAPURA
RAJPURA
MUKTSAR
FAZILKA
GONIANA
BARNALA
DHURI
RAMPURA PHUL
BHACHCHU
MAUR
MANSA
(in Quintals)
ABOVE 12,000
6,000 - 12,000
3,000 - 6,000
1,000 - 3,000
100 - 1,000

FIG 2 :3

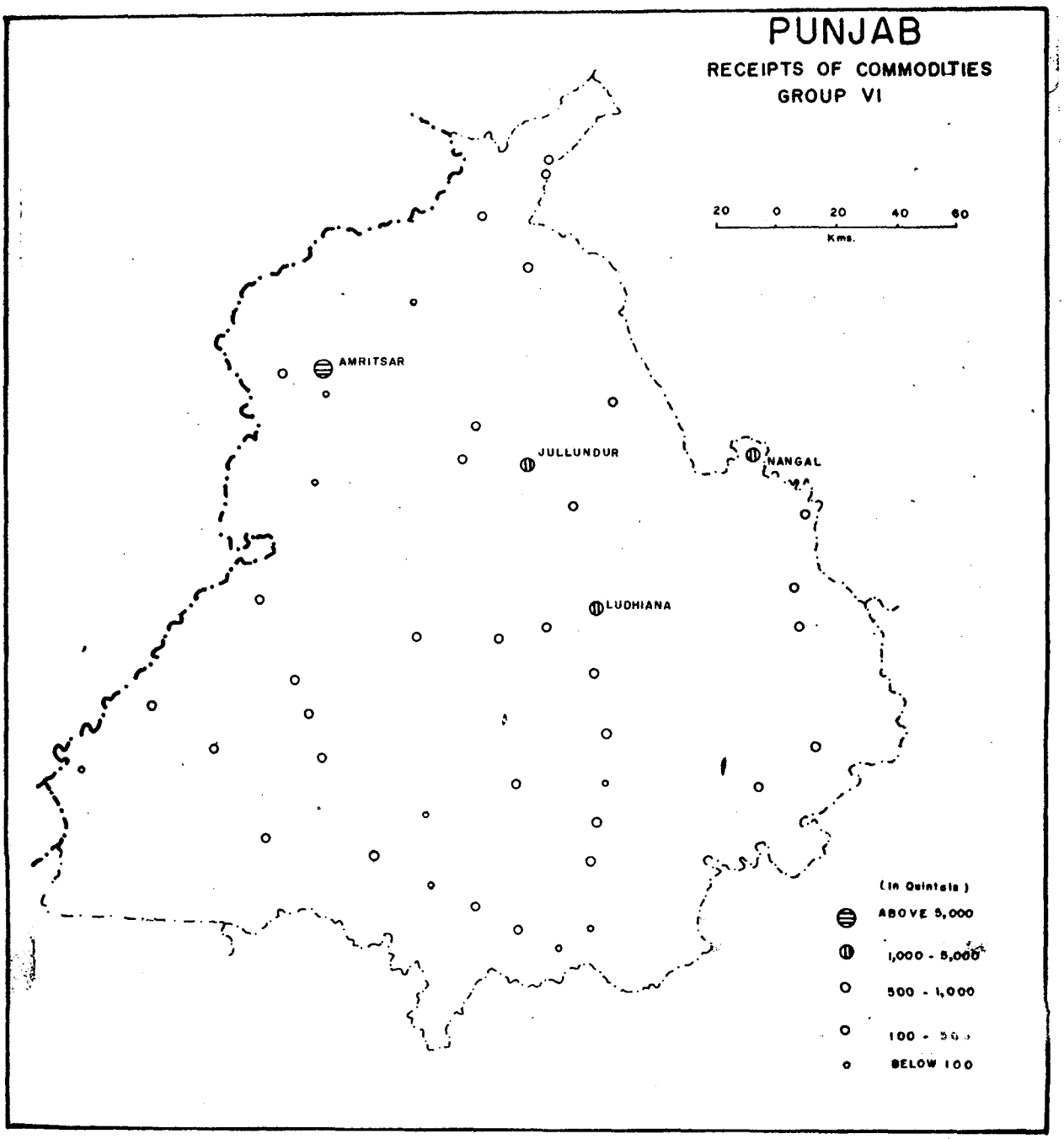

PUNJAB
RECEIPTS OF COMMODITIES
GROUP VI
20 0 20 40 60
Kms.
AMRITSAR
JULLUNDUR
NANGAL
LUDHIANA
(In Quintals)
ABOVE 5,000
1,000 - 5,000
500 - 1,000
100 - 500
BELOW 100

FIG 2.14

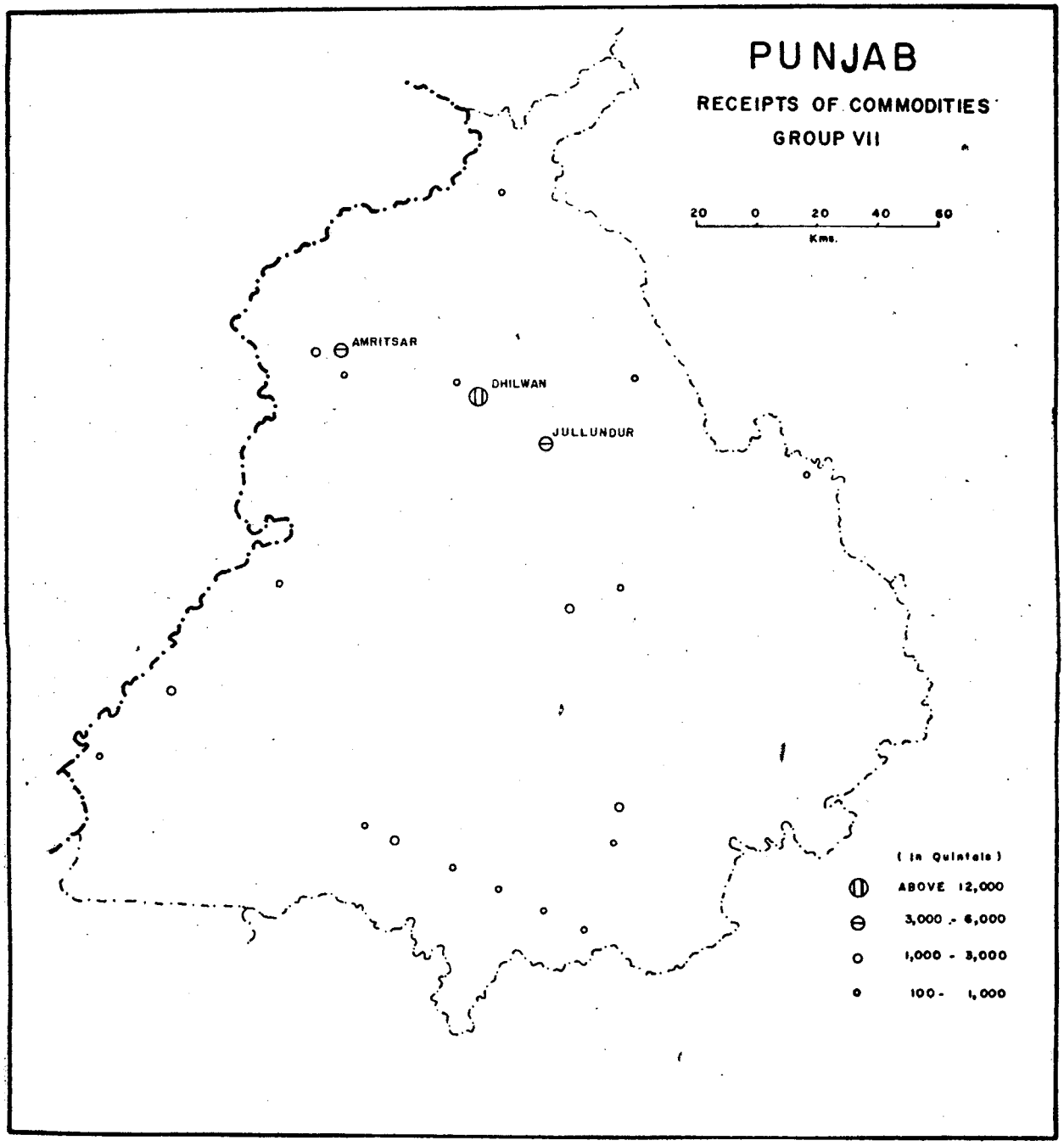

PUNJAB
RECEIPTS OF COMMODITIES
GROUP VII
20 0 20 40 60
Kms.
AMRITSAR
DHILWAN
JULLUNDUR
(In Quintals)
ABOVE 12,000
3,000 - 6,000
1,000 - 3,000
100 - 1,000

FIG 2 15

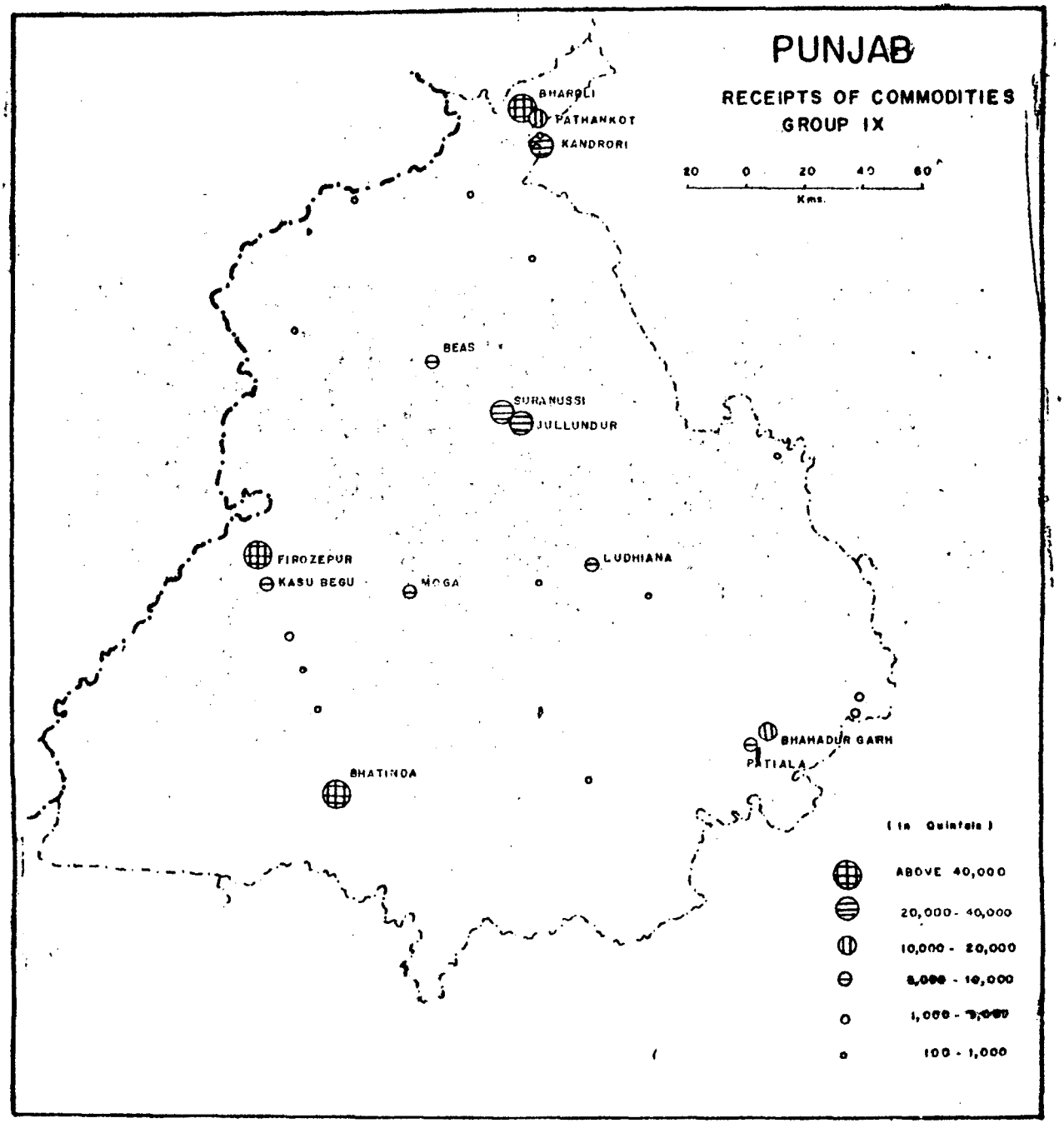

PUNJAB
RECEIPTS OF COMMODITIES
GROUP IX
20 0 20 40 60
Kms.
BHARPLI
PATHANKOT
KANDRORI
BEAS
SURANUSSI
JULLUNDUR
FIROZEPUR
KASU BEGU
MOGA
LUDHIANA
BHATINDA
BHAHADUR GARH
PATIALA
(In Quintals)
ABOVE 40,000
20,000 - 40,000
10,000 - 20,000
5,000 - 10,000
1,000 - 5,000
100 - 1,000

FIG 2.16

The study of shippers and receivers discussed above brings out the following features:

1. Urban dominance is evident in the interaction patterns as explained by commodity flows through railways.
2. The economy of the region has a strong export base.
3. Regional specialization in food products is indicated.
4. To strengthen the regional specialization of agricultural products, inputs into agriculture are exchanged within the region rather than without.
5. Intra-regional commodity flow patterns are different from inter-regional commodity composition suggesting a high degree of regional economic homogeneity.
6. The size and the nature of the interaction matrix suggests internally cohensive functional regions.

- -

Chapter III

Shippers and Receivers - Spatial Relations

Spatial arrangements, at a given point of time, are static phenomena. Spatial interactions, on the other hand, are dynamic processes. None the less, the two are reciprocally related. Having studied the spatial arrangement of shippers and receivers, and the nature of commodity composition, it is possible to visualize a set of relationships that may exist given the existing regional conditions. In addition to the general hypothetical statements made earlier, therefore, the following relationships may be tested:

1. Homogeneity in agricultural production being evident and agriculture being the export base of the region, distinction between regional and extra-regional centres is distorted.
2. The generation and absorbtion of commodities is largely dominated by a given set of centres.
3. Following from statement one, a high degree of association would exist between supply of food products and receipt of inputs into agriculture.
4. With an observed shift in the pattern of cropping from food to non-food crops (cotton and sugarcane), an even stronger association between the supply of raw materials for manufacturing (agricultural and associated origin) and receipts of inputs into agriculture is to be noticed.
5. The locational aspects of the region (frontier effect) should lead to a high degree of association between the flow of defence goods and other commodity groups, although logical ties between the two are absent.

The Statements Tested

The range of statements made above are tested against coefficients of correlation between the pairs of variables. The results

and their interpretation are discussed below:

A correlation analysis between the quantity supplied by each shipper to centres within the region and to those outside records a coefficient of 0.46 (significant at 99% level of confidence) suggesting a close correspondance between regional and extra-regional supplies of goods. Evidently, much of the supplies are accounted for by food products (88% of the total supply) the production of which is more or less evenly distributed throughout the region. Although the region as a whole has a specialization in the production of food as compared to the rest of the national system, intra-regional specialization is absent. Consequently, no distinction exists between intra and extra regional centres.

As seen earlier, about 300 centres in the region are connected by the rail net, yet only 150 centres figure as receivers. Of these 150 centres, 130 also appear as generators. The association between receivers and shippers of commodities is brought out by a correlation coefficient of 0.34 (significant at 98% level of confidence).

The statements made earlier with reference to relationships at the intra-regional interaction level is discussed below with the help of a correlation matrix between the suppliers and receivers of different commodity groups (Table 3.1).

Table III.1.

Correlation matrix between Suppliers and Receivers

	Receivers/ Suppliers	1	2	3	4	5	6	7
Food products	1	.100	-.068	.088	.194*	-.027	-.011	-.040
Raw materials (Agriculture & assoc. origin).	2		.094	.198*	.592***	-.037	.223**	-.014
Raw materials (minerals & semi-processed goods)	3			-.015	.101	.033	.050	.105
Inputs into agriculture	4				.481***	-.031	.094	.348***
Construction materials	5					-.033	.100	.010
Consumer goods	6						.019	.277**
Defence goods	7							.396***

*** - 99% level of confidence

** - 98% level of confidence

* - 90% level of confidence.

It is interesting to note that the supply of food products is significantly related with the receipts of inputs into agriculture. A stronger relationship between the two is suggested by a correlation coefficient of .592 than the association between the supply of food products and receipts of inputs into agriculture (r = .194). This indicates a stress on the development of agro-based industries. In other words, the supply of agricultural inputs is rewarded with agricultural output to support the secondary sector. Such a relationship, while being healthy, also creates a chain reaction wherein the supplier is supplied back with consumer products. This is indicated by a coefficient of .223.

A high correlation between the shippers and receivers of inputs into agriculture (r = .481) suggests that the centres are collection-distribution points.

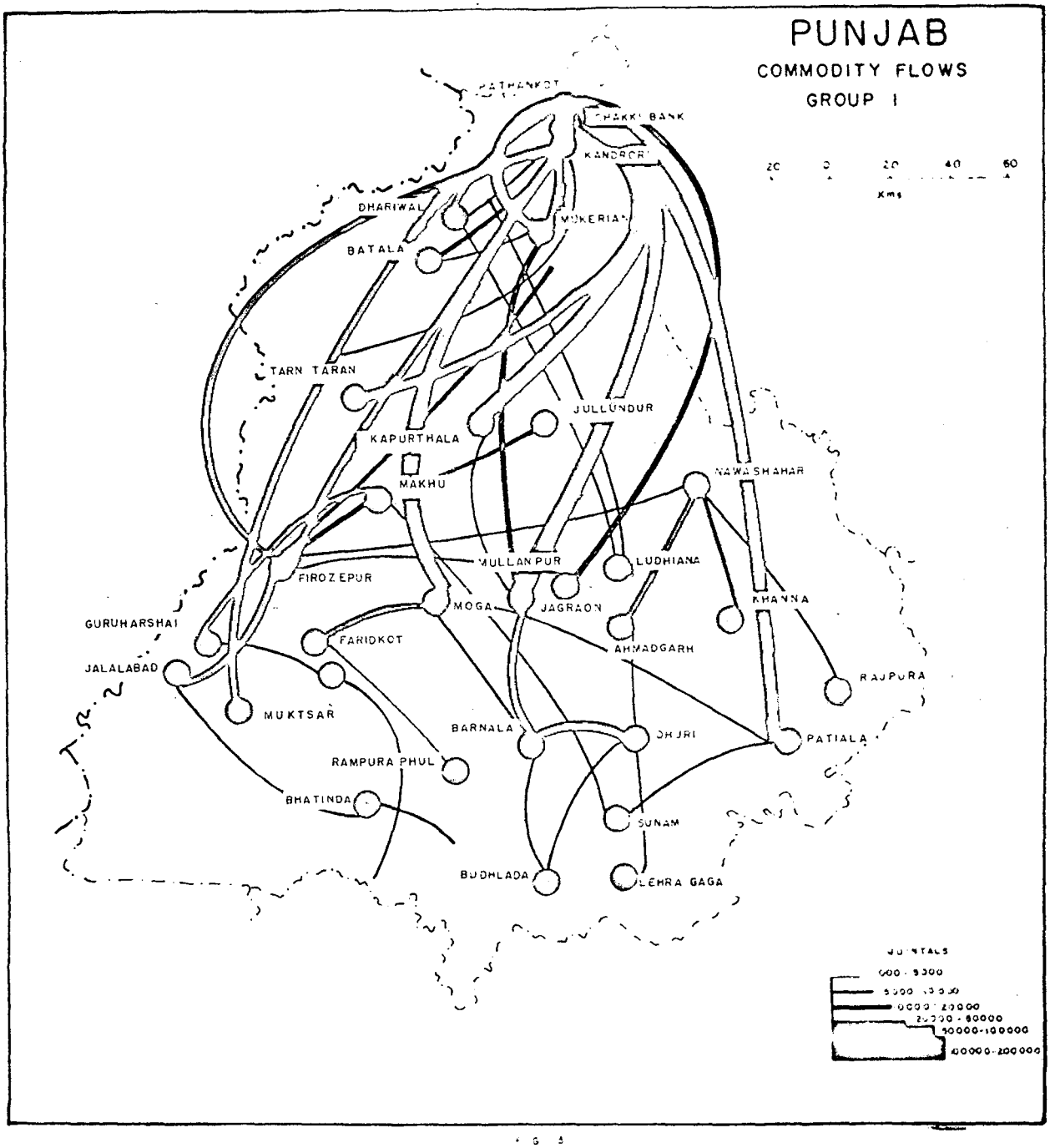
It would seem from the correlation matrix that the suppliers of inputs into agriculture correspond with the receipt of defence goods. However, no logical dependence between the two groups of commodities can be vesualized. The relationship may be attributed to the general association between the receivers and shippers established earlier.

It is not surprising to note that the supply and receipt of construction material is unrelated with the movement of any other commodity group. The absence of this relationship may be attributed to the insignificant quantity of movement along with a restricted number of suppliers and receivers (in fact, there are less than five suppliers/receivers with quantity above 5000 quintals).

The suppliers of consumer goods is related with the receipt of defence goods. However, the common link of the two groups of commodities is the association with centres of secondary activity and urbanization. Also many of the large shippers and receivers of Punjab locate contonments. For the same reason, the supply and receipts of defence goods are related to each other.

The Interaction Process

Fig. 3.1 maps the flow of food products in Punjab. The most striking feature brought out by the map is the dominance of Pathankot, Chakki Bank and Kandrori as receivers. It is also evident


PUNJAB
COMMODITY FLOWS
GROUP I
20 0 20 40 60
Kms
PATHANKOT
THAKKI BANK
KANDROR
DHARIWAL
MUKERIAN
BATALA
TARN TARAN
JULLUNDUR
KAPURTHALA
MAKHU
NAWASHAHAR
MULLANPUR
LUDHIANA
FIROZEPUR
MOGA
JAGRAON
KHANNA
GURUHARSHAI
FARIDKOT
AHMADGARH
JALALABAD
RAJPURA
MUKTSAR
BARNALA
DHURI
PATIALA
RAMPURA PHUL
BHATINDA
SUNAM
BUDHLADA
LEHRA GAGA
TONNAGE
600 - 5300
5000 - 10000
10000 - 20000
20000 - 50000
50000-100000
100000-200000

that this cluster of receivers extends its area of collection throughout the state. Not only is the quantity received by this cluster large, but also, its suppliers are varied and located all over the region. One can infer that these centres collect food products from the region and distribute them to the neighbouring states of Himachal Pradesh and Jammu and Kashmir. Therefore, of necessity (there is a break in the network development beyond these points), these centres act as transit points. It would be superfluous to conceive of Punjab as a hinterland of the Pathankot cluster with respect to food products.

At lower levels of hierarchy, major centres of regional economic organization (as suggested by the flow of food products) may be recognised as Firozpur, Nawashahr, Jagraon, Patiala, Makhu and Moga. All these centres have well defined hinterlands of local dimension each receiving or sending smaller quantities of food products from/to nearby centres.

The nature of this commodity group warrants a study of this nature at lower levels, which however, is not possible with the data available.

The movement of raw materials for manufacturing (of agricultural and associated origin) seem to be restricted both in space and in terms of interacting centres (Fig. 3.2). It is clear from the map that the quantity of flow is small and definite organization of the regional economy is weak. Typically, one can see each receiving centre assembling its material from at most two other centres. Thus, functional ties are not strong.

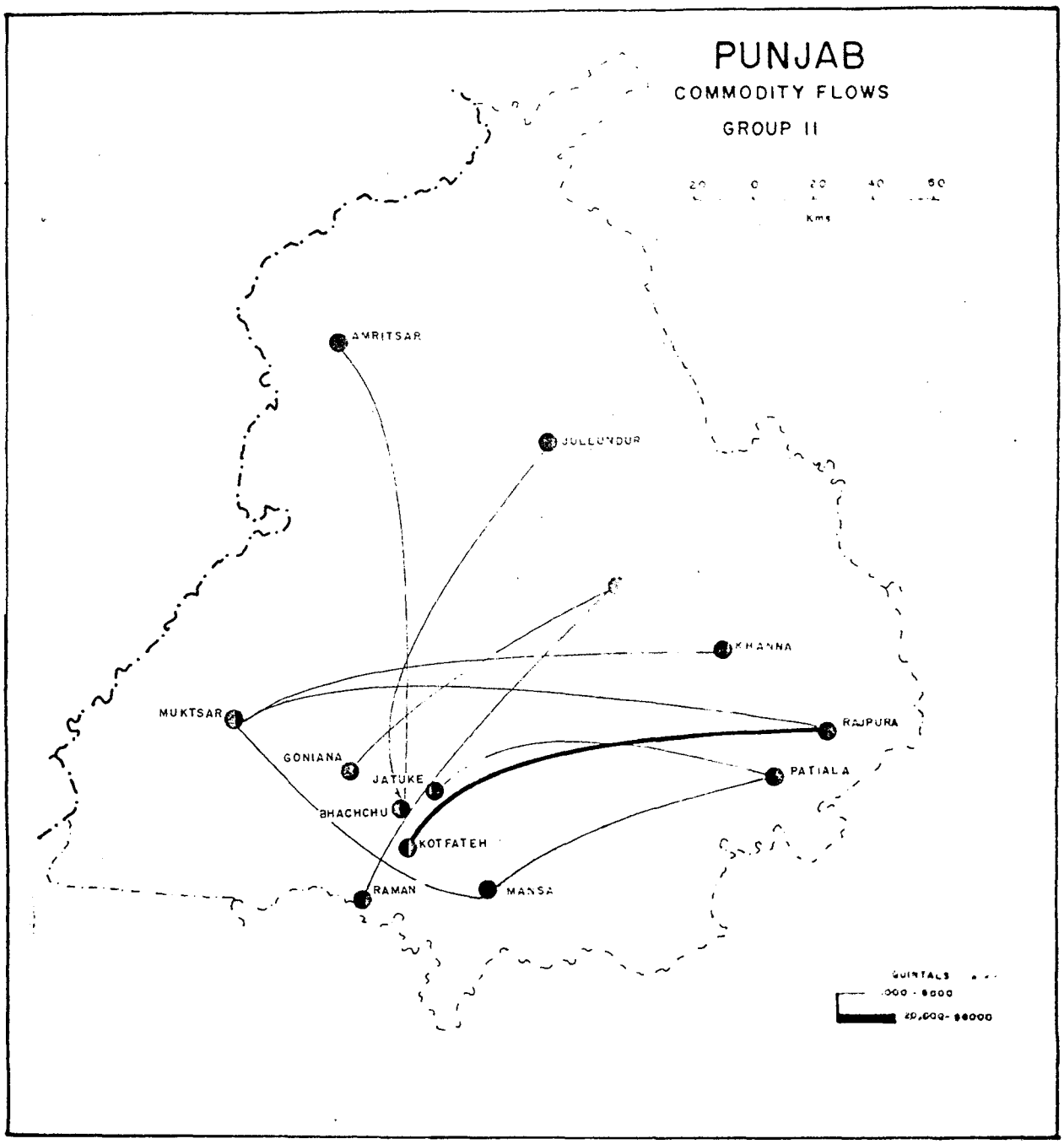
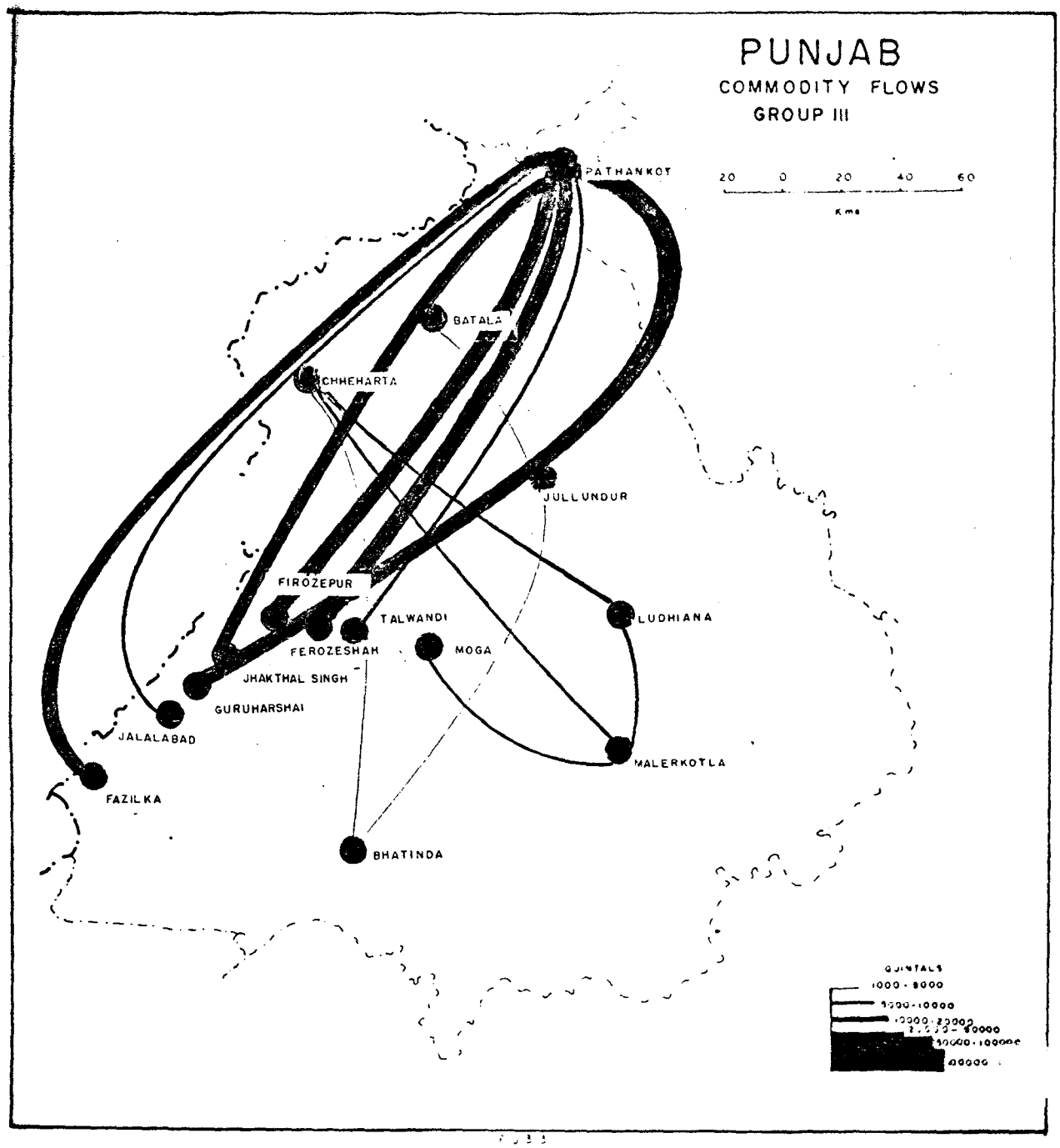

PUNJAB
COMMODITY FLOWS
GROUP II
20 0 20 40 60
Kms
AMRITSAR
JULLUNDUR
KHANNA
MUKTSAR
RAJPURA
GONIANA
JATUKE
PATIALA
BHACHCHU
KOTFATEH
RAMAN
MANSA
QUINTALS
1000 - 9000
40,000- 80000

Fig. 3.3 maps the flow of raw materials for manufacturing (minerals and semi-processed goods). Pathankot, once again, emerges as the largest shipper. Of the eleven receivers, seven receive from Pathankot, and these flows form the bulk of the movement. Movements of small quantities originating from Malerkatta and Barnala go to Chhcharta, Ludhiana, Bhatinda and Jullundur. As can be seen from the map, flows from Pathankot are long distance bulk movements, whereas other movements are of small quantities and confined to relatively small and medium distances. No hierarchies can be recognised from the flow pattern.

The interaction pattern presented by the flow of inputs into agriculture integrates almost the entire region. Although bulk movements are absent, a number of centres are involved in the interaction matrix. Definite hinterlands of major centres together with their hierarchies may be identified (Fig. 3.4). At higher levels, Bhatinda and Barnala emerge. In the next level, Dhuri, Ludhiana and Khanna can be identified with far reaching hinterlands, though, the functional ties as represented by the magnitude of flow are weaker. At lower levels, Anandpur Sahib, Sujanpur and Verka emerge which circumscribe a widespread interaction field.

The flow of construction materials (Fig. 3.5) fa ls to bring out regional interdependence, except for a strong tie between Pathankot and Dilwan, and three weak interaction dyads.

Perhaps the most self evident hierarchy of functional regions is brought out by the flow of defence goods. Four centres, at highest level, with well defined fields emerge (Fig. 3.6) - Pathan-


PUNJAB
COMMODITY FLOWS
GROUP III
20 0 20 40 60
Kms
PATHANKOT
BATALA
CHHEHARTA
JULLUNDUR
FIROZEPUR
TALWANDI
FEROZESHAH
MOGA
LUDHIANA
JHAKTHAL SINGH
GURUHARSHAI
JALALABAD
MALERKOTLA
FAZILKA
BHATINDA
QUINTALS
1000 - 5000
5000 - 10000
10000 - 20000
20000 - 50000
50000 - 100000
100000

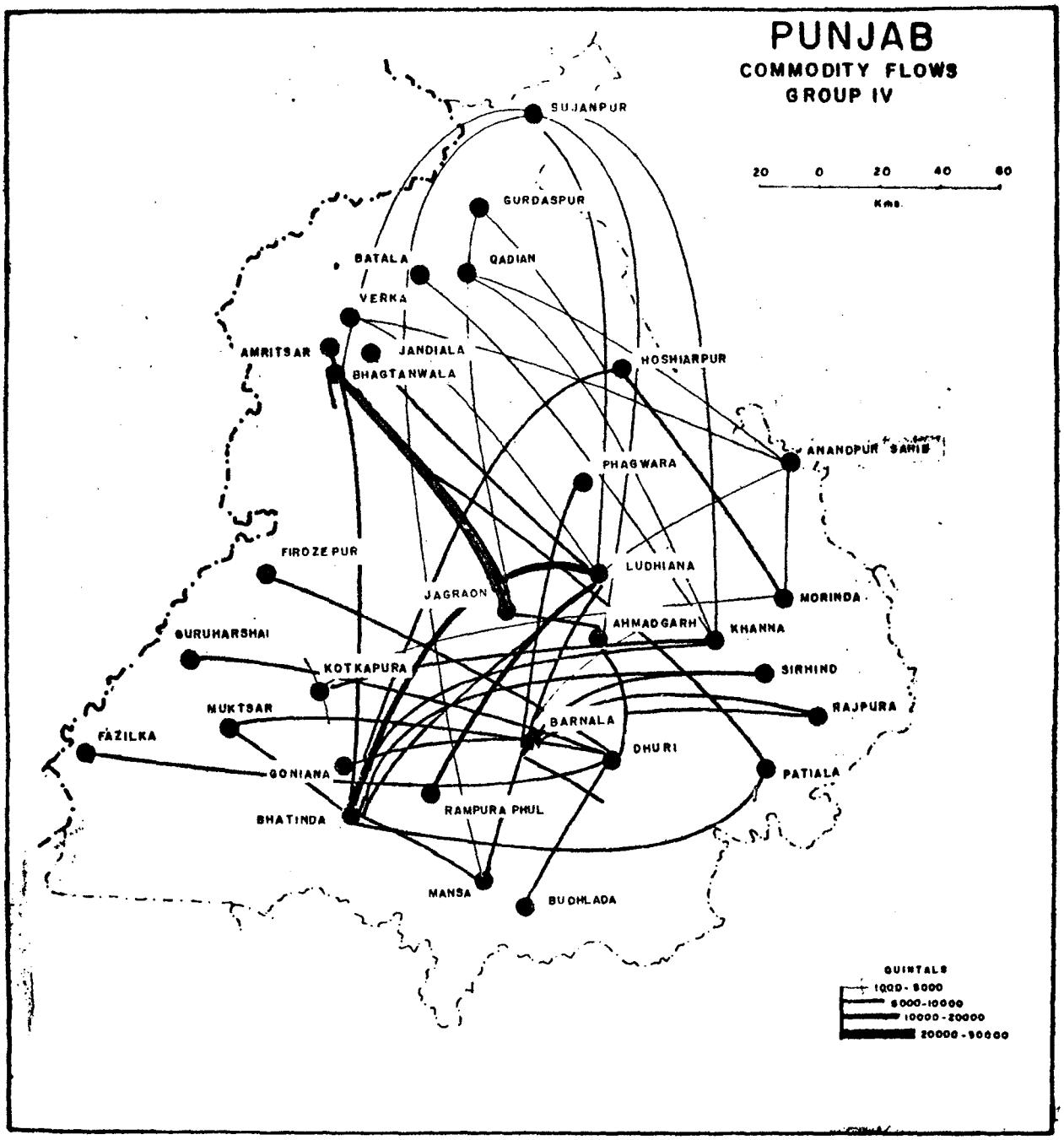

PUNJAB
COMMODITY FLOWS
GROUP IV
20 0 20 40 60
Kms.
SUJANPUR
GURDASPUR
BATALA
QADIAN
VERKA
AMRITSAR
JANDIALA
BHAGTANWALA
HOSHIARPUR
ANANDPUR SAHIB
PHAGWARA
FIROZEPUR
LUDHIANA
JAGRAON
MORINDA
AHMADGARH
KHANNA
GURUHARSHAI
KOTKAPURA
SIRHIND
MUKTSAR
BARNALA
RAJPURA
FAZILKA
DHURI
GONIANA
PATIALA
RAMPURA PHUL
BHATINDA
MANSA
BUDHLADA
QUINTALS
1000 - 5000
5000-10000
10000 - 20000
20000 - 50000

FIG 3.4

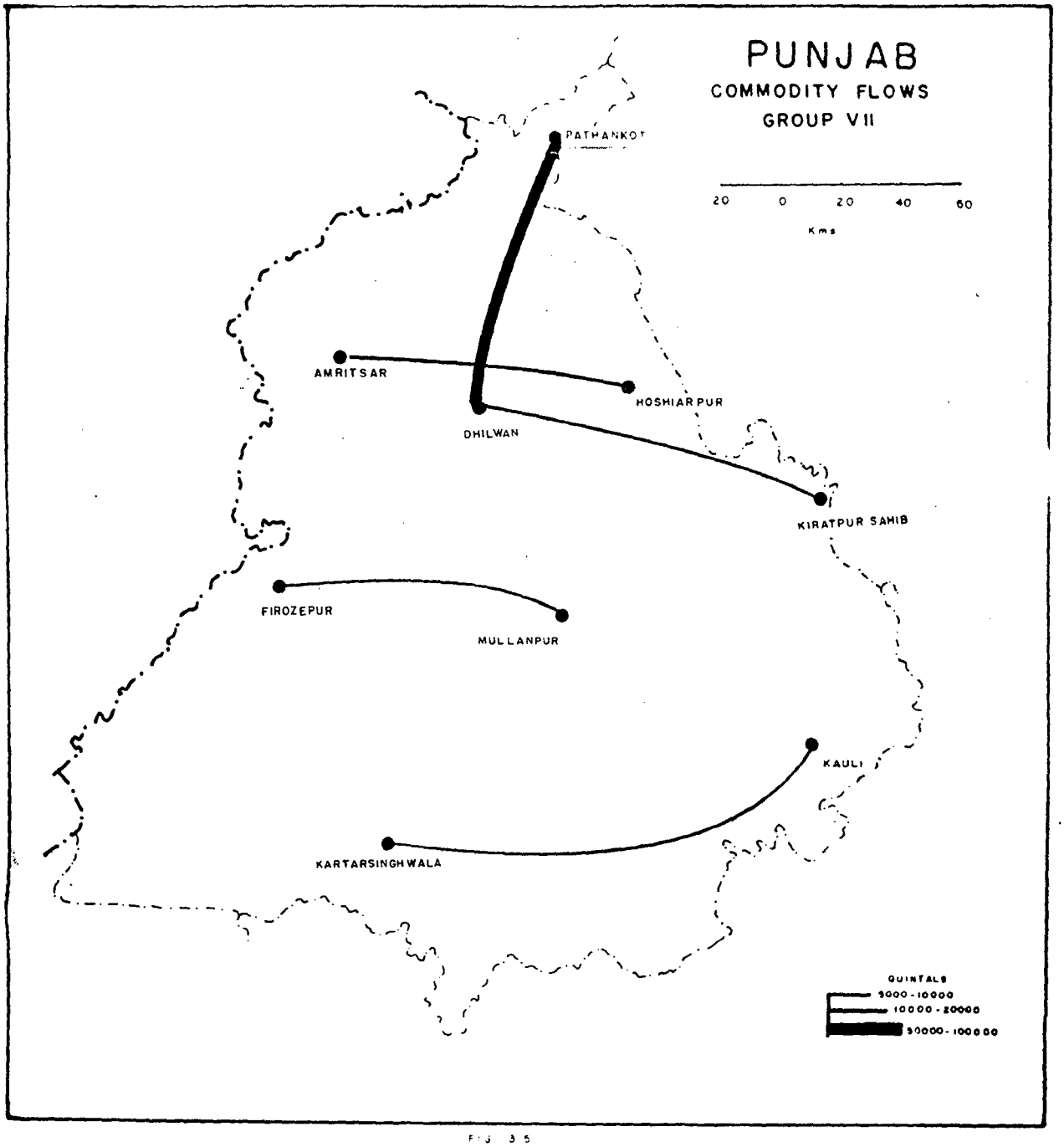
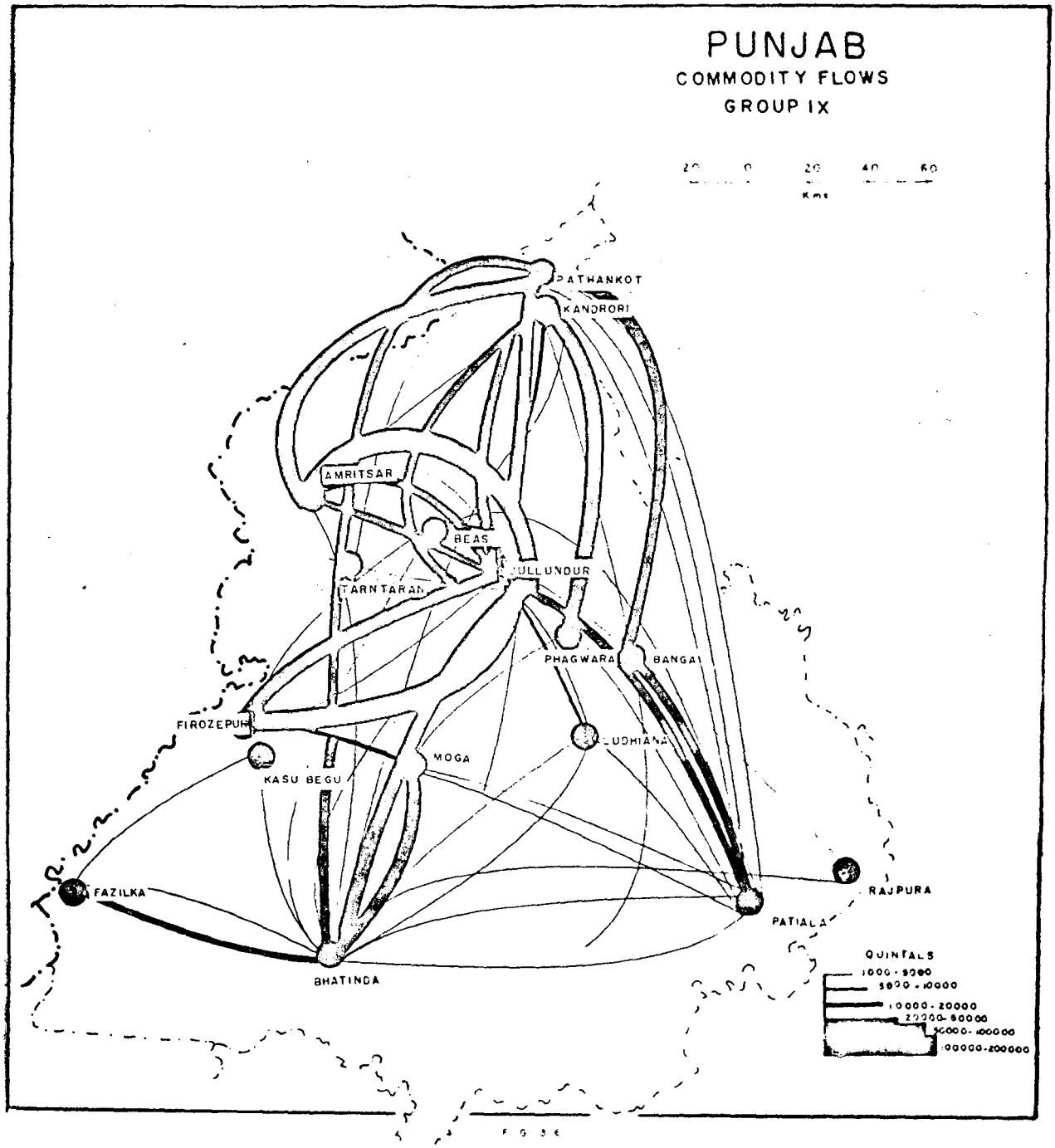

PUNJAB
COMMODITY FLOWS
GROUP VII
20 0 20 40 60
Kms
PATHANKOT
AMRITSAR
HOSHIARPUR
DHILWAN
KIRATPUR SAHIB
FIROZEPUR
MULLANPUR
KAULI
KARTARSINGHWALA
QUINTALS
5000 - 10000
10000 - 20000
50000 - 100000

FIG 3.5


PUNJAB
COMMODITY FLOWS
GROUP IX
Kms
PATHANKOT
KANDRORI
AMRITSAR
BEAS
TARNTARAN
PHAGWARA
BANGA
FIROZEPUR
MOGA
KASU BEGU
FAZILKA
BHATINDA
PATIALA
RAJPURA
QUINTALS
1000 - 5000
5000 - 10000
10000 - 20000
20000 - 50000
50000 - 100000
100000 - 200000

kot - Kandrori, Amritsar, Jullundur and Bhatinda. At a lower level, Patiala and Firozpur emerge with more or less common interacting centres. At the third level, centres such as Ludhiana, Banga, Moga etc. occur although their field is composed of weak regional ties.

It would appear from the map that the bulk of the flows is confined to a few centres which interact with each other involving medium distances. The map makes distance friction an obvious phenomenon.

Based on the above discussion, the following points may be made:

1. Distinct intra and extra-regional organizers of the economy are absent in the region.
2. Functional integration in the region is evident.
3. A healthy relationship between the flows of the agricultural and the industrial sectors exists.
4. In the interaction system, the South Western parts of the region, to a large extent, remain unconnected.

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Chapter IV

Shippers and Receivers - Integration of Local, Regional National Markets

The centres of production and consumption in an economy are integrated into a system through movement processes. While posing the problem earlier, we indicated that such integrations may be visualized at three area level - local, regional and national. The national economic system can be viewed as consisting of a number of small settlements interacting with a number of centres at local level. These local centres, in turn are integrated through a fewer number of centres at regional level. The regional centres are once again brought into the national system through a much fewer centres of national importance.

However, a clear distinction between centres at local, regional and national levels may not exist in reality. Infact, the range of movements may involve a combination of the three levels. In other words, a centre may interact at local, regional or national level or a combination of these with varying degree of intensity. Here, a taxonomy has been developed to identify the role of each interacting node in integrating the national space economy.

Similar to classification of urban centres according to their characteristics a classification may be made grouping the shippers and receivers of commodities as local, regional or national centres based on their dominant areal fields of interaction. A classification of this nature should of necessity answer the question "at what point can a centre be labelled as local, regional or national?" The numerical taxonomy adopted for this

purpose is a simple one. The mean interaction at the three levels is computed for the region as a whole. A positive departure from the mean would indicate specialization at particular levels. The departures from mean may be of varying magnitude indicating varying degree of specialization. The differing magnitudes are measured here through standard deviations from the norm. The procedure adopted, therefore, sieves out insignificant shippers/receivers, and brings out specialization of important centres whether they dominate at one area level or multi area level. The method also identifies the degree of specialization simultaneously.

The locality limit of a centre is defined as its interaction within a radius of 50 kms. The limit remains, however, arbitrary. Interactions taking place beyond this radius but within the state boundaries are termed regional. While those beyond the state boundaries as national.

Each interacting centre is therefore, classified as a local, regional or national centre (or a combination of these) only if it scores an interactance value exceeding the regional norm.

A Hierarchy of Local, Regional and National Centres

In this section we identify centres which dominate the local, regional and national markets, and establish their hierarchy if any. In the normal development of economic interaction, a three tier hierarchy is dicernible (Fig. 4.1). Thus, a pyramidal structure of space economy may be visualized as indicated by the figure. Although the figure suggests existance of well defined

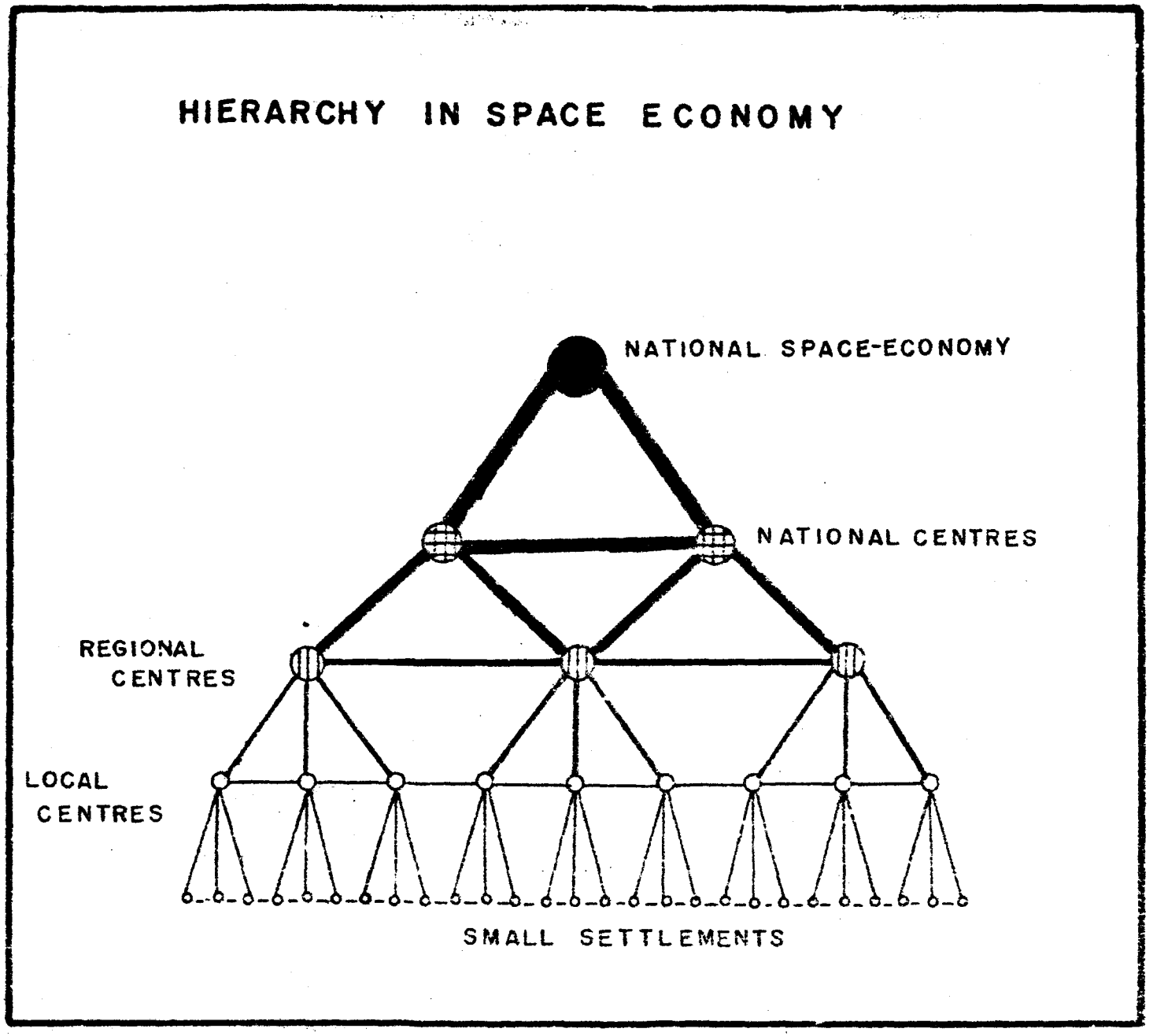
HIERARCHY IN SPACE ECONOMY
NATIONAL SPACE-ECONOMY
NATIONAL CENTRES
REGIONAL CENTRES
LOCAL CENTRES
SMALL SETTLEMENTS

FIG. 4-1

local, regional and national centres, in reality, many centres may be functioning at more than one level. Nonetheless, the essential structure of the model would be maintained in the normal course of regional economic development. To what extent this pattern of development is noticeable in the study area? This is the question discussed below.

Not all the centres show specialization at any of the three levels. Of the 127 shippers only 57 indicate specialization (Table 4.1). The specialization varies from purely local, regional or national level, to all possible combination of these, and also with differing magnitudes of specialization.

Table IV.1

Classification of Shippers

S. No.	Centres	Local Shipment	Regional Shipment	National Shipment	Classification
1.	Rajpura	0	3872	785006	N2
2.	Sirhind	0	4100	597611	N1
3.	Khanna	964	11326	1471239	N2R1
4.	Doraha	40	2053	377987	N1
5.	Budhlada	442	3768	335848	N1
6.	Mansa	848	7814	51714	N1
7.	Maur	4614	599	12483	L1
8.	Bhatinda	4580	71889	684240	R2L1N1
9.	Rampura Phul	6298	8494	387536	R1L1N1
10.	Barnala	12235	22060	731978	L2N2R1
11.	Dhuri	7959	70985	538720	R2L1N1
12.	Patiala	1711	33390	2218064	N3R1
13.	Ludhiana	24343	25513	800924	L3R1N2
14.	Philaur	0	6	385730	N1
15.	Phagwara	0	5892	658874	N1

16. Jullundur	6737	145969	278210	R3L1
17. Sura Nussi	1486	40845	20850	R2
18. Kartarpur	0	460	41881	N1
19. Dhilwan	9911	17	25425	L2
20. Beas	0	12822	308333	R1N1
21. Butari	0	5	387133	N1
22. Jandiala	0	2069	337335	N1
23. Amritsar	3667	19497	1392460	N3R1L1
24. Kot Kapura	4234	2490	763387	N2L1
25. Faridkot	5039	2002	299133	L1
26. Firozpur	3731	45635	317627	R2L1N1
27. Chheharta	2847	15378	314025	R1L1N1
28. Batala	34365	23148	1397222	N3L3R1
29. Dhariwal	37964	644	220380	L3
30. Dinanagar	3846	1793	126124	L1
31. Pathankot	5429	207080	232169	R3L1
32. Bhagtanwala	0	26738	717120	R1N1
33. Tarn Taran	3671	15701	1331807	N3R1L1
34. Patti	4	2450	335221	N1
35. Banga	0	13000	608657	R1N1
36. Nawashahar	0	12900	546718	R1N1
37. Hoshiarpur	0	9718	476048	N1
38. Tanda Urmar	20245	3	257861	L2
39. Dasuya	213	20635	217801	R1
40. Mukerian	12645	1096	371222	L2N1
41. Kapurthala	333	38738	1002620	N2R1
42. Makhu	0	21658	511592	R1N1
43. Fazilka	293	9078	464494	N1
44. Guruharshai	126	4582	505883	N1
45. Nakodar	3244	33	664582	N1L1
46. Talwandi	0	9991	462767	N1
47. Moga	9290	40543	2538643	N3R2L1
48. Jagraon	2082	43653	1471217	N3R2
49. Mullanpur	0	16602	513140	R1N1
50. Ahmadgarh	7476	2373	485550	L1N1
51. Mabrkotla	7194	5472	542515	N1L1

52. Sangrur	2972	3675	662441	L1N1
53. Sunam	220	12055	594747	N1
54. Sujanpur	0	15608	491962	R1N1
55. Muktsar	322	18368	603572	R1N1
56. Gurdaspur	50231	9804	470723	L3N1

L = Local 1 = within one standard deviation
R = Regional 2 = within two standard deviation
N = National 3 = Beyond two standard deviation.

The basic feature brought out by the classification is that a large number of centres singly specialize at national level exchange of commodities. However, none of these centres deviate more than two standard deviations from the norm. The distribution of these centres is mapped in Fig. 4.2 Evidently the 17 centres of national importance are not confined to any one part of the region but occur in clusters of two or three centres covering almost the entire region. A number of these as can be seen from the map are aligned along the Delhi-Amritsar axis.

At regional level, only two centres are to be noticed (Fig. 4.2). Again, neither of them score more than two positive standard deviations, as indicated by Table 4.1. Of the two centres Sura Nussi is predominantly concerned with shipment of defence commodities, where as Dasuya dominates the generation of food products.

Further down at the local level, only four centres emerge as essentially local centres (Maur, Dinanagar, Farid Kot and Dilwan). In line with the other mono level centres, none of the four show high degree of specialization. The common feature of the four local centres is that all of them have a high proportion of food product component in their shipments. Thus, it is clear

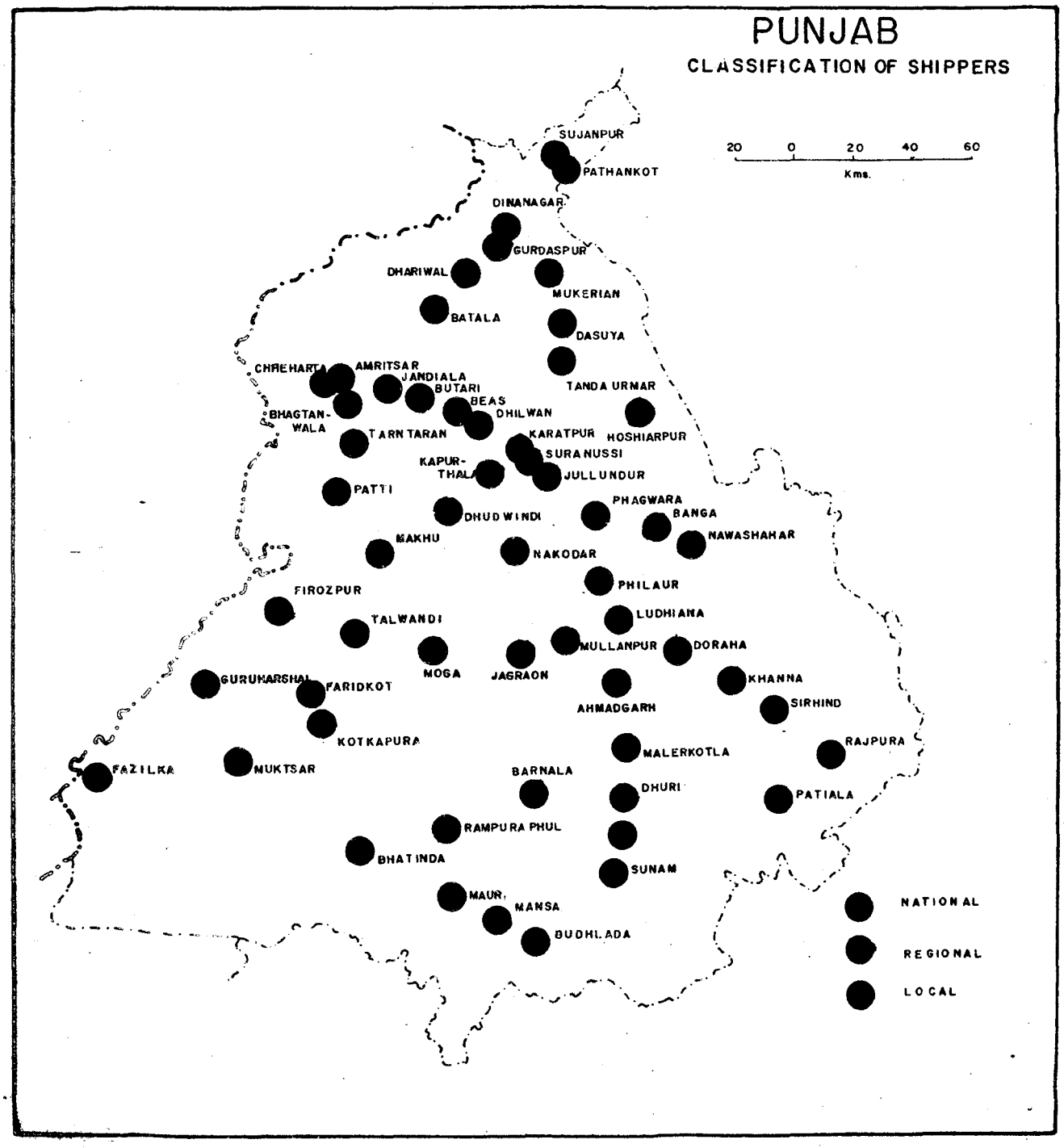
PUNJAB
CLASSIFICATION OF SHIPPERS
20 0 20 40 60
Kms.
SUJANPUR
PATHANKOT
DINANAGAR
GURDASPUR
DHARIWAL
MUKERIAN
BATALA
DASUYA
CHHEHARTA
AMRITSAR
JANDIALA
BUTARI
BEAS
TANDA URMAR
BHAGTAN-WALA
DHILWAN
HOSHIARPUR
TARN TARAN
KARATPUR
SURANUSSI
KAPUR-THALA
JULLUNDUR
PATTI
PHAGWARA
DHUDWINDI
BANGA
NAWASHAHAR
MAKHU
NAKODAR
PHILAUR
FIROZPUR
LUDHIANA
TALWANDI
MULLANPUR
DORAHA
MOGA
JAGRAON
GURUHARSHAI
FARIDKOT
KHANNA
AHMADGARH
SIRHIND
KOTKAPURA
MALERKOTLA
RAJPURA
FAZILKA
MUKTSAR
BARNALA
DHURI
PATIALA
RAMPURA PHUL
BHATINDA
SUNAM
MAUR
MANSA
BUDHLADA
NATIONAL
REGIONAL
LOCAL

FIG. 4·2

that the degree of specialization is not large in the case of specialization at any one area level.

Twenty three centres show specialization at two areal levels. Of these the most dominant combination is that of regional and national functions. Unlike the mono-level centres, a number of centres classified as bi-functional, show a higher degree of specialization either at regional or national level. Twelve out of the twenty three centres of bi-functional nature, indicate a combination of regional and national character.

Local-regional combinations are afforded by three centres, (Pathankot, Jullundur, and Dhariwal). Of these three centres, while Dhariwal dominates in the shipment of food products, Jullundur and Pathankot generate a variety of commodities. This leaves out eight centres in the odd combination of local and national specialization.

Only ten centres emerge with specialization at all the three levels. Again, a number of these centres record more than three standard deviations in atleast in one of the three categories. For examples larger centres like Amritsar show more than three standard deviations at national level, smaller centres like Batala, Gurdaspur, record high degree of specialization at local level. High degree of specialization at regional level, however, is not noticed in any combinations.

The classification of centres into the three categories discussed above brings out certain basic characteristics prevailing in the space economy of Punjab:

1. A number of centres interact more with the national system than with regional or local systems.

2. The hierarchy outlined in the normal development of space economy is distorted.

3. The distortion in the hierarchy is further accentuated by the odd specialization at local and national level.

4. The interaction at local level is weak.

Two explanations are possible for the distributions, either the distortions are a continuing process from the British colonial origin, or the information about interaction is incomplete, as short distance and even considerable long distance movements of certain commodities are accounted for by other modes of transport. However, it would not be unrealistic to assume that, the interaction matrix of movement by different modes of transport would be positively related with each other. In such a case the distortions in the integration of space economy can not be ruled out.

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Chapter V

Summing up

Movement is fundamental in integrating space economy. The importance of movement processes is stressed by the fact that it has been considered as an index of regional economic development. The functional ties between different parts of a region are established by flows. The flows are channelled through networks. The two (flows and networks) together influence the structure and growth of any economy. Although, the role of flows in the understanding of regional economic systems is undebatable, a review of literature on this aspect reveals only meagre attempts in this direction. Even in the advanced countries, studies of this nature are of recent origin. Particularly, in India, organised efforts to link space economy with movement processes are almost non-existant. This lacuna would assume greater proportions if one realizes the amount of resources spent on the collection of data relating to station to station commodity movement. More, so when data of such magnitude is unrecorded even in many of the advanced countries.

However, the mere availability of data does not make a study of this nature any simpler. Interaction matrices, are perhaps, the most difficult form of data to be analysed even with third generation computers. Of necessity, therefore, the dimensions of the data matrices are to be restricted. Even a restricted data matrix would however, be in a position to bring out basic linkages between the economy, space and movement.

In this study, a step has been taken in this direction. Available resources have doubtless placed further restriction on

the depth of the study, none the less, a number of features, basic to the Indian economy in general, and several others specific to the region, have emerged.

The following generalizations with reference to the characteristics of commodity flows and spatial organization may be made:

1. Regional specialization forms the base for the integration of the national economic system.
2. Urban dominance in the organization of space economy is overwhelming.

In addition to the above features, the following findings specific to Punjab may be brought out:

1. The economy of the region has a strong export base which is composed of food products.
2. This export base is strengthened by intra-regional flows of products from the secondary sector, particularly the intra-regional exchange of inputs into agriculture.
3. Flow patterns within suggest a high degree of homogeneity in the regional economy.
4. The regional interaction matrix indicates internally cohesive functional regions.
5. Distinct intra and extra-regional centres of interaction are absent in the region.
6. The single departure from the uniformity of railway gauge structure is reflected in the isolation of the South Western part of the region from the rest of the regional flow system.
7. A few large urban centres repeatedly emerge as the organizers of the regional economy irrespective of the nature of the commodity group involved.
8. The hierarchy in space economy is distorted.
9. The flows between the urban clusters constitute the bulk of the interactions taking place within the region.

The study has brought out a number of relationships existing between different sectors and regions of Punjab. Such relationships may be extended to other regions of the country provided they reveal a certain degree of internal homogeneity.

It is realized that the movement of commodities by railways consists essentially of long distance haulage. Therefore, a study of inter-regional movements in the National economic system may be more significant than intra-state movements. Therefore, a study of this nature extended to the national system as a whole would be more revealing, and the entire hierarchy of organisers of the national economy could be established.

* * *

APPENDIX I

Commodity Groups

Group I : Food Products - Raw, Semi-processes and Processed

Rice, gram and pulses, wheat, jawar, bajra, other grains, fruits and vegetables (fresh), sugar, molasses and gur jagree, khandsari sugar, vegetable and other edible oils, coffee, dry fruits, meat, eggs, fish (fresh and dry), groceries and other provisions.

Group II: Raw Materials for Manufacturing - of Agricultural (and associated) origin.

Oil seeds, cotton (raw, full pressed, ginned and half pressed), jute (raw, full and half pressed, waste and cuttings) sugarcane, tobacco (un manufactured), hides and skins, bones, lac, bidi leaves, wool (raw, loose and pressed), silk (raw and waste), hemp, rubber (raw and scrap).

Group III: Raw materials for manufacturing - minerals and semi-processed goods.

Limestone, dolomite, mangness ores, iron ore, mica, bamboo, steel, alluminium, soda, caustic, and soda ash, industrial alcohol, acids.

Group IV: Inputs into Agriculture

Fodder, oil cake, agricultural implements, manure (chemical, organic) seeds.

Group V: Industrial Fuels

Coal, coke and patent fuel, mineral oils, (kerosene, petrol, diesel and liquid fuel, liquid petrolium gas).

Group VI : Consumer Goods

Fire wood, salt, soap, matches, manufactured tobacco, cigarattes, biddies, gunnies, tanned skin and leather, rubber goods, tubes and tyres, woolen piece goods, artificial silk piece goods, silk piece goods,coir, cycle and cycle parts, motor cars and parts, electrical goods (bulbs, batteries, fans, etc.), glass ware, paper and paper products, paints and varnishes, colours and dyes, fire works, opium, drugs, films.

Group VII : Construction Materials

Marbles and stones, sand, charcoal, timber and wood, cement, bricks, asbestos, tiles, coal tar, lime, china clay.

Group VIII: Livestock

Group IX : Defence Goods

(Un-specified).

* * * *

APPENDIX II

Shipments and Receipts of Commodities

S.No:	Stations	Shipments within the state	Total Shipment	Receipts
		(Quantity in Quintals)		
1.	Sambhu	1	1	2
2.	Rajpura	3872	788878	14208
3.	Surai Banjara	0	0	8
4.	Sadhoo Garh	0	0	4
5.	Sirhind	2936	601711	6232
6.	Khanna	12490	1483729	7217
7.	Chawapail	0	0	27739
8.	Doraha	2093	380080	2336
9.	Sonahwal	0	0	1820
10.	Dhandari Kalan	0	0	2398
11.	Lalru	469	988	1024
12.	Dhulkot	4249	8085	1120
13.	Bahadurgarh	11598	16826	15788
14.	Bareta	633	158821	1612
15.	Budhlada	4210	340058	6455
16.	Mansa	8662	525836	7791
17.	Maur	5113	129956	4248
18.	Maisar Khana	0	0	5
19.	Kot Fateh	5715	7263	6
20.	Kartar Singh Wala	0	0	3833
21.	Bhatinda	27738	76469	82948
22.	Bhuchchu	5125	123907	3973
23.	Rampuraphul	14792	402328	9915
24.	Hadiaya	6	30	4
25.	Barnala	34295	766273	7921
26.	Sekha	2204	2204	0
27.	Alal	0	0	6
28.	Dhuri	78944	617664	21412
29.	Patiala	35101	2253165	19605
30.	Kanli	1401	2742	1

31.	Nangal	6593	78345	4842
32.	Anandpur Sahib	4983	7286	5965
33.	Kiratpur Sahib	4156	71935	170
34.	Bharatgarh	330	750	0
35.	Ghanauli	0	0	12
36.	Ropar	594	79188	1607
37.	Kurali	2577	174472	1474
38.	Morinda	3146	261386	2467
39.	Bassi Pathnan	104	128507	462
40.	Ludhiana	49856	850780	612632
41.	Phi laur	6	385736	1142
42.	Goraya	33	635	1323
43.	Phagwara	5892	664766	5401
44.	Chiheru	0	0	18
45.	Jullundur	152706	1326297	61546
46.	Sura Nussi	47582	68432	33940
47.	Kartarpur	460	419271	447
48.	Hamira	308	60315	38109
49.	Dhilwan	9928	35353	19658
50.	Beas	12822	327155	8858
51.	Butari	5	387138	6
52.	Tangra	0	0	1
53.	Jandiala	2069	339404	2488
54.	Mananwala	0	0	10
55.	Amritsar	23164	1415624	67947
56.	Goniana	4510	35859	3970
57.	Chand Bhan	0	0	8
58.	Jaitu	4882	62205	2942
59.	Kot Kapura	6724	770111	16794
60.	Faridkot	7043	306176	11381
61.	Gobhwala	6	43	6
62.	Kasu Begu	152	152	3203
63.	Firozpur	49366	1015123	119056
64.	Majitha	4512	28680	1841
65.	Fatehgarh Churian	2426	19327	1118

66.	Hardarawala	0	0	225
67.	Ramdas	2	2	3
68.	Derababa Nanak	150	14506	1006
69.	Atari	5	5	0
70.	Khasa	30	1572	500
71.	Chheharta	18225	332250	5651
72.	Qadian	1998	45215	2578
73.	Ver	2444	8199	2167
74.	Kathunagal	5	5	9
75.	Jaintipura	1902	3456	0
76.	Batala	57513	1454735	3678
77.	Dhariwal	44408	264788	670
78.	Gurdaspur	60035	530758	9917
79.	Dinanagar	5639	131763	3005
80.	Jakalori	0	0	128
81.	Sarna	2395	12165	3329
82.	Bharoli	2520	24405	61859
83.	Pathankot	212509	444678	48525
84.	Bhagtanwala	26738	743858	14038
85.	Gahlwar Varpal	0	0	216
86.	Tarn Taran	19372	1351179	22799
87.	Kairon	0	0	5
88.	Patti	2454	337665	834
89.	Baparai	0	0	3
90.	Gharyala	15	15	7
91.	Valtoha	540	540	4
92.	Khem Karan	0	0	16
93.	Mandholi	0	0	3
94.	Kulthan Abdullah	0	0	9
95.	Bahram	38	60	247
96.	Banga	10905	621657	6956
97.	Nawashahar	12900	559618	4389
98.	Garhshankar	13	3181	2264
99.	Saila Khurd	0	0	64
100.	Jai Jon Doaba	105	7956	82
101.	Khurdpur	3	15963	228

102.	Sham Chaurasi	0	0	239
103.	Nasrala	0	0	4
104.	Hoshiarpur	9718	485766	2763
105.	Bhagpur Sirwal	2	1898	270
106.	Tanda Urmar	20248	278109	1102
107.	Dasuya	20848	228749	1283
108.	Unchi Bassi	7175	23184	6463
109.	Mukerian	13741	384963	3885
110.	Mirthal	188	276	7
111.	Kandrori	4916	9031	145576
112.	Chakki Bank	1840	126817	206879
113.	Kapurthala	39071	1041691	2522
114.	Sultanpur Lodi	1799	359179	5289
115.	Lohian Khas	2	739	14
116.	Jogiwala	0	0	4
117.	Makhu	9823	21658	4045
118.	Butewala	0	0	4
119.	Mullanwala Khas	8	15	254
120.	Maholam	0	0	30
121.	Fazilka	9371	473865	27306
122.	Ladhuka	242	1297	259
123.	Bahmaniwala	0	0	4
124.	Jalalabad	11380	300354	12711
125.	Guruharshai	4608	510491	81496
126.	Jhakthal Singh	32	32	22554
127.	Bilga	0	0	12
128.	Nurmahal	233	17380	16
129.	Nakodar	3277	667859	3619
130.	Malsian Sahkot	1658	22787	686
131.	Ferozeshah	0	0	11107
132.	Talwandi	9991	472758	11327
133.	Moga	49833	2588476	27665
134.	Ajitwal	0	0	5
135.	Jagraon	45735	1516952	16130

136.	Chaukiman	0	0	220
137.	Mullanpur	16602	529742	4386
138.	Kila Raipur	0	0	1617
139.	Ahmadgarh	10140	495690	19742
140.	Malerkotla	12666	555181	3187
141.	Himmatana	0	0	13
142.	Sangrur	6847	669288	4943
143.	Sunam	12275	607022	8042
144.	Lehra Gaga	720	259787	6188
145.	Jamalpur Shaikhan	0	0	4834
146.	Malout	844	44428	469
147.	Giddarbaha	187	27711	317
148.	Sujanpur	15608	507570	2353
149.	Raman	8429	135437	2798
150.	Bariwala	621	116920	304
151.	Muktsar	18690	622262	6392
152.	Lakhewali	0	0	177
153.	Roranwala	10	54	33
154.	Sanget	14	87888	101

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