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It is certified that the dissertation entitled "Spatial and Temporal Variations in Levels of Development: A Case Study of Bihar" submitted by Mr. Salamuddin Ansari, in partial fulfilment of the requirement for the Degree of Master of Philosophy (M.Phil) of the University, is a bonafide and original work to the best of my knowledge and may be placed before the examiners for evaluation.

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Chapter I

INTRODUCTION

Chapter I

INTRODUCTION

1.1 Statement of the Problem

The basic aim of planned and sustained economic growth and development has been assured by the State in almost every country of the world and this is now acknowledged as the most important goal of economic policy. This responsibility, however, acquires greater importance in a democratic country wedded to the policy of growth with social justice. The very preamble of the Indian Constitution guarantees social, economic and political justice and resolves to create conditions for equality of status and of opportunity for all the citizens.

The progress of economic development at any time, however, is never even and smooth throughout the length and breadth of any country. The pace of growth is quicker in certain areas as compared to others for various socio-economic (i.e. difference in natural endowments and technological achievements) and historical reasons. This ultimately results in regional economic disparities and imbalances and creates the problem of economic backwardness in certain areas. The industrialized countries of the West also faced the problems of "Depressed Areas" where economic conditions remained relatively stagnant while the other areas at the same time enjoyed continuous economic prosperity. The existence of such economic disparities in our country violates the basic ideals enshrined in our Constitution and at the same time it generates a feeling of economic insecurity and

frustration. At this stage the "Regional Planning" becomes quite necessary, as it involves the determination of the hierarchy of regions as well as the hierarchy of problems which should be tackled at different regional levels and temporal stages. It is the only sure means of removing unjustified disparities in socio-economic development. [No region should be allowed to grow at the cost of other regions unless the national interests so demand. Every part of the country should be enabled to develop itself to the fullest extent. This can be done only through proper "Regional Planning". The present study, Spatial and Temporal Variations in Levels of Development: A Case Study of Bihar, has been conducted with a view to have some concrete help in this matter.

When we take India for consideration we find that the pace of economic development is not even throughout the country. Some of the states are most developed, e.g., Punjab and Haryana, while some of the states are least developed, e.g., Bihar and Uttar Pradesh. The state of Bihar is one of the least developed states in the Indian sub-continent and is regarded as a backward state or a depressed area. But when we consider the natural endowments of Bihar we find that although it is regarded as a "Depressed Area", its growth potentialities are vast.] For example Bihar is very rich in agricultural resources. The Gangetic Plain, with fertile alluvial soil, covers an area of about 28,000 square miles or about 42 per cent of territory of the state. Out of every 100 acres of land in the state, nearly

49 acres are under the plough as against 46 acres in India. Even more in the districts of North Bihar Plain out of every 100 acres of land, nearly 60 to 74 acres are under the plough. In spite of that Bihar is agriculturally backward and deficient in food production. It is mainly due to less irrigation facilities, more dependence of agriculture on rainfall, low per hectare yield of crops, etc., which is quite clear from the table given below:

Table I

Table[1] showing the position of Bihar and India in 1970-1971

		Bihar	INDIA
1.	Percentage of net area sown to total area.	48.8	46.1*
2.	Percentage of Gross Irrigated area to gross cropped area	24.8	23.0*
3.	Per hectare yield of rice in Kgs	829.3	1123.0
4.	Per hectare yield of wheat in Kgs	957.0	1307.0
5.	Per hectare yield of maize in Kgs	952.0	1279.0

The other important factors setting back the agricultural economy of Bihar are the frequent occurence of devastating floods in the low-lying areas of North and South Bihar Plains and droughts in large areas of Chhotanagpur Plateau.

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* Provisional.

1 Government of India (1974), Indian Agriculture in Brief, Directorate of Economics and Statistics, Ministry of Agriculture, the Controller of Publications, Civil Lines, Delhi, pp. 28-45.

Bihar, especially North and South Bihar Plains are rich in water resources, as they are drained by many perennial rivers like Ganges and its tributaries namely Gandak, Burhi Gandak, Bagmati, Gogra (Saryu), Kamla, Kosi, Mahananda, Son, Punpun, Morhar, Phalgu, etc. If the water of these rivers would have been utilized for irrigation and hydro-electric generation, there would have been great agricultural and industrial development in Bihar.

(3) South Bihar, especially Chhotanagpur Plateau area is the richest mineral belt not only in Bihar but also in the whole of Indian sub-continent and is compared to the 'Ural Region' of the U.S.S.R. It contains the world's largest reserves of Mica and also large quantities of iron ore, coal, copper, bauxite, limestone, kyanite, chromite, asbestos, clay, etc., and thus provides large scope for the development of heavy metallurgical and other industries in the region. Although varying degree of industrialization has taken place in this region, it is not upto the extent of its fullest potentialities.

(4) Bihar, with a population of 56,353,369 persons and a density of 324 persons per square kilometre, is the second most populous and the third most densely populated state in India. Thus, it is also very rich in human resources. But when we consider the work-force, we find that only 31.03 per cent of the total population of Bihar consists of workers as against 33.3 per cent for the country as a whole. And the majority of its

workers (about 83.22 per cent) are engaged in primary sector as against 72.1 per cent for the country as a whole. The high percentage of workers in secondary and tertiary sectors is generally regarded as an indicator of economic progress. But in this case also we find that the position of Bihar is below the country average. For example, in Bihar the percentage of workers engaged in secondary and tertiary sectors is 9.66 and 7.11 respectively as against 16.7 and 11.2 respectively for the country as a whole. Thus we find that Bihar is lagging behind in respect of work-force, although it is one of the most populous states of the country.[5]

Urbanization and literacy are also generally regarded as indicators of economic progress. In Bihar the urban population constitutes only 10.0 per cent of the total population and the extent of literacy is 19.9 per cent. Corresponding figures for the country as a whole are 19.3 per cent and 29.35 per cent respectively.

In this way we find that in spite of rich agricultural, water, mineral and human resources Bihar is lagging behind in each and every field. Thus, there exists a paradox - a region or state richest in natural resources but poorest or lowest in economic development. At this stage it becomes imperative to conduct a research work and find out some feasible solution for it.

1.2 Objectives of the Study

(i) To analyse the causes for low levels of development.

(ii) To assess the resource potential.

(iii) To evaluate the factors that contribute to disparities in levels of development between regions.

(iv) To determine the hierarchy of regions (in respect of development) as well as the hierarchy of factors which are affecting the development of regions, so that they should be tackled first at different regional levels and temporal stages.

(v) To suggest patterns of integrated development of Bihar in an intra-regional and inter-regional context.

1.3 Hypothesis to be Tested

Spatial inequalities in development are often accentuated by inequalities in resources potential and imbalances in the regional structure of development.

1.4 Regional Setting

For the present study the state of Bihar has been selected. Geographically it is situated between 21° 58' 10" north and 27° 31' 15" north latitude and 83° 19' 50" east and 88° 17' 40" east longitude.[2] It is a land-locked territory with an area of

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2 Government of Bihar (1972), Bihar Through Figures, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 1.

173,876 square kilometres[3] (about 67,196 square miles) bounded on the north by Nepal, on the east by West Bengal, on the south by Orissa and on the west by Madhya Pradesh and Uttar Pradesh (see figure no. 1). According to 1971 Census the state of Bihar, with a population of 56,353,369 (56 million approximately), is the second most populous state after Uttar Pradesh (88.3 million) and with a density of 324 persons per square kilometre, it is the third most densely populated state in India after Kerala and West Bengal (549 and 504 persons per square kilometre respectively). It occupies about 5.3 per cent of total area of India whereas its share of total Indian population is about 10.40 per cent.

Bihar is the only state where the Indian plain and plateau really meet. The state, therefore, is geographically representative of the two major Indian physical units - the young unstable alluvial Indo-Gangetic Plain rich in agricultural resources and the ancient rigid crystalline Peninsular Upland of granite, gneisses and schists rich in mineral resources. A little portion of new folded mountains (Himalayan Siwaliks) is also represented in the extreme north-western part of this state. Thus the state of Bihar can be divided into three following physiographic regions:

(i) Himalayan Foothills.

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3 Government of Bihar (1971), Bihar Statistical Hand Book, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 4.

(ii) The Gangetic Plain = (a) North Bihar Plain
(b) South Bihar Plain

(iii) The Southern Hills and Plateaus.

(i) Himalayan Foothills:- This is a narrow hilly region in the extreme north-western part of Bihar in Champaran district. This is a part of well-known Siwalik Range of the Himalayan foothills, which was formed during Tertiary Time. This region covers an area of about 364 square miles[4] and is roughly delimited on the south by 500 feet contour line. The region consists of two ranges of hills - The Ramnagar Dun and Sumeswar Range - with intervening valleys, all parallel to the Nepal border in a north-west to south-east direction. The Ramnagar Dun or Dun Range is about 32 kilometres long and comparatively lower than the Sumeswar Range which runs along 72 kilometres at an average altitude of about 1500 feet (about 450 metres) above sea-level. The whole of this region is made up of relatively young, sedimentary rocks of Late Tertiary times (sandstones and pebbles).

(ii) The Gangetic Plain:- The second major physiographic region of Bihar is the Gangetic Plain or Ganga Plain which covers an area of about 28,000 square miles or about 42 per cent of territory of the state. It is roughly delimited in the south by 500 feet contour line. On the basis of differences in relief

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4 Enayat Ahmad (1965), Bihar - A Physical, Economic and Regional Geography, Ranchi University Press, Ranchi, pp. 19-26.

features the Gangetic Plain has been divided into two parts[5] by River Ganges:

(a) North Bihar Plain.

(b) South Bihar Plain.

(a) North Bihar Plain:- The entire plain area lying north of River Ganges is known as North Bihar Plain. Politically, it comprises the districts of Saran, Champaran, Muzaffarpur, Darbhanga, Saharsa and Purnea. It accounts for about 27.96 per cent of the total area of the state and about 66.81 per cent of the total area of the Gangetic Plain. It is composed of highly fertile alluvial soil and thus provides a strong agricultural base. The whole of this area is almost a dead-level plain. The imperceptible general slope is from the north-west to the south-east as shown by the courses of the rivers. From the north-western to the south-eastern corner of North Bihar Plain the slope is roughly 100 feet in 250 miles. This region is drained by snow-fed perennial rivers (the tributaries of Ganges) namely, Gandak, Burhi Gandak, Gogra, Baghmati and Kisi, etc. and thus is rich in water resources.

(b) South Bihar Plain:- The plain area lying south of River Ganges and north of 500 feet contour line is known as South Bihar Plain. Politically, it comprises the districts of Shahabad,

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5 National Council of Applied Economic Research (1959), Techno-Economic Survey of Bihar, vol. 1, Leaders' Press Private Ltd., Asia Publishing House, New Delhi, p. 3.

Gaya, Patna, Monghyr and Bhagalpur. It covers about 13.89 per cent of the total area of the state and about 33.19 per cent of the total area of the Gangetic Plain. This plain is irregularly defined in the south because of the approach of the southern hills and plateaus. It gradually tapers from a wide base in the west to a narrow tongue on the north of the Rajmahal Hills. Its surface rises more rapidly away from the River Ganges than the North Bihar Plain. It is largely made up of the alluvial brought from the southern hills and plateaus and, therefore, provides sound agricultural base. Its general slope is from the south-west to the north-east. It is also drained by many rivers like Son, Punpun, Morhar, Phalgu, Chandan, etc. As we move towards south outliers of ancient crystalline rocks appear as low and high hills, for example, Pirhari Hills (361 feet) near Bihar-sharif, the Barabar Hills in Gaya district, the Rajgir Hills (1462 feet) which extend continuously towards Gaya and the Kharagpur Hills (500 to 1000 feet) in Monghyr district.

(iii) The Southern Hills and Plateaus:- As it is mentioned earlier, the whole area south of 500 feet contour line is the hills and plateau region of South Bihar. Politically, it comprises the districts of Palamau, Hazaribagh, Ranchi, Singhbhum, Dhanbad and Santhal Paraganas and accounts for about 57.60 per cent of the total area of the state. All this tract except the Kaimur Plateau of Shahabad and the Rajmahal Hills of Santhal Parganas is known as the Chhotanagpur Plateau. In Chhotanagpur region there

are four plateaus, such as (i) Higher Ranchi Plateau or Pat region (2500 to 3600 feet above sea-level) composed of Deccan lava; (ii) Lower Ranchi Plateau (about 2000 feet above sea-level) made up of mostly granite and gneisses; (iii) Lower Chhotanagpur Plateau (about 1000 feet above sea-level) composed of granite, gneisses, schists and other Dharwar rocks; and (iv) The Lowest Plateau having uniform surface formed by the river valleys, plains (500 to 1000 feet above sea-level) composed of granite and gneisses and partly of schists etc. The basaltic Rajmahal Hills which were formed towards the end of Gondwana period and the Kaimur Plateau of Vindhyan period composed of sandstones belong to the fourth erosion level or the Lowest Plateau. The highest point in Bihar is formed by the isolated conical hill of Parasnath rising upto 4480 feet above sea-level, which is situated in the eastern part of Hazaribagh district or Chhotanagpur Plateau region.

The whole of this region is drained by three main rivers - Damodar, Baraker and Suburnrekha - which directly flow to the Bay of Bengal. The Damodar river flows from west to east through the middle of Chhotanagpur and thus provide enough potentialities for hydro-electric generation and irrigation in this region. Baraker flows in easterly direction while Suburnrekha to south-easterly direction thus indicating the general slope of this region towards east and south-east-direction. The valley belt of Damodar consists of softer rocks known as Gondwana while the

rest of Chhotanagpur Plateau is composed of hard crystalline rocks of granite, gneisses and schists and is, therefore, rich in mineral resources.[6] It contains the world's largest reserves of mica, and also large quantities of iron ore, coal, copper, bauxite, limestone, Kyanite, chromite, asbestos, clay, etc. and thus provides enough opportunities for the development of heavy metallurgical and other industries in the region. As the hills and plateaus are covered by forests, this region is also very rich in forest resources.

In spite of all these natural endowments the state of Bihar is regarded as an under developed region. Thus there exists a paradox - "A region or state richest in natural resources but poorest or lowest in economic development". It may be due to unplanned utilization of natural resources and other factors too. Therefore, it becomes necessary to take up this region for research work and find out feasible solution to maximise the regional resource utilization and develop this region to the fullest extent and thus remove unjustified disparities in socio-economic development of this region.

For administrative purposes, Bihar has been divided into following commissionaries or divisions and districts:

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6. Ibid., p. 5.

Divisions	Districts	
	Upto 1971	At present (May 1976)
1. Patna Division	1. Patna	1. Patna
		2. Nalanda
	2. Gaya	3. Gaya
		4. Aurangabad
		5. Nawadah
	3. Shahabad	6. Bhojpur
		7. Rohtas
2. Tirhut Division	4. Saran	8. Saran
		9. Siwan
		10. Gopalganj
	5. Champaran	11. East Champaran
		12. West Champaran
	6. Muzaffarpur	13. Muzaffarpur
		14. Vaishali
		15. Sitamarhi
	7. Darbhanga	16. Darbhanga
		17. Samastipur
		18. Madhubani
3. Bhagalpur Division	8. Monghyr[7]	19. Monghyr
	9. Bhagalpur	20. Bhagalpur
	10. Santhal Parganas	21. Santhal Parganas
4. Kosi Division (Formed after 1971)	11. Saharsa	22. Saharsa
	12. Purnea	23. Purnea
		24. Katihar
		25. Begusarai
5. Chhotanagpur Division	13. Palamau	26. Palamau
	14. Hazaribagh	27. Hazaribagh
		28. Giridih

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7 Monghyr district has been divided into two districts - (i) Monghyr and (ii) Begusarai. Monghyr is still in Bhagalpur Division but Begusarai has gone to Kosi Division.

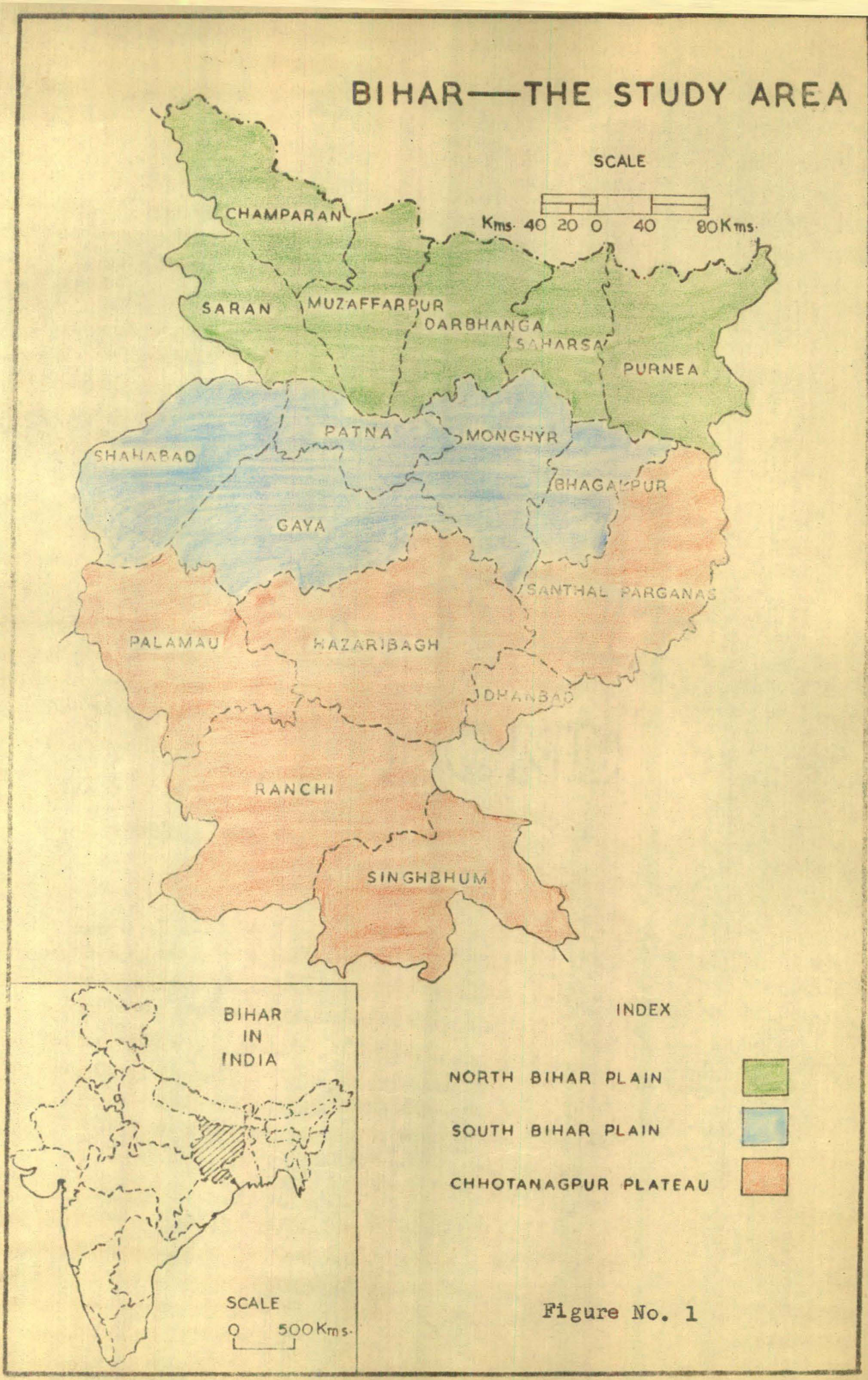
BIHAR—THE STUDY AREA
SCALE
Kms. 40 20 0 40 80 Kms.
CHAMPARAN
SARAN
MUZAFFARPUR
DARBHANGA
SAHARSA
PURNEA
PATNA
MONGHYR
SHAHABAD
BHAGALPUR
GAYA
SANTHAL PARGANAS
PALAMAU
HAZARIBAGH
DHANBAD
RANCHI
SINGHBHUM
BIHAR IN INDIA
SCALE
0 500 Kms.
INDEX
NORTH BIHAR PLAIN
SOUTH BIHAR PLAIN
CHHOTANAGPUR PLATEAU

Figure No. 1

15. Ranchi	29. Ranchi
16. Dhanbad	30. Dhanbad
17. Singhbhum	31. Singhbhum

Thus it is clear from the above chart that formerly there were only four divisions and seventeen districts, but at present there are five divisions and thirty-one districts. The administrative considerations play an important role in making development plans. Thus a region which is not administratively viable would be hardly of any use. Therefore, in the present study district has been selected as unit area. The availability of data also act as an important constraint in the choice of regions. As the data are not available in terms of new thirty-one districts, the old seventeen districts have been selected for the present study and grouped into the following three broad regions based on geographical homogeneity and contiguity (see figure no. 1):

Broad Regions	Districts (17 → 30)
1. North Bihar Plain	Saran, Champaran, Muzaffarpur, Darbhanga, Saharsa and Purnea.
2. South Bihar Plain	Shahabad, Patna, Gaya, Monghyr and Bhagalpur.
3. Chhotanagpur Plateau	Palamau, Hazaribagh, Ranchi, Singhbhum, Dhanbad and Santhal Parganas.

The data have been collected and analysed in terms of only these districts and broad regions.

1.5 Data Base and Methodology

The present methods of planning in Bihar are scheme-based,

and not area based, for example, there are separate plans for industrial, agricultural, electricity, irrigation, transportation, production, etc., development. Sometimes on the basis of one variable, i.e. industrialization, an area is divided into developed and backward regions, and development plans are made accordingly. But actually the planning should be area-based, and not the scheme-based, because all human activities take place in the geographical surface. Again the problem of economic backwardness can not be equated with the industrial backwardness only. It is a multi-dimensional problem covering not only industries but also agrarian, social, economic and political structure. If at a time only one variable is taken and development plans made, there would not be an overall development of the region. For an overall or balanced development of a region all variables contributing to the development should be considered at the same time. With this view in mind 29 variables from different aspects of the regional economy have been selected for the present study and analysed with reference to unit area, that is district. The time constraints inhibit intensive study based on block or tahsil level data. This study is, therefore, a preliminary attempt and yet a necessary step in the analysis of the problem. Field-work would also be necessary in subsequent stages of the work. These variables have been classified into the following three broad groups:

Groups	No. of variables
1. Agriculture	12

2. Occupational patterns 12

3. Socio-economic characteristics 5

The first group in agriculture consists of the following 12 variables:

(i) Percentage of net area sown to total area.

(ii) Percentage of area sown more than once to total area.

(iii) Percentage of cultivated area to total cultivable land.[8]

(iv) Percentage of area under forest to total area.

(v) Percentage of area under rice to gross cropped area.

(vi) Percentage of area under wheat to gross cropped area.

(vii) Percentage of area under maize to gross cropped area.

(viii) Per hectare yield of rice in kilogrammes.

(ix) Per hectare yield of wheat in kilogrammes.

(x) Per hectare yield of maize in kilogrammes.

(xi) Normal annual rainfall in millimetres.

(xii) Percentage of gross irrigated area to gross cultivated land.

The first three variables have been selected with a view to know the land-use pattern as well as the levels of agricultural development. The fourth variable, that is, area under forest has been selected mainly with a view to know the land-use pattern. Although it does not show the levels of agricultural development, it is related to agriculture. The yield and acreage

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8 Here cultivable land includes current fallows, other fallow lands and net area sown.

of crops generally indicate the production trends and cropping patterns and ultimately the levels of agricultural development in an area. For the present study the yield and acreage of only rice, wheat and maize have been selected, because these are the major crops covering about $\frac{3}{4}$th of the total cultivated area in almost each and every district of the state. Although rainfall does not show the level of agricultural development, it is one of the most important factors affecting the agriculture of Bihar. Irrigation has been selected because it shows the level of agricultural development; and it is one of the most important factors contributing to the development of agriculture.

The second group of occupational patterns consists of the following 12 variables:

(i) Percentage of total workers to total population.

(ii) Percentage of workers engaged in primary sector to total workers.

(iii) Percentage of cultivators to total primary sector.

(iv) Percentage of agricultural labourers to total primary sector.

(v) Percentage of workers engaged in secondary sector to total workers.

(vi) Percentage of workers engaged in household industry to total secondary sector.

(vii) Percentage of workers engaged in manufacturing industry other than household to total secondary sector.

(viii) Percentage of workers engaged in construction to total secondary sector.

(ix) Percentage of workers engaged in tertiary sector to total workers.

(x) Percentage of workers engaged in trade and commerce to total tertiary sector.

(xi) Percentage of workers engaged in transport, storage and communication to total tertiary sector.

(xii) Percentage of workers engaged in other services to total tertiary sector.

All these variables have been selected with a view to know the occupational structure of Bihar which indirectly reflects the level of economic development. The workers engaged in live-stock, forestry, fishing, hunting, plantation, orchards and allied activities, and mining and quarrying have not been selected for the present study due to some technical difficulty. In 1961 workers engaged in all these fields were considered as one category and included in primary sector, but in 1971 the workers engaged in mining and quarrying are considered as a separate category and included in secondary sector. Thus the separate data for workers engaged in mining and quarrying is not available for the year 1961.

The third group of socio-economic characteristics consists of the following 5 variables:

(i) Density of population per square kilometre.

(ii) Percentage of Scheduled Castes and Scheduled Tribes to total population.

(iii) Percentage of literates to total population.

(iv) Percentage of urban population to total population.

(v) P.W.D. road mileage density per 1000 square miles.

High or low density of population in a region is not by

chance but it is due to certain physical, social and economic factors. In the present study the density of population has been included only with a view to see its distributional pattern and relationship with the factors contributing to the development of Bihar. The rest of the four variables of this group have been selected on the basis that they indicate the levels of socio-economic development of a region.

In pursuance of the main objective of working-out the levels of economic development and pointing-out the spatial and temporal variations in them, districtwise data on all the variables mentioned above have been collected for two time periods - 1960-61 and 1970-71. The main sources of data are the Census of India, vol. IV, Statistical Hand Book of Bihar, Bihar Through Figures, Annual Season and Crop Report, Central Statistical Organization (C.S.O.), Indian Agriculture in Brief, Labour Bureau and Ministry of Agriculture.

At the out set it is important to point out that all the indices are either essential or the best that could be chosen. On the contrary one is compelled to abandon certain more obvious and significant indices (e.g. per capita income, per capita consumption of power etc.) merely because of the paucity of data. The analysis is based on the premise that given a certain degree of agricultural and general infrastructure alongwith a potential of human and other resources, there is bound to be a certain level of economic development.

In order to determine the relative position of districts

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in respect of each and every variable, the data have been arranged in descending order and then divided into five groups - very high, High, Medium, Low and Very low - on the basis of major breaks. According to this method while dividing the whole range of data into five groups, we start from the 'state average' and move upward and downward and mark off significant breaks in frequency distribution. To make it clear one example is given below:

Percentage of area under rice during 1960-61

Groups	Data arranged in descending order	
Very High	82.17	Dhanbad
	82.14	Singhbhum
High	62.94	Santhal Parganas
	60.70	Ranchi
	60.10	Hazaribagh
Medium	51.92	Purnea
	50.83	Darbhanga
	50.66	Champaran
	47.17	BIHAR
	45.99	Gaya
Low	41.72	Shahabad
	39.83	Muzaffarpur
	39.56	Patna
	38.79	Bhagalpur
Very Low	32.51	Shahabad
	30.61	Saran

29.57	Monghyr
29.36	Palamau

It is clear from the above example that according to this method the districts having values close to each-other are grouped together. Thus this method appears to be more realistic and meaningful for spatial analysis, as it eliminates the shortcomings of quartiling method.

For computing the composite index of the level of economic development for each small administrative unit (that is district) simple ranking method has been applied. While ranking, the district having the highest development level has been given the lowest value. Thus the district having the lowest value of composite index is regarded as the most developed one and vice-versa. At the first stage the composite index for level of development in the field of agriculture, occupational patterns and socio-economic characteristics has been worked out separately by adding the ranks of each and every variable of the respective group. At the second stage these three groups have been reranked and a composite index for level of overall economic development has been worked out by adding their ranks. In order to determine the relative position of districts the values of composite index have been arranged in ascending order and divided into five groups by the method mentioned above.

On the basis of these groups maps have been prepared for regional groupings and analysis. With a view to have a comparative study and note the pattern of change during the decade

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1961-71, the data for 1960-61 and 1970-71 have been mapped on one sheet of paper.

In order to analyse the process of development and pattern of association between the variables correlation method has been applied. For this purpose a correlation matrix has been worked out with the help of computer on the basis of following formula:

Stage I:- All data have been written in the form of a 'matrix X' given below. As there are 29 variables which have been collected with reference to 17 districts of the state, there will be 17 rows and 29 columns in 'matrix X.'

$$X = \begin{bmatrix} X_{11} & X_{12} \cdots\cdots X_{1m} \\ X_{21} & X_{22} \cdots\cdots X_{2m} \\ \vdots & \vdots \quad\quad \vdots \\ X_{n1} & X_{n2} \cdots\cdots X_{nm} \end{bmatrix}$$

Where X_{11} means first row[9] and first column.[10]

X_{12} means first row and second column.

X_{1m} means first row and last column.[11]

X_{21} means second row and first column.

X_{22} means second row and second column.

X_{2m} means second row and last column.

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9 In this case first row means first district.

10 In this case first column means the first variable.

11 In this case last column means the 29th column. Thus 'm' indicates the number of columns.

X_{n1} means last row[12] (that is 17th district) and first column.

X_{nm} means last row and last column.

Stage II:- At this stage the 'Matrix X' has been standardised ($\dot{X}$) to eliminate the biasness of scale by the formula: $\dot{X} = \frac{X - \bar{X}}{S}$. Thus the original 'Matrix X' will be written as below:

$$\dot{X} = \begin{bmatrix} \frac{X_{11} - \bar{X}_1}{S_1} & \frac{X_{12} - \bar{X}_2}{S_2} & \cdots\cdots & \frac{X_{1m} - \bar{X}_m}{S_m} \\ \frac{X_{21} - \bar{X}_1}{S_1} & \frac{X_{22} - \bar{X}_2}{S_2} & \cdots\cdots & \frac{X_{2m} - \bar{X}_m}{S_m} \\ \vdots & \vdots & & \vdots \\ \frac{X_{n1} - \bar{X}_1}{S_1} & \frac{X_{n2} - \bar{X}_2}{S_2} & \cdots\cdots & \frac{X_{nm} - \bar{X}_m}{S_m} \end{bmatrix}$$

Where $\bar{X}_1$ means the mean of the first variable.

$\bar{X}_2$ means the mean of the second variable.

$\bar{X}_m$ means the mean of the last variable.

S_1 means the standard deviation of first variable.

S_2 means the standard deviation of second variable.

S_m means the standard deviation of last variable.

Stage III:- At this stage co-efficient of correlation matrix that is 'R' has been worked out by the formula: $R = \frac{\dot{X}' \dot{X}}{n}$

It will be written as below:

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12 In this case last row means the 17th row. Thus 'n' indicates the number of rows.

$$R = \frac{\dot{X}' \dot{X}}{n} = \begin{bmatrix} \frac{X_{11} - \bar{X}_1}{S_1} & \frac{X_{21} - \bar{X}_1}{S_1} & \cdots & \frac{X_{n1} - \bar{X}_1}{S_1} \\ \frac{X_{12} - \bar{X}_2}{S_2} & \frac{X_{22} - \bar{X}_2}{S_2} & \cdots & \frac{X_{n2} - \bar{X}_2}{S_2} \\ \vdots & \vdots & & \vdots \\ \frac{X_{1m} - \bar{X}_m}{S_m} & \frac{X_{2m} - \bar{X}_m}{S_m} & \cdots & \frac{X_{nm} - \bar{X}_m}{S_m} \end{bmatrix} \begin{bmatrix} \frac{X_{11} - \bar{X}_1}{S_1} & \frac{X_{12} - \bar{X}_2}{S_2} & \cdots & \frac{X_{1m} - \bar{X}_m}{S_m} \\ \frac{X_{21} - \bar{X}_1}{S_1} & \frac{X_{22} - \bar{X}_2}{S_2} & \cdots & \frac{X_{2m} - \bar{X}_m}{S_m} \\ \vdots & \vdots & & \vdots \\ \frac{X_{n1} - \bar{X}_1}{S_1} & \frac{X_{n2} - \bar{X}_2}{S_2} & \cdots & \frac{X_{nm} - \bar{X}_m}{S_m} \end{bmatrix}$$

Where 'n' means the number of districts.

Stage IV:- At this stage we have got the co-efficient of correlation matrix that is 'R Matric' which has a dimension of 29 rows and 29 columns. In mathematical form it is generally written as below:

$$R = \begin{bmatrix} r_{11} & r_{12} & r_{13} & r_{14} \cdots & r_{1m} \\ & r_{22} & r_{23} & r_{24} \cdots & r_{2m} \\ & & r_{33} & r_{34} \cdots & r_{3m} \\ & & & r_{44} \cdots & r_{4m} \\ & & & & \vdots \\ & & & \cdots & r_{mm} \end{bmatrix} \text{ OR } \begin{bmatrix} 1 & r_{12} & r_{13} & r_{14} \cdots & r_{1m} \\ & 1 & r_{23} & r_{24} \cdots & r_{2m} \\ & & 1 & r_{34} \cdots & r_{3m} \\ & & & 1 \cdots & r_{4m} \\ & & & & \vdots \\ & & & \cdots & 1 \end{bmatrix}$$

Where r_{11} means correlation of first variable with first variable which is always equal to 1.

r_{12} means correlation of first variable with the second variable.

r_{1m} means the correlation of first variable with the last variable.

r_{22} means the correlation of second variable with second variable which will also be always equal to 1.

Similarly r_{23} means correlation of second variable with the third variable and so on.

Chapter II

FACTORS CONTRIBUTING TO THE DEVELOPMENT OF BIHAR

Chapter II

FACTORS CONTRIBUTING TO THE DEVELOPMENT OF BIHAR

Part - I

AGRICULTURE

2.10 The Agricultural Economy of Bihar

In pursuance of the main objective of working out the agricultural development in Bihar and also evolving suitable strategy for its development, an examination of the prevailing agricultural economy of Bihar becomes imperative. In this chapter, therefore, an attempt has been made to highlight the basic features of the agricultural economy of Bihar. The main features of the agricultural economy of Bihar that have been discussed here are the following: (a) land-use pattern, (b) cropping pattern, and (c) production trends.

2.10(a) Land-use Pattern

Land is one of the greatest resources[1] of an area. It provides room for human dwellings, communication lines, factories, cultivation, grazing, orchards and forests, etc. As it is clear from the Table No. 2 that out of every 100 acres[2] of land in the

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1 "By resources we mean the total wealth or stock of an area that can be drawn upon to meet the present and future needs of its people." Enayat Ahmad (1965), Bihar - A Physical, Economic and Regional Geography, Ranchi University Press, Ranchi, p. 81.

2 Government of Bihar (1971), Bihar Statistical Hand Book, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 28.

state, nearly 49 acres are under the plough and 17 acres under the forests. The area under forests have shown a substantial decline during the decade 1960-61 and 1970-71. This is rather disconcerting because the overall proportion of area under forests in Bihar is much below the desirable optimum (30 per cent), as per National Forest Policy resolution.

The net sown area has registered a considerable increase during the decade. It is the result of reclamation by extension of irrigation facilities and improved techniques of agriculture. But the scope for further extension of area under cultivation is very limited, particularly in the plains region, as the percentage of area under culturable waste in the state is only 3.0. The gross cropped areas has registered a marginal increase during this decade. This indicates that during the decade the intensification of cultivation in the state has been very less. During 1970-71 the percentage of area under current fallows and other fallow lands to total area of the state was 9.1 and 5.1 respectively. The share of barren and uncultivable land was 6.1 per cent. The land put to non-agricultural uses[3] was 8.9 per cent. It has also registered a slight increase during the decade. This could be attributed to the use of land for urban and industrial purposes. The rest about 2.1 per cent of the

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3 Lands classified under this head are those that have been used for construction of buildings, roads, railways and which lie under water bodies, e.g. wells, rivers, canals, tanks etc.

state was occupied by permanent pastures and other grazing lands and miscellaneous trees and groves. Recent change in the pattern of land utilization in Bihar may be seen in the following Table No. 2 which gives the relevant statistics for the decade 1960-61 and 1970-71.

Table - 2

Classification of area in Bihar under different heads in the years 1960-61 and 1970-71. (4)

Head of Classification		Percentage to total area of the State	
		1960-61	1970-71
1.	Forest	21.7	16.9
2.	Barren and uncultivable land	4.8	6.1
3.	Land put to non-agricultural uses	8.0	8.9
4.	Culturable waste other than fallow lands	5.2	3.0
5.	Permanent pastures and other grazing lands	1.3	1.0
6.	Land under miscellaneous trees and groves	0.6	1.1
7.	Current fallows	7.7	9.1
8.	Other fallow lands	4.9	5.1
9.	Net area sown	45.8	48.8
10.	Gross area sown	63.5	63.6
11.	Area sown more than once	17.7	14.8
	Total from 1 to 9	100.0	100.0

4 Government of Bihar (1970-71), Annual Season and Crop Report, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 25.

2.11 Forest

Forests, apart from being an important natural resource of a region, protect the agricultural land from erosion and floods and thereby stabilize agriculture by maintaining soil fertility. The forest area in the state is inadequate as stated above. It covers only 16.9 per cent of the total area of the state. It is continuously declining as revealed by the land-use statistics (see Table No. 2), apparently under the more pressing needs of industrial and mineral development, unrestricted cutting, heavy grazing and recurring annual hot season fires.

Figure No. 2 depicts that the forest area in the state is disproportionately distributed. The districts of Hazaribagh, Ranchi, Palamau and Singhbhum of Chhotanagpur Plateau have a major share of forests in the state, which constitute 73.5 per cent of the total forest area of the state. In these districts the percentage of area under forest is varying between 24 and 48, but in 1960-61 it was varying between 28 and 50, thus showing a general trend of decline (see Table No. 3). The very high percentage of area under forest is in the districts of Palamau (48.1) and Hazaribagh (40.2). In Dhanbad and Santhal Parganas districts of this region the percentage of area under forest is comparatively low ranging between 8 and 10.

The districts of South Bihar Plain contain some forests only in the areas adjoining the Chhotanagpur Plateau. In this region the percentage of area under forest generally varies

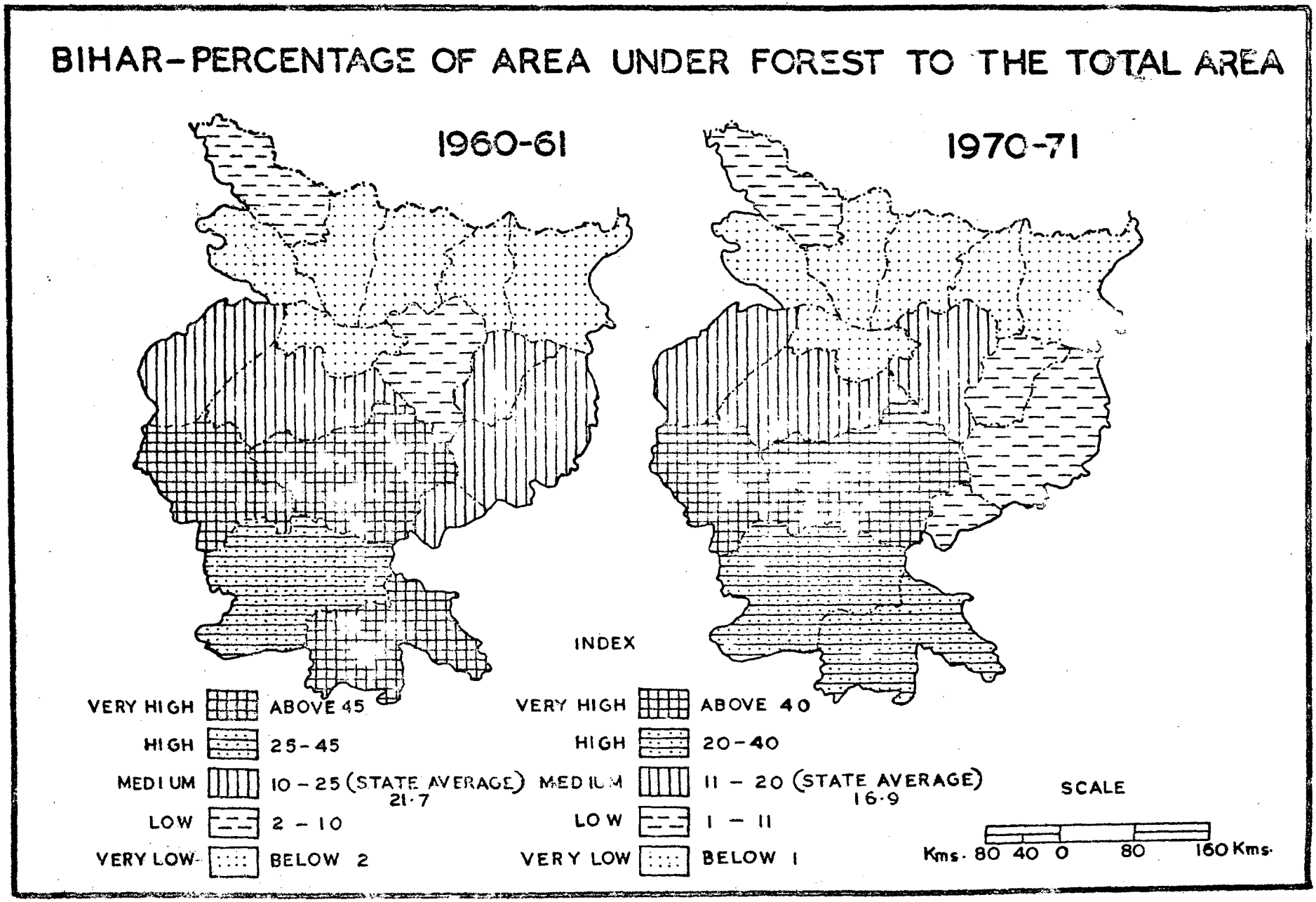
BIHAR-PERCENTAGE OF AREA UNDER FOREST TO THE TOTAL AREA
1960-61
1970-71
INDEX
VERY HIGH ABOVE 45
HIGH 25-45
MEDIUM 10-25 (STATE AVERAGE 21·7)
LOW 2-10
VERY LOW BELOW 2
VERY HIGH ABOVE 40
HIGH 20-40
MEDIUM 11-20 (STATE AVERAGE 16·9)
LOW 1-11
VERY LOW BELOW 1
SCALE
Kms. 80 40 0 80 160 Kms.

Figure No. 2

Table - 3

Table showing the percentage of area under forest to total area during 1960-61 and 1970-71

Districts	1960-61	1970-71
1. Patna	0.8	0.8
2. Gaya	18.1	12.1
3. Shahabad	22.1	15.6
4. Saran	0.0	0.0
5. Champaran	7.5	9.7
6. Muzaffarpur	0.0	0.0
7. Darbhanga	0.0	0.0
8. Monghyr	8.5	13.8
9. Bhagalpur	11.4	8.1
10. Saharsa	0.2	0.0
11. Purnea	1.4	0.1
12. Santhal Parganas	23.7	10.3
13. Palamau	50.0	48.1
14. Hazaribagh	48.3	40.2
15. Ranchi	28.3	23.5
16. Dhanbad	15.3	8.4
17. Singhbhum	46.8	29.1
BIHAR	21.7	16.9

between 8 and 16. Patna is the only district of this region where the percentage of area under forest is less than 1 (about 0.8). It is the only district where the percentage of area under forest is almost constant during 1960-61 and 1970-71. In all other districts of this region it has registered a declining trend, with one exception of Monghyr where it has increased from 8.5 in 1960-61 to 13.8 in 1970-71.

The districts of Saran, Muzaffarpur, Darbhanga and Saharsa of North Bihar Plain are almost altogether devoid of forests. There are some planted forests in Purnea district. In North Bihar Plain forests are only found in the foothills in north-western Champaran where the percentage of area under it has shown an increasing tendency and increased from 7.5 in 1960-61 to 9.7 in 1970-71.

Thus we come to the conclusion that, except in a few districts, the percentage of area under forest is rapidly declining in all other districts of Bihar. It is a matter of great concern, as it adversely affects the rainfall and agriculture of the region. For example, it was probably rapid deforestation leading to decrease in humidity which adversely affected tea cultivation in Chhotanagpur. Therefore, the Government of Bihar should give special attention towards the preservation of forest wealth and even attempts should be made to increase the proportion of area under forest, as it is much below the desirable optimum (30 per cent). This calls for integrated land-use policy.

2.12 Net Sown Area

The net sown area represents the geographical extent of cultivated or sown land during a particular year. In Bihar the net sown area constitutes 48.8 per cent of the total area of the state. It has registered a positive rate of growth about +5.25 per cent, as a result it has increased from 45.8 per cent in 1960-61 to 48.8 per cent in 1970-71. Except Muzaffarpur, Monghyr, Bhagalpur, Hazaribagh and Palamau, all other districts of Bihar have registered a positive rate of growth, as a result in these districts the proportion of land under net sown area has increased (see Table No. 4). The net sown area increases only when the current fallows, other fallow lands and culturable wastes are reclaimed by extension of irrigation facilities, improved agricultural techniques and any other means. Generally in a year of good rainfall the proportion of current fallow decreases and the net sown area increases.

In the wholly plain and alluvial districts of North Bihar Plain the percentage of net sown area to the total area of the district varies between 60 and 74, as it is clear from figure No. 3. In the districts of Darbhanga, Saran and Muzaffarpur it varies between 69 and 74, while in the Kosi-ravaged districts of Saharsa and Purnea, and in Champaran where some land is hilly and forested, its percentage is only 60.3, 66.3 and 67.6 respectively.

In the districts of South Bihar Plain the percentage of

BIHAR- PERCENTAGE OF NET AREA SOWN TO TOTAL AREA OF THE DISTRICT

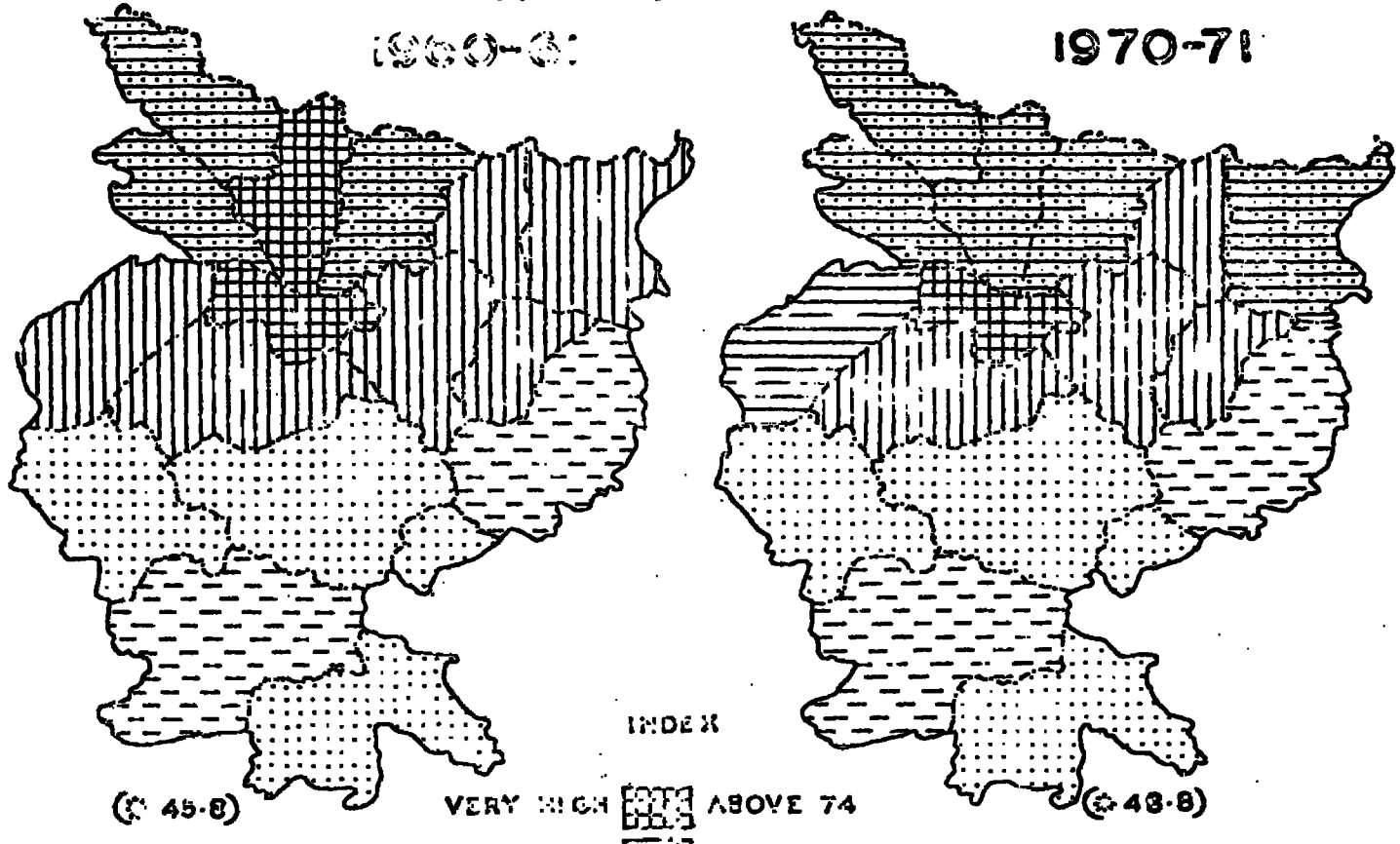

Figure No. 3

Table - 4

Table showing the proportion of land under net sown area and its rate of growth during 1960-61 and 1970-71.,

Districts	Percentage of net sown area to total area		Percentage rate of growth
	1960-61	1970-71	1961-71
1. Patna	75.2	77.2	+ 2.69
2. Gaya	56.2	58.5	+ 4.07
3. Shahabad	59.8	67.8	+ 13.53
4. Saran	69.5	71.2	+ 2.52
5. Champaran	65.4	67.6	+ 3.52
6. Muzaffarpur	77.3	73.6	- 4.76
7. Darbhanga	69.6	69.8	+ 0.35
8. Monghyr	56.3	48.5	- 17.74
9. Bhagalpur	58.4	53.4	- 8.57
10. Saharsa	54.7	60.3	+ 19.79
11. Purnea	52.8	66.3	+ 25.62
12. Santhal Parganas	33.5	40.4	+ 20.55
13. Palamau	23.6	21.4	- 9.68
14. Hazaribagh	20.8	19.8	- 5.42
15. Ranchi	36.9	39.5	+ 7.10
16. Dhanbad	28.5	28.6	+ 4.47
17. Singhbhum	21.7	29.9	+ 38.18
BIHAR	45.8	48.8	+ 5.25

net sown area to total area of the district generally varies between 48 and 68. Only in the district of Patna its percentage is 77.2, the highest in the state. In all other districts of this region its percentage is comparatively lower than the North Bihar Plain districts, because of the presence of agriculturally negative land in the forested and hilly tracts of these districts adjoining the Chhotanagpur Plateau.

In the districts of Chhotanagpur, where there are relatively large forest cover and scarped slopes, the percentage of net sown area falls abruptly to below 30. It is comparatively higher in the districts of Santhal Parganas (40.4) and Ranchi (39.5) where the extent of undulating peneplain is the largest and forest cover relatively small. Generally speaking, in Chhotanagpur the proportion of net sown area varies indirectly with the proportion of forested land in a district.

Thus we came to the conclusion that topography and soil play an important role in determining the percentage of net sown area in a district. As it is mentioned earlier the net sown area may be increased by reclaiming current fallows, other fallow lands and cultivable wastes which constitute together about 17.2 per cent of the total area of the state, the attempts should be made to reclaim more and more of these lands. In this way with an increase in the net sown area there will be increase in agricultural production which will lead to the economic development of the region.

2.13 Area Sown More Than Once

The area sown more than once is that cultivated area in which two or more than two crops are grown in a year. It indicates the intensification of agriculture of a region and ultimately the levels of agricultural development. The area sown more than once constitutes 14.8 per cent of the total area of the state. It has registered a negative rate of growth, as a result it has declined from 17.7 per cent in 1960-61 to 14.8 per cent in 1970-71. It has shown a general trend of decline in most of the districts of Bihar. Champaran, Muzaffarpur, Darbhanga and Saharsa of North Bihar Plain and Bhagalpur and Monghyr of South Bihar Plain are the only districts which have registered a positive rate of growth in area sown more than once. One thing is remarkable that in the irrigated districts of South Bihar Plain and also in the fertile plain districts of North Bihar Plain the percentage of area sown more than once is comparatively higher (even higher than the state average 14.8) than the hilly, forested and less fertile districts of Chhotanagpur Plateau. (See Figure No. 4 and Table No. 5).

In the districts of North Bihar Plain the percentage of area sown more than once varies between 22 and 33. Saran and Purnea are the only districts where it has registered a negative rate of growth, as a result in these districts it has declined from 26.2 and 27.5 in 1960-61 to 24.8 and 22.1 in 1970-71 respectively.

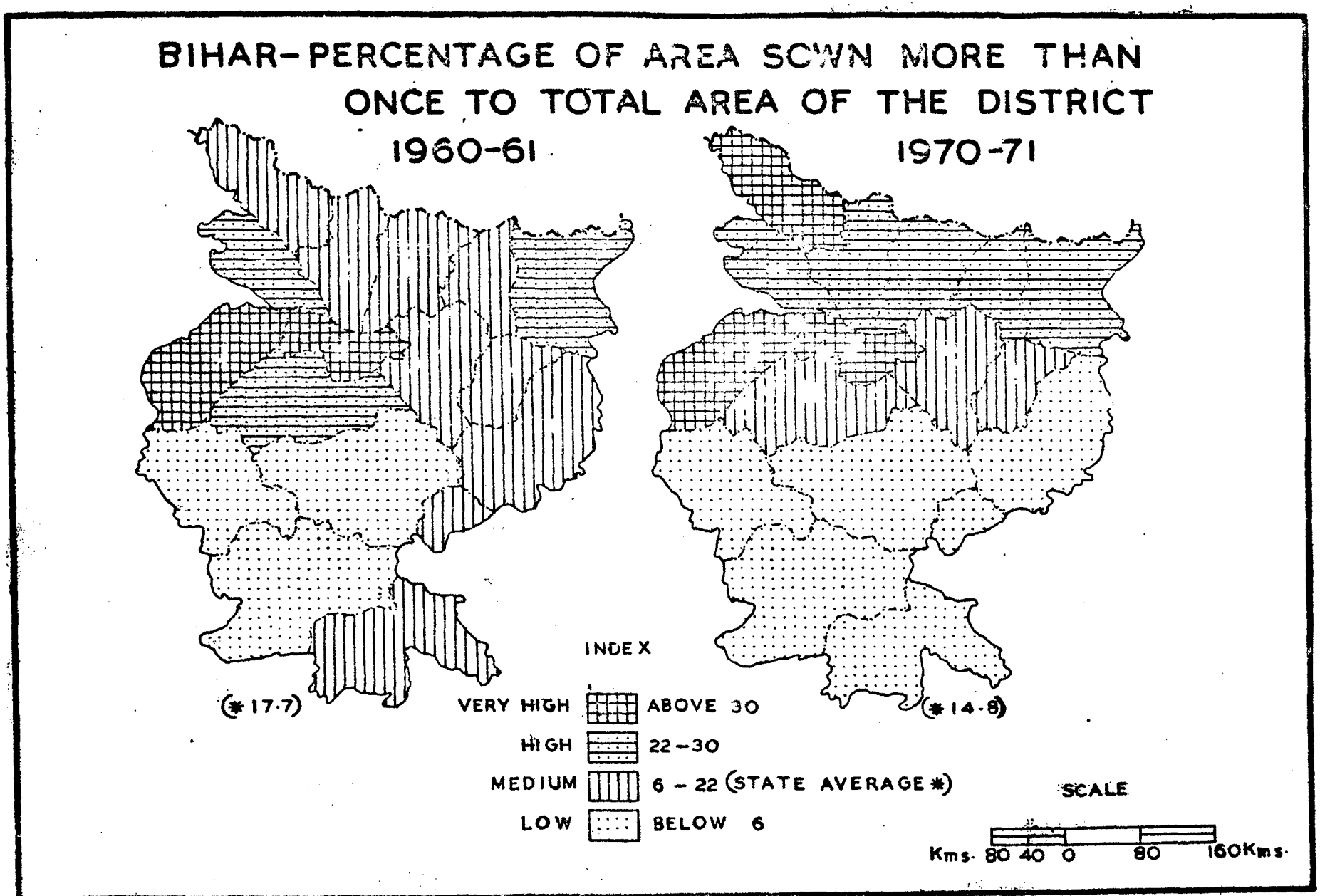
BIHAR-PERCENTAGE OF AREA SOWN MORE THAN ONCE TO TOTAL AREA OF THE DISTRICT
1960-61
1970-71
(*17·7)
(*14·8)
INDEX
VERY HIGH
ABOVE 30
HIGH
22-30
MEDIUM
6 - 22 (STATE AVERAGE *)
LOW
BELOW 6
SCALE
Kms. 80 40 0 80 160Kms.

Figure No. 4

Table - 5

Table showing the percentage of area sown more than once to total area during 1960-61 and 1970-71

Districts	1960-61	1970-71
1. Patna	45.4	38.8
2. Gaya	29.7	16.9
3. Shahabad	41.9	32.3
4. Saran	26.2	24.8
5. Champaran	19.4	32.2
6. Muzaffarpur	21.7	26.1
7. Darbhanga	21.1	22.0
8. Monghyr	13.7	15.0
9. Bhagalpur	15.1	19.4
10. Saharsa	9.8	25.7
11. Purnea	27.5	22.1
12. Santhal Parganas	19.2	5.9
13. Palamau	5.4	5.2
14. Hazaribagh	5.2	2.3
15. Ranchi	5.4	3.6
16. Dhanbad	10.8	1.9
17. Singhbhum	10.0	1.4
BIHAR	17.7	14.8

In the irrigated districts of South Bihar Plain the percentage of area sown more than once varies between 15 and 39. Patna, Shahabad and Gaya are the only districts where it has registered a negative rate of growth, as a result in these districts it has declined from 45.4, 41.9 and 29.7 in 1960-61 to 38.8, 32.3 and 16.9 in 1970-71 respectively. In spite of a substantial decrease in the percentage of area sown more than once the districts of Patna and Shahabad rank first and second in the state.

Almost all the districts of Chhotanagpur have registered a very high negative rate of growth in area sown more than once, as a result in these districts there has been a substantial decline in it, for example, in these districts the percentage of area sown more than once was varying between 5 and 20 in 1960-61, while in 1970-71 it is varying only between 1 and 6. It is mainly either due to decreased irrigation facilities or very less irrigation facilities and also less fertile soil.

Thus we have noticed that during this decade in most of the districts of Bihar the area sown more than once has shown a declining trend, which is very injurious for the agricultural economy of the state. Therefore, the present need is to increase the area sown more than once by the extension of irrigation facilities, use of fertilizers and improved agricultural techniques for increasing the agricultural production and developing the agricultural economy of the state.

2.14 Cultivated Area as Percentage of Cultivable Land

The percentage of cultivated area[5] to total cultivable land[6] indicates upto what extent a district or region has utilized its available agricultural resources and also how much is scope for further development? In Bihar the percentage of cultivated area to total cultivable land is 77.51. It has shown a declining trend in the state, e.g. it has declined from 78.63 in 1960-61 to 77.51 in 1970-71. Figure No. 5 clearly depicts that in the districts of North and South Bihar Plains the percentage of cultivated area to total cultivable land is comparatively higher than those of Chhotanagpur region (see also Table No. 6). It is mainly due to the fact that the formers have fertile soils and more irrigation facilities than the latter.

In all the districts of North Bihar Plain the percentage of cultivated area to total cultivable land has shown an increasing tendency, for example, in 1960-61 it was varying between 70 and 91, while in 1970-71 it is varying between 78 and 93. In the districts of Saharsa, Purnea and Champaran both the net sown area and cultivable land have registered a positive rate of growth but the former has a comparatively higher rate than the latter, as a result in these districts the percentage of cultivated area to total cultivable land has increased during this

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5 Cultivated area refers to net sown area.

6 Cultivable land here includes current fallows, other fallow lands and net sown area.

BIHAR – PERCENTAGE OF CULTIVATED AREA TO TOTAL CULTIVABLE LAND

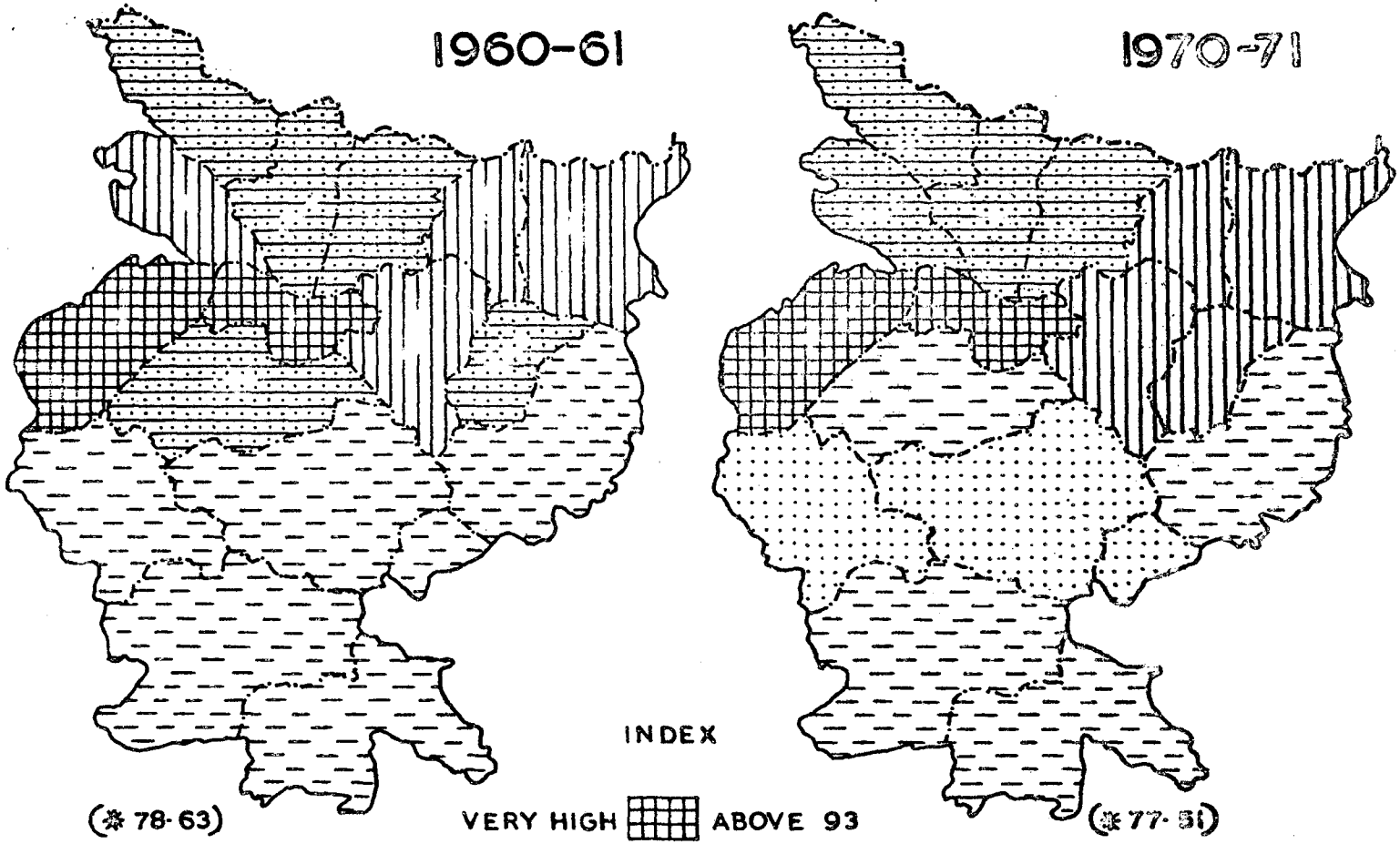

Figure No. 5

Table - 6

Table showing the percentage of cultivated area to total cultivable land during 1960-61 and 1970-71.

Districts	1960-61	1970-71
1. Patna	93.00	95.03
2. Gaya	90.55	67.20
3. Shahabad	93.06	95.58
4. Saran	83.77	87.70
5. Champaran	90.03	92.17
6. Muzaffarpur	90.96	91.15
7. Darbhanga	86.80	89.77
8. Monghyr	84.01	75.01
9. Bhagalpur	85.94	82.01
10. Saharsa	77.20	78.41
11. Purnea	70.18	82.55
12. Santhal Parganas	65.80	64.26
13. Palamau	63.05	53.93
14. Hazaribagh	62.23	54.08
15. Ranchi	64.84	65.04
16. Dhanbad	63.60	57.49
17. Singhbhum	63.97	63.82
BIHAR	78.63	77.51

decade. The districts of Darbhanga and Saran have registered a positive rate of growth in net sown area but a negative rate of growth in cultivable land, therefore, naturally there will be an increase in its percentage. While in the district of Muzaffarpur both net sown area and cultivable land have registered a negative rate of growth, but the former has a comparatively lower rate than the latter, as a result in this district also the percentage of cultivated area to total cultivable land has increased. It is generally higher in the western districts (ranging between 87 and 93) of Saran, Champaran, Muzaffarpur and Darbhanga than the Kosi-ravaged districts of Saharsa and Purnea, where it is only 78.41 and 82.55 respectively.

In the districts of South Bihar Plain the percentage of cultivated area to total cultivable land varies between 67 and 96. In the districts of Shahabad and Patna, where more than 50 per cent of the land is irrigated, it has shown an increasing tendency, e.g. it has increased from 93.06 and 93.00 in 1960-61 to 95.58 and 95.03 in 1970-71 respectively. With such a high percentage Shahabad and Patna stand first and second in the state respectively. In these districts both net sown area and cultivable land have registered a positive rate of growth, but the former has a comparatively higher rate, as a result the percentage of cultivated area to total cultivable land has increased. In the district of Gaya also both net sown area and cultivable land have registered a positive rate of growth, but the former has a

very lower rate (4.07 per cent) than the latter, as a result in this district the percentage of cultivated area to total cultivable land has substantially declined from 90.55 in 1960-61 to 67.20 in 1970-71. In the districts of Monghyr and Bhagalpur both the net sown area and cultivable land have registered a negative rate of growth, but the former has a faster rate than the latter, as a result in these districts also the percentage of cultivated area to total cultivable land has declined from 84.01 and 85.94 in 1960-61 to 75.01 and 82.01 in 1970-71 respectively.

In the districts of Chhotanagpur the percentage of cultivated area to total cultivable land varies between 53 and 66. Except Ranchi in all the districts of Chhotanagpur it has shown a declining trend during this decade. In Ranchi district it has increased because the net sown area has increased at a faster rate than the cultivable land. In the districts of Hazaribagh and Palamau the net sown area has registered a negative rate of growth, while cultivable land has registered a positive rate of growth, as a result its percentage has declined. In the districts of Dhanbad, Santhal Parganas and Singhbhum both the net sown area and cultivable land have registered a positive rate of growth, but the former has a lower rate than the latter, as a result in these districts also the percentage of cultivated area to total cultivable land has declined. As it is clear from Figure No. 5 that all the districts of Chhotanagpur form a compact belt where the percentage of cultivated area to total cultivable land is comparatively low.

Thus we come to the conclusion that the districts of North and South Bihar Plains, with more irrigation facilities and fertile soils, have considerably utilized their agricultural resource. The scope for further extension of area under cultivation is very limited in these districts. On the contrary the districts of Chhotanagpur region, with less irrigation facilities and less fertile soils, have utilized only about $\frac{2}{3}$ of their agricultural resource and about $\frac{1}{3}$ is almost unutilized. Therefore, the scope for further extension of area under cultivation is more in these districts. These are the districts where culturable wastes are also abundant. In these districts the area under cultivation may be increased by reclaiming the culturable wastes. Thus in these districts the area under cultivation may be increased by extension of irrigation facilities, more and more use of fertilizers and improved agricultural techniques.

2.15 Irrigation

Irrigation is one of the capital intensive physical infrastructural items that supports agricultural sector. It confers many benefits to agriculture. For example, in the irrigated area there is more intensive utilization of land than in the non-irrigated area . Agriculture is more profitable in irrigated area, and there is greater opportunity in raising the level of income of farmers in the irrigated area. The level of farm output is higher in irrigated area as compared with that in non-irrigated area . The marketable surplus of farm products

increases with the provision of irrigation facilities. It means that subsistance agriculture should increasingly become commercialized agriculture, if adequate irrigation facilities are provided. Irrigation facility by raising the productivity of the soil may also encourage the use of modern inputs like fertilizers and hybrid seeds. This influence of irrigation gives it a strategic place in any programme of modernization of agriculture.

In Bihar the percentage of gross irrigated area to gross cultivated land is 24.8. It has increased from 18.6 per cent in 1960-61 to 24.8 per cent in 1970-71. Except Santhal Parganas and Hazaribagh,in almost all the districts of Bihar it has shown a general trend of increase. This increase is mainly due to the development of many major and minor irrigation schemes in these districts during the different plan periods. Figure No. 6 clearly depicts that the districts of South Bihar Plain are more irrigated than the North Bihar Plain. The districts of Chhotanagpur Plateau are the least irrigated.

In the districts of South Bihar Plain the percentage of gross irrigated area to gross cultivated land varies between 20 and 64. It has increased in all the districts of South Bihar Plain (see Table No. 7). The districts of Patna, Gaya and Shahabad comprise a distinct tract where more than 51 per cent of gross cultivated land is under irrigation. In the districts of Bhagalpur and Monghyr it is 35.1 per cent and 20.3 per cent respectively. In the districts of South Bihar Plain the irrigation is mostly

BIHAR—PERCENTAGE OF GROSS IRRIGATED AREA TO TOTAL CULTIVATED AREA

1960-61

1970-71

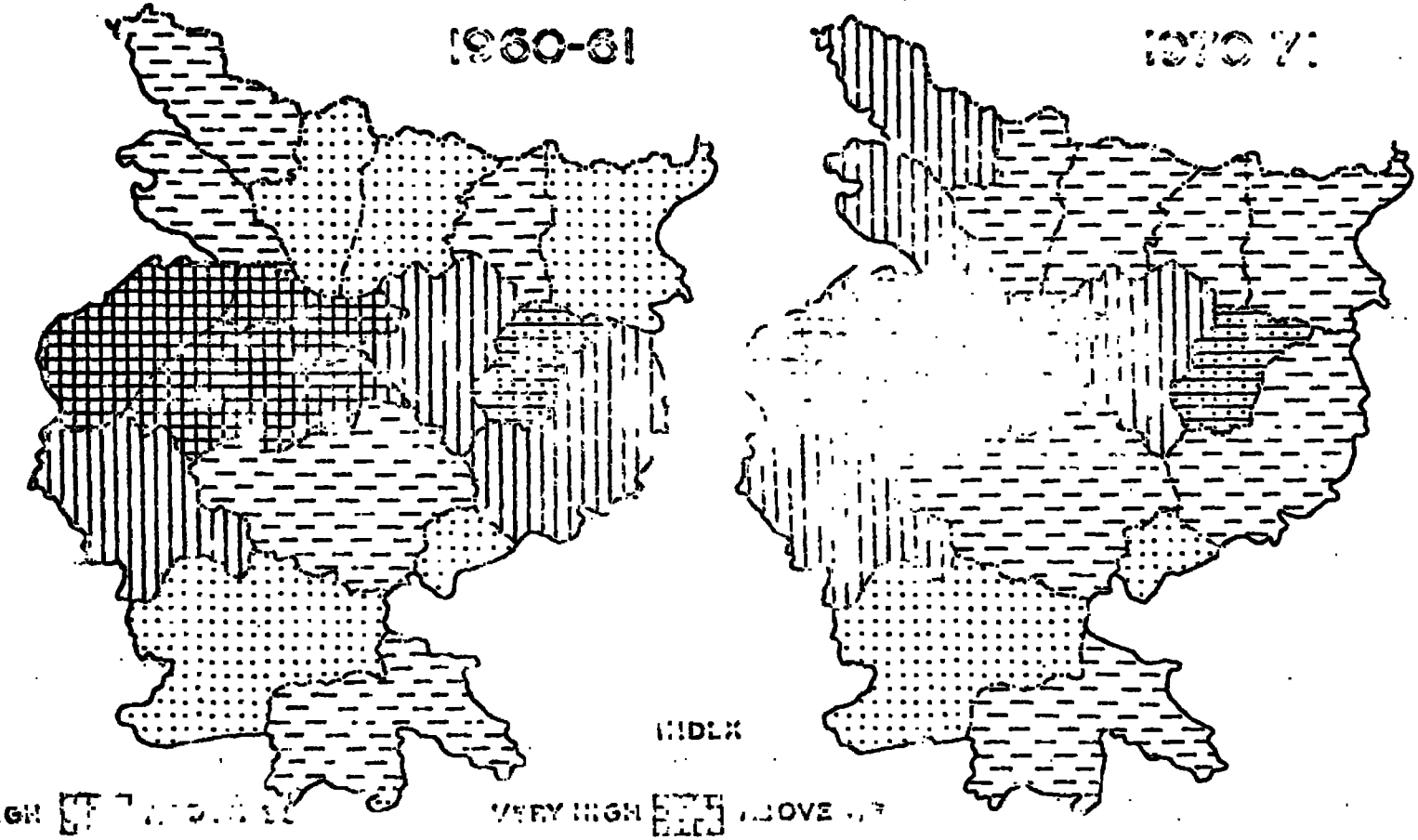

Figure No. 6

Table - 7

Table showing the percentage of gross irrigated area to gross cultivated land during 1960-61 and 1970-71.

Districts	1960-61	1970-71
1. Patna	43.6	51.2
2. Gaya	51.2	63.7
3. Shahabad	43.9	61.4
4. Saran	10.0	20.6
5. Champaran	8.4	22.0
6. Muzaffarpur	3.1	6.6
7. Darbhanga	1.5	10.4
8. Monghyr	17.6	20.3
9. Bhagalpur	26.0	35.1
10. Saharsa	9.3	14.5
11. Purnea	0.7	9.8
12. Santhal Parganas	15.5	8.8
13. Palamau	19.2	21.4
14. Hazaribagh	12.8	6.3
15. Ranchi	1.3	3.3
16. Dhanbad	2.8	3.6
17. Singhbhum	5.6	5.6
BIHAR	18.6	24.8

developed because they form the driest part of the state, having less than 1207 millimetres annual normal rainfall, and require more irrigation for agricultural development.

In the districts of North Bihar Plain the percentage of gross irrigated area to gross cultivated land varies between 6 and 22. All the districts of North Bihar Plain have also registered a positive rate of growth, as a result in these districts it has increased (see Table No. 7). On account of a very high positive rate of growth in the districts of Purnea and Darbhanga it has tremendously increased, e.g. from 0.7 and 1.5 in 1960-61 to 9.8 and 10.4 in 1970-71 respectively. This development is attributed to the development of Kosi Project. In the districts of Saran and Champaran its percentage has almost doubled. It is mainly due to the development of Gandak Project. The districts of North Bihar Plain consisting of mellow alluvium obtaining soil moisture by seepage from the numerous streams and depressions, by percolation from the sub-montane tracts and by frequent inundations, are normally free from the need for irrigation.[7] That is why in these districts the irrigation is comparatively less developed than the South Bihar Plain districts.

In the districts of Chhotanagpur the percentage of gross irrigated area to gross cultivated land is very low, generally

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7 Enayat Ahmad (1965), Bihar: A Physical Economic and Regional Geography, Ranchi University Press, Ranchi, p. 116.

ranging between 3 and 9. Palamau is the only district where it is comparatively high about 21. The districts of Santhal Parganas and Hazaribagh have registered a negative rate of growth, as a result in these districts it has declined from 15.5 and 12.8 in 1960-61 to 8.8 and 6.3 in 1970-71 respectively. In all other districts of Chhotanagpur it has shown an increasing tendency, but at a comparatively very slower rate. The main causes of less development of irrigation in this region are the hilly terrain and comparatively moister climate.

Thus we conclude that the agricultural economy of Bihar is developing, as irrigation which confers many benefits to agriculture has shown an increasing tendency during this decade. For further development attempts should be made to increase more and more irrigation facilities, especially in the districts of North Bihar Plain and Chhotanagpur Plateau, where its percentage is comparatively very low.

2.16 Rainfall

The rainfall has been included in the present study with the view that it is one of the most important factors affecting the agriculture of Bihar. The failure and success of crops, especially Kharif crops, generally depend on rainfall conditions. We can take, for example, the "Hathia" rains, generally in October, are very important for the paddy crops and are always eagerly awaited throughout the state. Their failure not only affects the standing crops, but also results in making the sowing

of cold weather crops difficult. Bihar gets most of its rain from the south-west monsoon which sets in towards the first half of June and lasts till September or first half of October. The annual normal rainfall in Bihar during 1970-71 is 1271.6 millimetres, but during 1960-61 it was 1281.5 millimetres, thus showing a slight variation during the decade. This phenomenon is common in almost all the districts of Bihar.

Figure No. 7 depicts that the distributional pattern of annual normal rainfall in Bihar is almost the same during both periods 1960-61 and 1970-71. The district of Monghyr is one exception where change has taken place and that is due to decline in annual normal rainfall during 1970-71. Patna of South Bihar Plain and Purnea of North Bihar Plain are the districts where the annual normal rainfall is the lowest 992.0 millimetres and the highest 1585.3 millimetres[8] in the state respectively. The districts of Patna, Gaya, Shahabad, Monghyr and Bhagalpur of the South Bihar Plain and Saran and Muzaffarpur of the North Bihar Plain form one compact belt of comparatively lower rainfall, where the annual normal rainfall varies between 1121.2 and 1206.2 millimetres (see Table No. 8). That is why this belt is the most suitable for wheat cultivation, as it is a dry-zone crop. The peripheral districts of this belt have a moderate annual normal rainfall ranging from 1121.2 to 1385.4 millimetres, and

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8 Government of Bihar (1970-71), Annual Season and Crop Report, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 49.

BIHAR – NORMAL RAINFALL IN MILLIMETRES

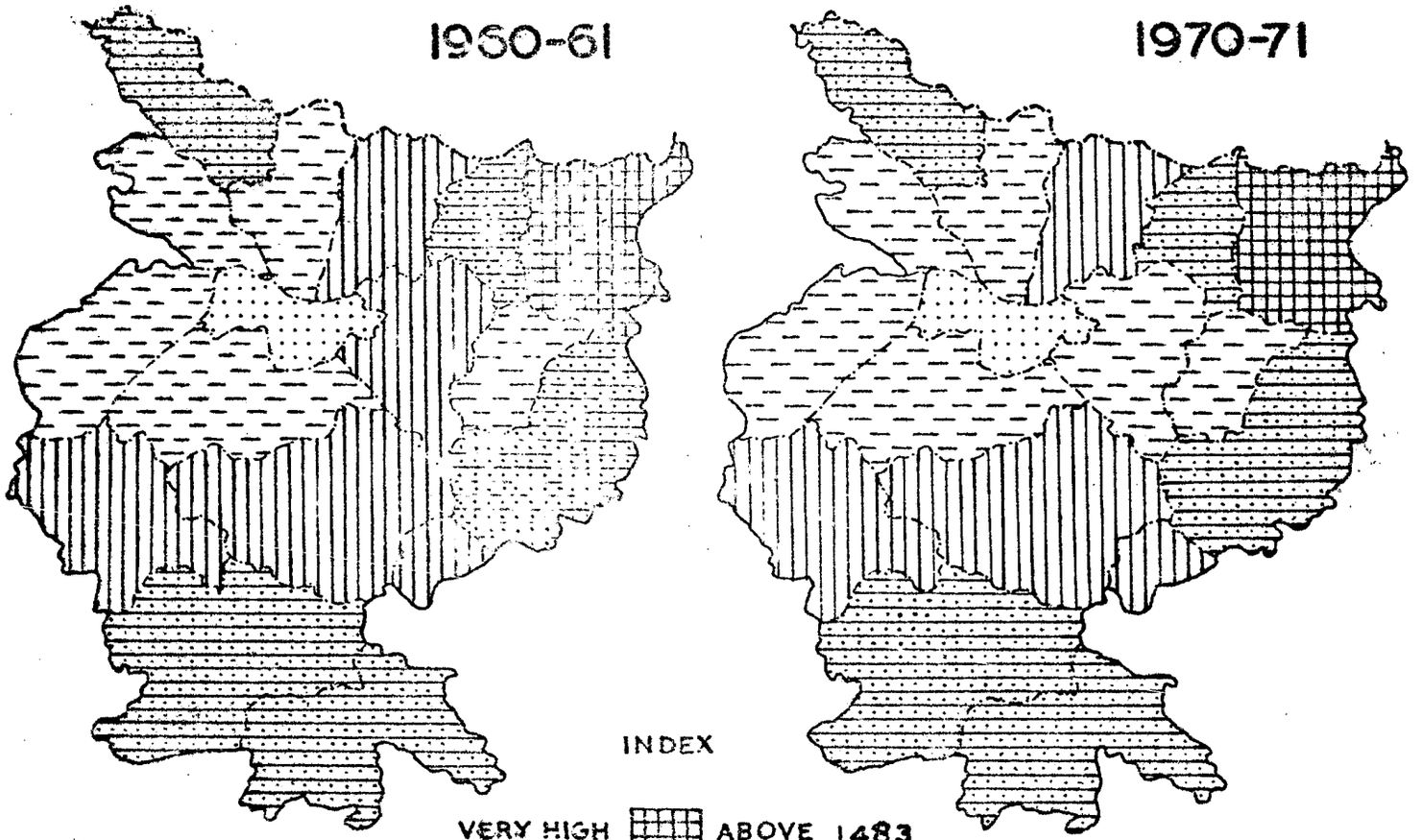

Figure No. 7

Table - 8

Table showing the annual normal rainfall in millimetres during 1960-61 and 1970-71.

Districts	1960-61	1970-71
1. Patna	1002.2	992.0
2. Gaya	1141.8	1150.8
3. Shahabad	1122.6	1122.9
4. Saran	1140.8	1121.2
5. Champaran	1425.3	1391.5
6. Muzaffarpur	1187.9	1183.7
7. Darbhanga	1249.0	1249.9
8. Monghyr	1223.2	1206.2
9. Bhagalpur	1157.4	1166.2
10. Saharsa	1395.4	1385.4
11. Purnea	1588.8	1585.3
12. Santhal Parganas	1384.0	1377.2
13. Palamau	1311.5	1335.1
14. Hazaribagh	1259.3	1258.1
15. Ranchi	1458.1	1482.6
16. Dhanbad	1334.8	1310.7
17. Singhbhum	1402.3	1434.6
BIHAR	1281.5	1271.6

are suitable for maize cultivation, while the north-eastern districts of the North Bihar Plain and eastern and southern districts of Chhotanagpur have comparatively higher annual normal rainfall, ranging from 1377 to 1585 millimetres, and are suitable for rice cultivation. That is why the districts of Chhotanagpur have a very high percentage of area under rice, ranging from 56 to 84. In the districts of the North Bihar Plain the annual normal rainfall varies from 1121.2 to 1585.3 millimetres, while in the districts of Chhotanagpur it varies from 1258.1 to 1482.6 millimetres. Thus on an average the Chhotanagpur is even moister than the North Bihar Plain.

2.10(b & c) Cropping Pattern and Production Trends

2.17 Rice

Rice is the most important crop of Bihar. It accounts for 47.83 per cent[9] of the gross cropped area. In other words out of every 100 acres of gross cropped area, nearly 48 acres are under rice cultivation in the state. It is also the leading crop[10] in all the districts of Bihar. In Bihar during 1960-61 the percentage of area under rice was 47.17, while during 1970-71 it has increased to 47.83, showing a very slow rate of growth +0.66 per cent during the decade. In North Bihar Plain the districts of Champaran, Muzaffarpur, Saharsa and Purnea have shown

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9 Ibid., p. 70-71.

10 See Appendix I.

a positive rate of growth in rice acreage, being highest[11] in Saharsa +82.28 per cent, while the districts of Saran and Darbhanga have shown a negative rate of growth during this decade. In South Bihar Plain the districts of Gaya, Shahabad and Bhagalpur have shown a positive rate of growth in rice acreage, while the districts of Patna and Monghyr have shown a negative rate of growth, highest being in Monghyr - 39.69 per cent, during this decade. While in Chhotanagpur region except Ranchi and Singhbhum all other districts have shown a negative rate of growth in rice acreage during this decade (1960-61 and 1970-71).

Figure No. 8 explains that the percentage of area under rice varies from region to region. In the hilly districts of Chhotanagpur Plateau, which are characterized by a monsoon agriculture, i.e. where cultivation mostly corresponds with the southwest monsoonal rain, the fields remaining generally bare for the rest of the year, the percentage of area under rice is high and varies between 52 and 84 with one exception of Palamau district where it is only about 30 during this decade (1960-61 and 1970-71). The districts of Singhbhum and Dhanbad, with a very high percentage of area under rice 83.62 and 78.20,[12] stand first and second respectively in Chhotanagpur as well as in the state. It is mainly due to the fact that only about ¼th of the area of these districts is under plough and this arable can generally

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11 See Table No. 9.

12 Ibid.

BIHAR– PERCENTAGE OF AREA UNDER RICE TO TOTAL CULTIVATED AREA

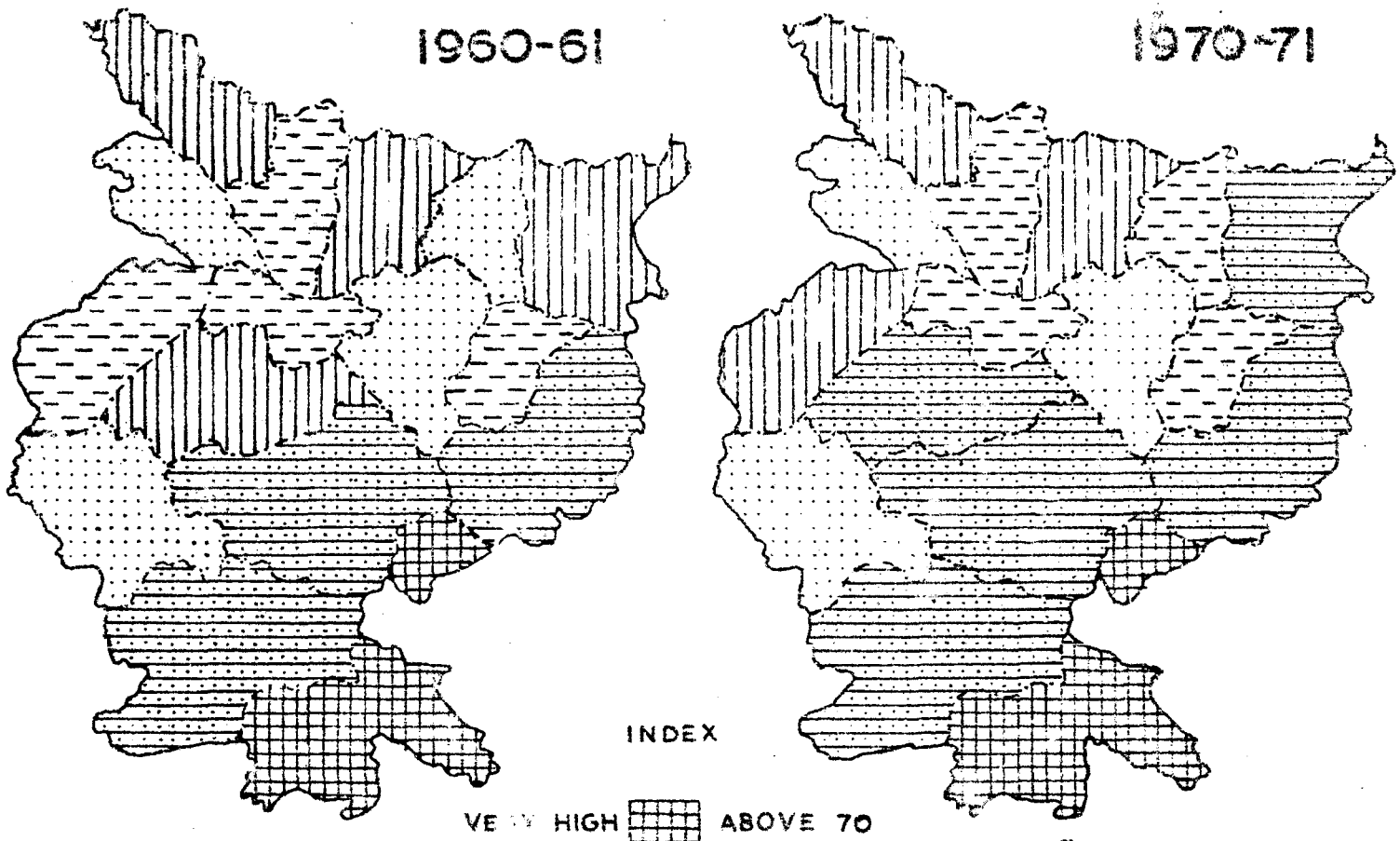

Figure No. 8

Table - 9

Table showing the percentage of area and rate of growth in rice acreage during 1960-61 and 1970-71.

Districts	Percentage of area under rice to gross cropped area		Percentage rate of growth in Rice Acreage
	1960-61	1970-71	1961-71
1. Patna	39.56	38.22	- 7.05
2. Gaya	45.99	53.06	+ 1.28
3. Shahabad	41.72	44.32	+ 4.67
4. Saran	30.61	30.19	- 1.00
5. Champaran	50.66	49.87	+ 16.03
6. Muzaffarpur	39.83	40.58	+ 2.53
7. Darbhanga	50.83	46.96	- 6.41
8. Monghyr	29.57	20.61	- 39.69
9. Bhagalpur	38.79	39.79	+ 1.66
10. Saharsa	32.51	40.93	+ 82.28
11. Purnea	51.92	53.26	+ 12.89
12. Santhal Parganas	62.94	69.26	- 3.35
13. Palamau	29.36	29.99	- 6.59
14. Hazaribagh	60.10	55.67	- 21.63
15. Ranchi	60.70	61.61	+ 3.40
16. Dhanbad	82.17	78.20	- 23.06
17. Singhbhum	82.14	83.62	+ 0.65
BIHAR	47.14	47.83	+ 0.66

grow rice only. Although rice is the predominant crop in the whole of Bihar, it is more so in the hilly districts of Chhotanagpur.

In the districts of South Bihar Plain the percentage of area under rice roughly ranges between 38 and 54, with one exception of Monghyr where it is about 21 during this decade. As a result of high rate of negative growth (-39.69 per cent) in rice acreage in Monghyr, the percentage of area under rice has gone down from 29.57 in 1960-61 to 20.61 in 1970-71. This decrease in rice acreage has been compensated by a tremendous increase in wheat and maize acreage[13] of the district during the decade. On account of a comparatively higher rate of growth in rice acreage the districts of Shahabad and Gaya have improved their position and come from low to medium and from medium to high group respectively (see Figure No. 8).

In Champaran, Darbhanga and Purnea districts of North Bihar Plain the percentage of area under rice is comparatively higher than the South Bihar Plain districts and ranges between 46 and 54. In Saran, Saharsa and Muzaffarpur districts of North Bihar Plain the percentage of area under rice is comparatively lower and ranges between 30 and 41. In North Bihar Plain the percentage of area under rice is the lowest in Saran district (30.19), where Bhit uplands are common. It is again relatively

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13 See Appendix I.

low in the Kosi-ravaged district of Saharsa (40.93).

Climate and hydrography, therefore, and not configuration largely control the extent of rice acreage. The invariable floods of the numerous winding streams and the depressions formed by the abandoned channels of rivers make North Bihar east of the Gandak the typical rice country of the state. The drier districts of South Bihar Plain, i.e. Shahabad, Patna and Gaya, should have had a lower rice acreage as Saran but for the development of irrigation from the Son river. In Chhotanagpur with a normal annual rainfall of 1258 to 1483 millimetres the monsoon normally provides sufficient moisture for rice cultivation.

The per hectare yield of rice in Bihar is about 829.3 kilogrammes.[14] It has shown a negative rate of growth (-4.37%), as a result it has declined from 867.2 kilogrammes in 1960-61 to 829.3 kilogrammes in 1970-71. Figure No. 9 explains that there exist spatial and temporal variations in per hectare yield of rice in the state. In 1960-61 the yield was generally higher in Chhotanagpur and irrigated districts of the South Bihar Plain than the North Bihar Plain, but in 1970-71 it is generally higher in Gaya and Shahabad districts of South Bihar Plain and Darbhanga, Saran and Champaran districts of the North Bihar Plain.

Except Ranchi almost all the districts of Chhotanagpur

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14 Government of Bihar (1972), Bihar Through Figures, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 66.

and Santhal Parganas have shown a negative rate of growth in per hectare yield of rice. It is comparative higher in the districts of Singhbhum, Hazaribagh, Dhanbad and Santhal Parganas, ranging between -14.10 per cent and -37.03 per cent. As a result of this per hectare yield of rice which was ranging between 930 and 1155 kilogrammes in these districts in 1960-61, now in 1970-71 it has greatly declined and ranging only between 684 and 836 kilogrammes.[15] Although the district of Ranchi has shown a positive rate of growth (+1.29 per cent) in per hectare yield of rice, the increase is very low.

In the districts of South Bihar Plain a similar pattern as Chhotanagpur is noticed. For example, except Gaya all districts of this region have shown a negative rate of growth in per hectare yield of rice, but here it is even higher than the Chhotanagpur as it ranges between -26.71 per cent and -43.12 per cent.[16] As a result of this in these districts the per hectare yield of rice which was ranging from about 798 to 1243 kilogrammes in 1960-61, now in 1970-71 it has tremendously declined and ranging from about 585 to 907 kilogrammes. On account of a positive rate of growth (+40.43 per cent) the per hectare yield of rice in Gaya district has increased from about 818 kilogrammes in 1960-61 to 1149 kilogrammes in 1970-71. Thus at present Gaya ranks first in per hectare yield of rice in the

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15 See Table No. 10.

16 Ibid.

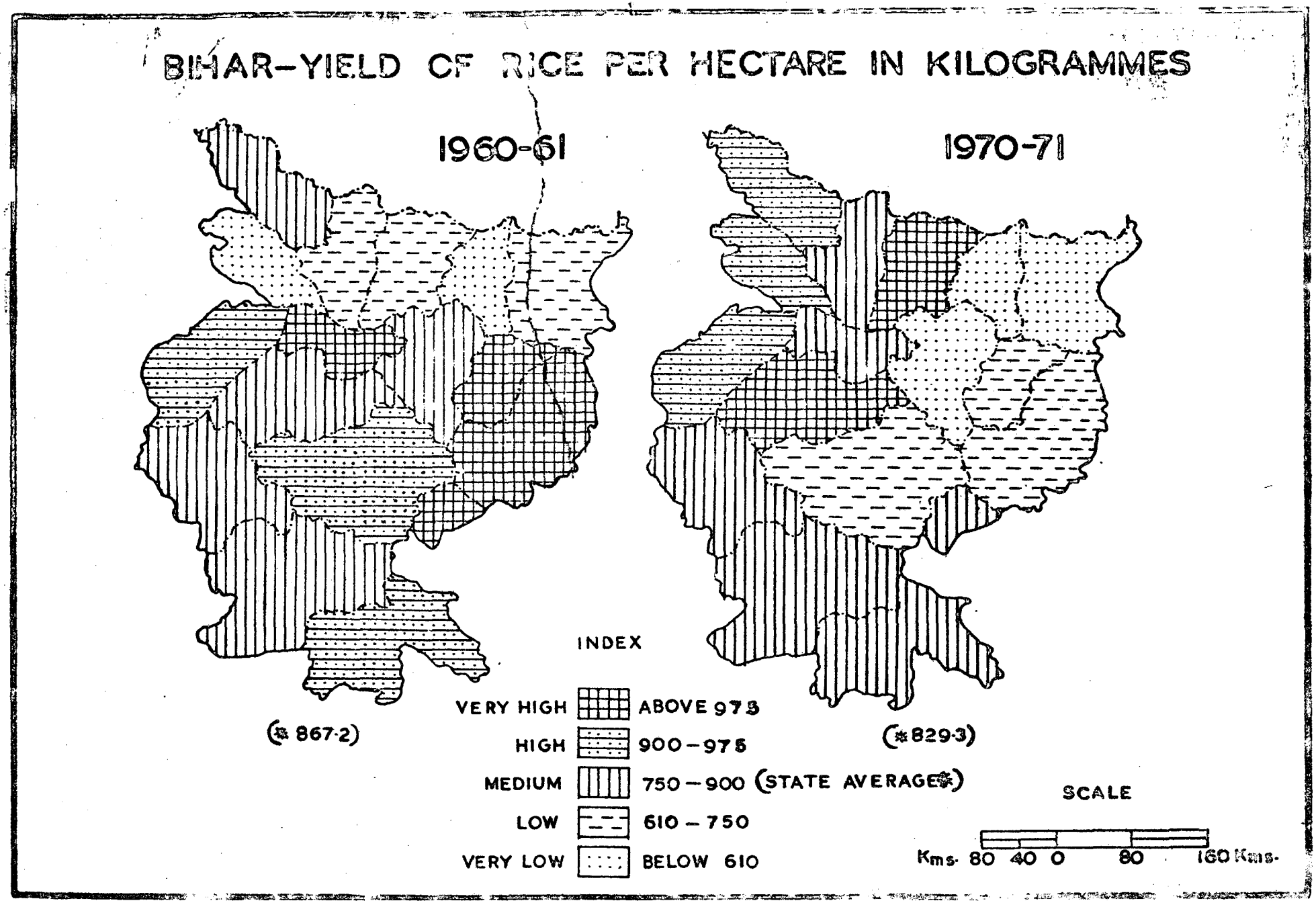
BIHAR–YIELD OF RICE PER HECTARE IN KILOGRAMMES
1960-61
1970-71
INDEX
VERY HIGH ABOVE 975
HIGH 900 – 975
MEDIUM 750 – 900
LOW 610 – 750
VERY LOW BELOW 610
(* 867·2)
(* 829·3)
(STATE AVERAGE*)
SCALE
Kms. 80 40 0 80 160 Kms.

Figure No. 9

Table - 10

Table showing per hectare yield of rice and percentage rate of growth in it during 1960-61 and 1970-71.

Districts	Per hectare yield in Kgs.		Percentage rate of growth in rice yield
	1960-61	1970-71	1961-71
1. Patna	1152.6	818.3	- 29.00
2. Gaya	817.9	1148.6	+ 40.43
3. Shahabad	952.6	907.3	- 4.76
4. Saran	601.1	931.3	+ 54.93
5. Champaran	847.1	917.0	+ 8.25
6. Muzaffarpur	742.6	785.0	+ 5.71
7. Darbhanga	717.8	981.0	+ 36.67
8. Monghyr	797.7	584.6	- 26.71
9. Bhagalpur	1242.3	706.6	- 43.12
10. Saharsa	493.3	556.0	+ 12.71
11. Purnea	682.1	482.0	- 29.34
12. Santhal Parganas	1085.2	683.3	- 37.03
13. Palamau	889.8	849.6	- 4.52
14. Hazaribagh	929.9	734.0	- 21.07
15. Ranchi	781.5	791.6	+ 1.29
16. Dhanbad	1154.8	813.0	- 29.60
17. Singhbhum	973.9	836.6	- 14.10
BIHAR	867.2	829.3	- 4.37

state. This can be credited to the increased irrigation facilities in this district.

Except Purnea, all the districts of the North Bihar Plain have shown a positive rate of growth in per hectare yield of rice, a quite opposite pattern to Chhotanagpur and South Bihar Plain districts. It is comparatively higher in the districts of Saran (+54.93 per cent) and Darbhanga (+36.67 per cent), as a result of this in these districts the per hectare yield of rice which was ranging from about 601 to 718 kilogrammes in 1960-61, now in 1970-71 it has greatly increased and ranging from 931 to 981 kilogrammes. In the districts of Champaran, Muzaffarpur and Saharsa also there has been increase in per hectare yield of rice, but at comparatively lower rate. Purnea is the only district of the North Bihar Plain which has shown a decreasing tendency in per hectare yield of rice. It may be due to less irrigation facilities. Thus we come to the conclusion that soil fertility and irrigation facilities mostly control the per hectare yield of rice. That is why the Western Gangetic Plain, with fertile soil and better irrigation facilities, is emerging as the most important rice producing area of the state.

2.18 Wheat

Wheat is the second most important[17] crop of Bihar after rice accounting for 11.93 per cent of the gross cropped area and

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17 In 1960-61, with 5.86 per cent of area, wheat was ranking third after rice and maize in the state.

is the leading among the rabi crops. In Bihar during 1960-61 the percentage of area under wheat was 5.86, while during 1970-71 it has increased to 11.93, showing a very high rate of growth, +101.89 per cent during this decade. Table No. 11 shows that during this decade in almost every district of Bihar there has been a positive rate of growth in wheat acreage, as a result the percentage of area under wheat which was varying from 0.07 in Dhanbad to 11.55 in Saran in 1960-61, now in 1970-71 it has increased greatly and ranging from 0.29 in Dhanbad to 25.21 in Shahabad district. In other words we can say that the wheat acreage has shown a general tendency of increase during this decade in the state. The Gangetic Plain or the districts of North Bihar Plain and canal irrigated districts of South Bihar Plain may be regarded as the wheat belt of Bihar, as in these districts the percentage of area under wheat is comparatively higher, ranging from 9.21 to 25.21 during 1970-71. It is clear from Figure No. 10.

On an average in the districts of North Bihar Plain the rate of growth in wheat acreage is comparatively higher than the irrigated districts of South Bihar Plain. It is very high in the districts of Saharsa (+279.60 per cent), Champaran (+235.46 per cent) and Purnea (+178.31 per cent) of the North Bihar Plain. As a result of this the percentage of area which was varying from 3.64 to 11.55 during 1960-61 in the districts of North Bihar Plain now in 1970-71 it has almost doubled and varying from 9.21 to

BIHAR - PERCENTAGE OF AREA UNDER WHEAT TO TOTAL CULTIVATED AREA

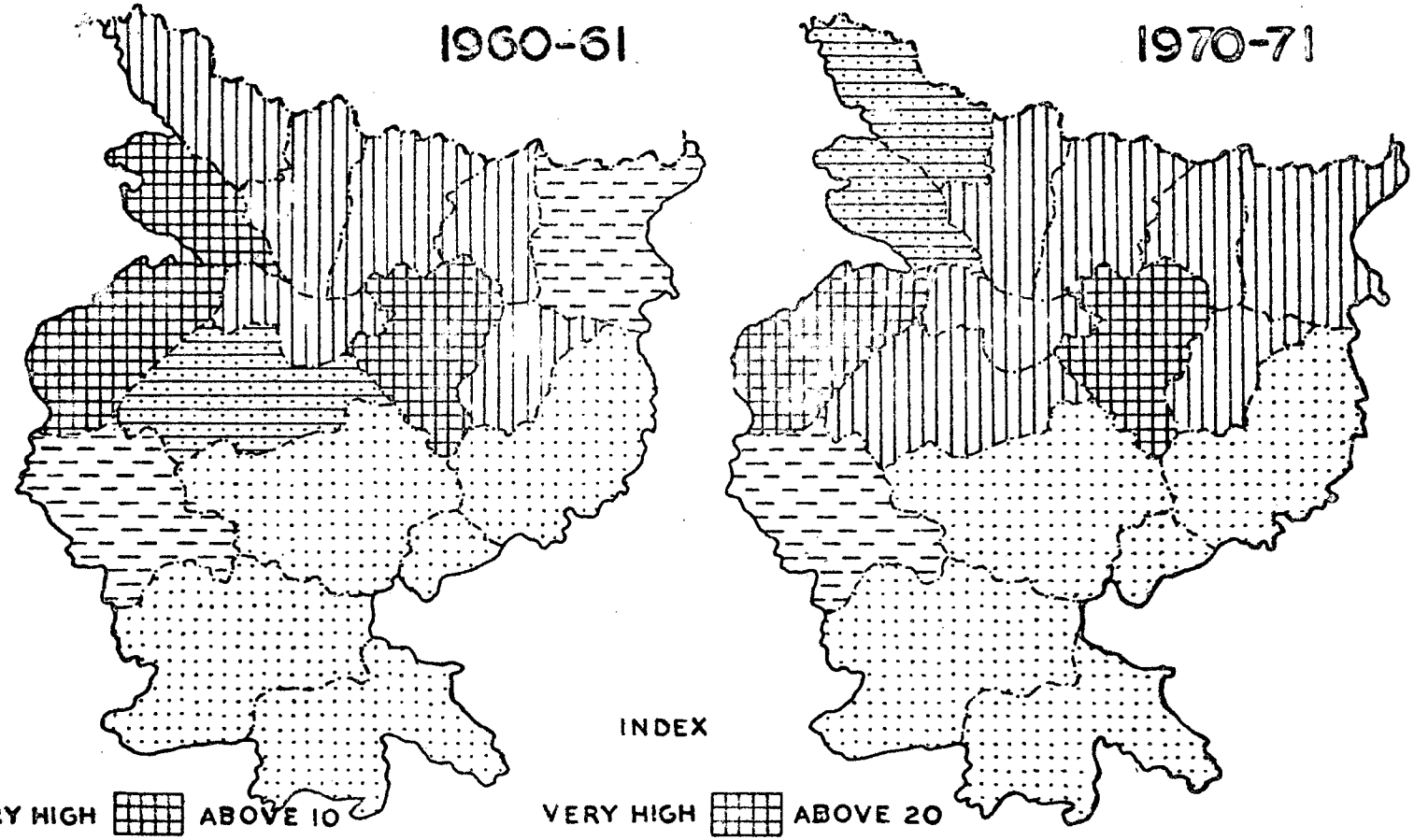

Figure No. 10

Table - 11

Table showing the percentage of area and rate of growth in wheat acreage during 1960-61 and 1970-71.

Districts	Percentage of area under wheat to gross cropped area		Percentage rate of growth in wheat acreage
	1960-61	1970-71	1961-71
1. Patna	6.52	12.79	+ 88.60
2. Gaya	9.34	13.75	+ 29.30
3. Shahabad	11.42	25.21	+ 117.48
4. Saran	11.55	18.20	+ 58.18
5. Champaran	6.11	17.39	+ 235.46
6. Muzaffarpur	5.39	11.59	+ 116.07
7. Darbhanga	4.87	11.45	+ 137.93
8. Monghyr	11.36	21.29	+ 62.17
9. Bhagalpur	4.96	9.70	+ 93.67
10. Saharsa	4.87	12.77	+ 279.60
11. Purnea	3.64	9.21	+ 178.31
12. Santhal Parganas	0.61	1.28	+ 84.80
13. Palamau	2.96	4.32	+ 33.17
14. Hazaribagh	1.03	1.48	+ 21.36
15. Ranchi	0.24	0.51	+ 110.19
16. Dhanbad	0.07	0.21	+ 201.37
17. Singhbhum	0.29	0.40	+ 33.40
BIHAR	5.86	11.93	+ 101.89

18.20. In South Bihar Plain the rate of growth in wheat acreage is comparatively higher in Shahabad (+117.48 per cent), Bhagalpur (+93.67 per cent) and Patna (+88.60 per cent) districts. In this region also the percentage of area under wheat has almost doubled.[18] Within this region the district of Shahabad with the driest climate and best canal irrigation, now supplemented by tube-wells, leads in wheat acreage in the state, having 25.21 per cent of the gross cropped area of the district. The district of Monghyr, where wheat is largely grown north of the Ganges where annual floods leave a heavy deposite of rich silt, comes next having 21.29 per cent of the gross cropped area of the district (see Figure No. 10). Except Muzaffarpur in all other districts of North Bihar Plain the increase in wheat acreage is mainly due to increase in gross cropped area as well as net sown area, while in South Bihar Plain districts, except Monghyr and Bhagalpur, it is mainly due to increase in net sown area. In the districts of Muzaffarpur, Monghyr and Bhagalpur the wheat acreage has increased mainly due to replacement of other crops.

As it is clear from Figure No. 10 all the districts of Chhotanagpur Plateau have a very low percentage of area under wheat. It is mainly due to the fact that the poorer soils of Chhotanagpur, which are hopelessly dry after rains because of

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18 In South Bihar Plain districts the percentage of area under wheat was varying from 4.96 to 11.42 in 1960-61, but in 1970-71 it is varying from 9.70 to 25.21 (see Table No. 11).

overdrainage, do not encourage wheat cultivation in the region. All the districts of this region have also registered a positive rate of growth in wheat acreage. It is comparatively higher in Dhanbad (+201.37 per cent), Ranchi (+110.19 per cent) and Santhal Parganas (+84.80 per cent). As a result of this the percentage of area under wheat has also increased in all the districts of this region, but it is still below 2. Palamau is the only district of this region where the percentage of area under wheat is more than 2, which has increased from 2.96 in 1960-61 to 4.32 in 1970-71.

Thus we come to the conclusion that the extent of wheat acreage is mainly controlled by soils fertility and irrigation facilities. With better and improved irrigation facilities the chances of increase in wheat acreage are greater in the North and South Bihar Plains than the Chhotanagpur region.

The per hectare yield of wheat in Bihar is 957 kilogrammes.[19] It has registered a positive rate of growth (+40.92 per cent), as a result it has increased from 679.1 kilogrammes in 1960-61 to 957 kilogrammes in 1970-71. Similar to wheat acreage it has also shown a general trend of increase[20] in almost all the districts of the state, with one exception of Gaya - where the rate of growth is negative (-3.06 per cent).

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19 Government of Bihar (1972), Bihar Through Figures, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 66.

20 See Table No. 12.

BIHAR – YIELD OF WHEAT PER HECTARE IN KILOGRAMMES

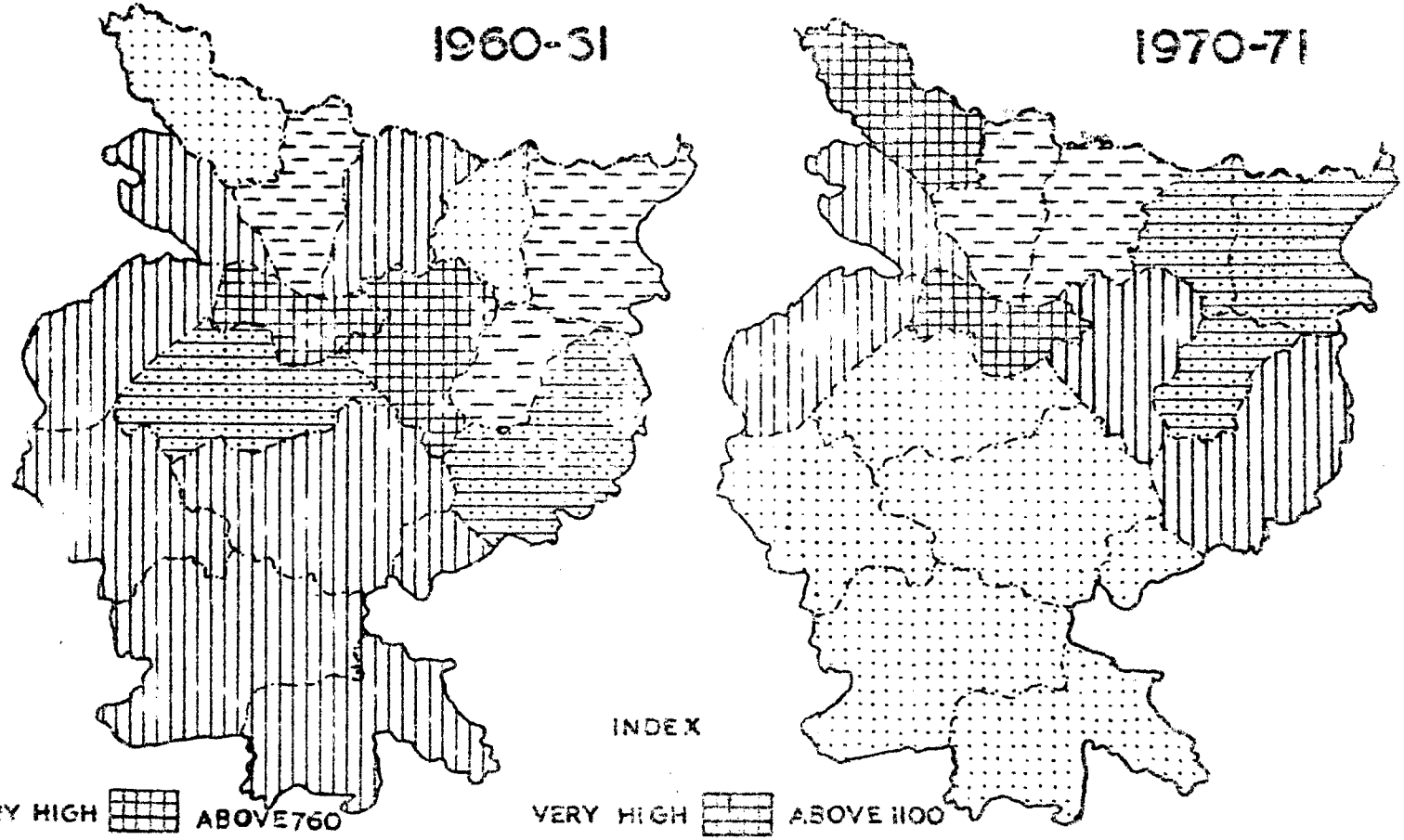

Figure No. 11

Table - 12

Table showing per hectare yield of wheat and percentage rate of growth in it during 1960-61 and 1970-71.

Districts	Per hectare yield in Kgs.		Percentage rate of growth in wheat yield
	1960-61	1970-71	1961-71
1. Patna	796.9	1190	+ 49.33
2. Gaya	726.2	704	- 3.06
3. Shahabad	691.3	972	+ 40.60
4. Saran	645.0	972	+ 50.70
5. Champaran	484.5	1164	+ 140.25
6. Muzaffarpur	533.5	784	+ 46.95
7. Darbhanga	649.1	860	+ 32.49
8. Monghyr	883.9	934	+ 5.67
9. Bhagalpur	582.4	995	+ 70.84
10. Saharsa	410.9	989	+ 140.69
11. Purnea	611.2	1006	+ 64.59
12. Santhal Parganas	732.2	972	+ 32.75
13. Palamau	654.3	717	+ 9.58
14. Hazaribagh	653.9	717	+ 9.65
15. Ranchi	654.0	717	+ 9.63
16. Dhanbad	656.4	717	+ 9.23
17. Singhbhum	653.5	717	+ 9.72
BIHAR	679.1	957	+ 40.92

Figure No. 11 clearly depicts that there exist spatial and temporal variations in per hectare yield of wheat in the state. In Saran, Champaran, Muzaffarpur, Darbhanga, Saharsa and Purnea districts of the North Bihar Plain the per hectare yield of wheat was varying from about 411 kilogrammes to 649 kilogrammes in 1960-61, but in 1970-71 it is varying from 784 kilogrammes to 1164 kilogrammes almost doubling the previous one. It is mainly due to higher rate of growth in the yield of wheat. The districts of Champaran (+140.25 per cent), Saharsa (+140.69 per cent) and Purnea (+64.59 per cent) have registered a very high rate of growth in per hectare yield of wheat, as a result in these districts it has tremendously increased and now ranging from 989 to 1164 kilogrammes.[21]

The per hectare yield of wheat has registered a positive rate of growth in the districts of Patna (+49.33 per cent), Shahabad (+40.60 per cent), Bhagalpur (+70.84 per cent) and Monghyr (+5.67 per cent) of the South Bihar Plain. As a result in these districts, the per hectare yield of wheat which was varying from 582 to 884 kilogrammes in 1960-61, now in 1970-71 it has increased much and varying from 934 to 1190 kilogrammes. The district of Patna, with per hectare yield of 1190 kilogrammes, stands first in the state. Only the Gaya district of the South Bihar Plain has registered a negative rate of growth, as a result the per hectare yield of wheat in this district has declined from

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21 Ibid.

726.2 kilogrammes in 1960-61 to 704 kilogrammes in 1970-71.

Table No. 12 shows that in almost all the districts of Chhotanagpur the rate of growth in wheat yield is roughly the same (about +9.50 per cent) during this decade. As a result the per hectare yield of wheat in all these districts has equalised (e.g. 717 kilogrammes). It is clear from Figure No. 11 that although the per hectare yield of wheat has shown an increasing tendency in all the districts of Chhotanagpur, it is still comparatively very low in these districts. The district of Santhal Parganas has registered a comparatively higher rate of growth (+32.75 per cent), as a result in this district per hectare yield has increased from 732.2 kilogrammes in 1960-61 to 972 kilogrammes in 1970-71. Thus on an average the increase in wheat yield has been comparatively lower in the Chhotanagpur region than the North and South Bihar Plains.

Thus we come to the conclusion that the fertile districts of the North and South Bihar Plains are the most favourable areas for wheat production, as these are the areas where both yield and acreage of wheat are high. In these areas both yield and acreage can be increased by better irrigation facilities and also more and more use of chemical fertilizer which has not been taken into consideration in the present study. On the contrary in the Chhotanagpur area the chances of increasing wheat cultivation are a little, as in this area both yields and acreage are very low and also increasing at a very slow rate.

2.19 Maize

Maize is the third most important crop of Bihar after rice and wheat accounting for 8.98 per cent of the gross cropped area.[22] For a rich harvest it requires rich, elevated well-drained and lighter soils. It needs well distributed light showers with short sunny intervals. It is very responsive to liberal fertilization. It requires rather careful cultivation, e.g. weeding and hoeing before the crop is ready. The output of maize varies inversely with that of rice which needs weather conditions opposed to that of maize. In Bihar during 1960-61 the percentage of area under maize was 7.24, while during 1970-71 it has increased to 8.98, showing a moderate rate of growth about +23.10 per cent. Except in Purnea, Santhal Parganas and Singhbhum districts, the maize acreage has registered a general trend of increase in almost all the districts of Bihar.[23] In North Bihar Plain the increase in maize acreage is mainly due to increase in gross cropped area and net sown area, while in the South Bihar Plain and Chhotanagpur it is mainly either due to increase in net sown area or replacement of other crops. It is clear from the Figure No. 12 that the chief maize belt of Bihar consists of Saran, Muzaffarpur, Darbhanga and Saharsa districts of the North Bihar Plain, eastern districts of the South Bihar Plain namely Monghyr and Bhagalpur and the northern districts of

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22 See Table No. 13.

23 Ibid.

BIHAR—PERCENTAGE OF AREA UNDER MAIZE TO TOTAL CULTIVATED AREA

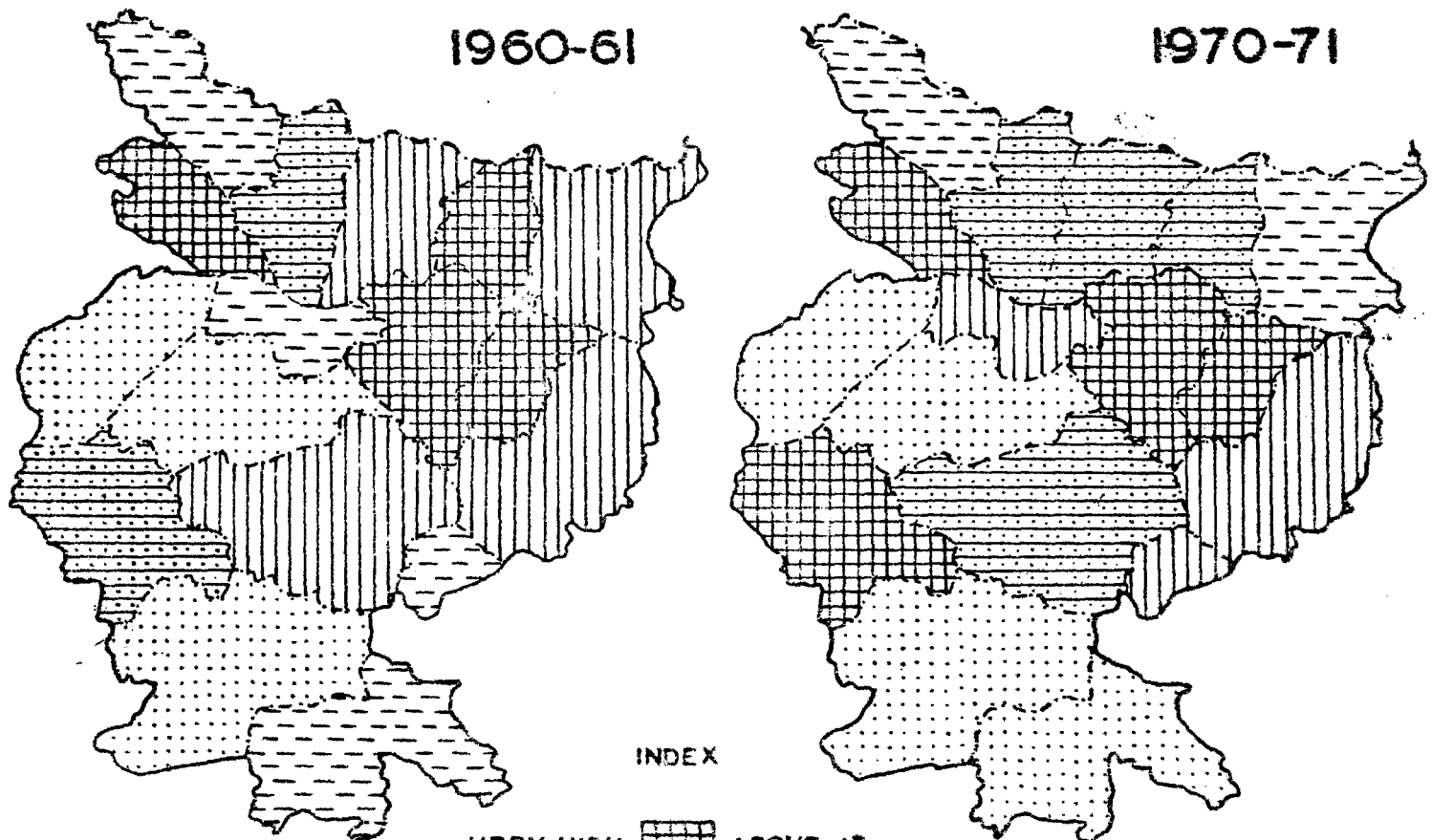

Figure No. 12

Table - 13

Table showing the percentage of area and rate of growth in maize acreage during 1960-61 and 1970-71.

Districts	Percentage of area under maize to gross cropped area		Percentage rate of growth in maize acreage
	1960-61	1970-71	1961-71
1. Patna	3.66	7.97	+ 109.45
2. Gaya	1.40	2.46	+ 54.48
3. Shahabad	1.26	1.85	+ 44.80
4. Saran	16.59	19.30	+ 16.77
5. Champaran	4.55	4.88	+ 26.41
6. Muzaffarpur	10.73	12.55	+ 17.63
7. Darbhanga	8.17	11.76	+ 45.86
8. Monghyr	16.46	26.91	+ 41.50
9. Bhagalpur	16.63	17.33	+ 3.29
10. Saharsa	14.58	12.36	+ 22.78
11. Purnea	6.84	4.35	- 30.06
12. Santhal Parganas	7.99	8.73	- 4.02
13. Palamau	9.85	14.67	+ 36.15
14. Hazaribagh	8.11	12.67	+ 32.14
15. Ranchi	1.21	1.79	+ 50.63
16. Dhanbad	4.92	7.92	+ 30.04
17. Singhbhum	3.21	2.86	- 11.76
BIHAR	7.24	8.98	+ 23.10

Chhotanagpur namely Palamau and Hazaribagh. They all together form a compact belt where the percentage of area under maize is high and ranges between 11.76 and 26.92.

Table No. 13 explains that except Purnea, in every district of the North Bihar Plain the maize acreage has registered a positive rate of growth. As a result in these districts the percentage of area under maize has increased, for example, in 1960-61 it was varying from 4.55 to 16.59, while in 1970-71 it is varying from 4.88 to 19.30. But there is one exception and that is the district of Saharsa. Although in Saharsa the maize acreage has registered a positive rate of growth about +22.78 per cent, the percentage of area under this crop has gone down. It is mainly due to the fact that in this district the rate of growth of gross cropped is comparatively very high about +44.81 per cent(just double). The district of Purnea has registered a negative rate of growth (-30.06 per cent) in maize acreage, as a result the percentage of area under maize has decreased from 6.84 in 1960-61 to 4.35 in 1970-71. Maize is relatively the most important crop in Saran district where there is a large proportion of sandy loam in the Bhit lands or newer alluvium, particularly near the Ghaghara and the Gandak. With 19.30 per cent of area under maize the district of Saran stands second in the state. It is generally the frequency of the well drained loamy levees in North Bihar that makes it important for maize.

During the decade (1960-61 and 1970-71) all the districts

of South Bihar Plain have registered a positive rate of growth in maize acreage, as a result in these districts the percentage of area under maize has increased. The eastern districts of South Bihar Plain namely Monghyr and Bhagalpur are the chief producers of maize. Monghyr with 26.92 per cent of area under maize in 1970-71 stands first in the state, while Bhagalpur with 17.33 per cent of area ranks third in the state. The districts of Shahabad, Patna and Gaya of South Bihar Plain are the least producers of maize. In these districts the percentage of area under maize ranges only from 1.85 to 7.97. The predominance of heavy clayey soils in these areas limits the maize cultivation.

Except Santhal Parganas and Singhbhum in all other districts of Chhotanagpur there has been a positive rate of growth in maize acreage, as a result in these districts the percentage of area under maize has increased.[24] One thing is remarkable, in spite of a negative rate of growth in maize acreage the percentage of area under maize has slightly increased in the district of Santhal Parganas. It is mainly due to the fact that in this district the gross cropped area has also registered a negative rate of growth (-12.17 per cent), but at a higher rate. On account of negative rate of growth the percentage of area under maize in Singhbhum district has decreased from 3.21 in 1960-61 to 2.86 in 1970-71. As it is clear from the Figure No. 12

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24 Ibid.

that Palamau and Hazaribagh districts of Chhotanagpur are the chief producers of maize where its percentage varies from 12.67 in Hazaribagh to 14.67 in Palamau. In other districts of Chhotanagpur the percentage of area under maize is low even less than the state average. In Chhotanagpur the relative infertility of the upland soils along with higher rainfall restricts the cultivation of maize particularly in the moister districts of Singhbhum, Ranchi and Dhanbad.

Thus we come to the conclusion that the extent of area under maize is generally controlled by climate and soil fertility and not by irrigation. However, the maize acreage can be increased with the use of high yielding varieties of maize and improved irrigation facilities, as this type of maize is generally grown in summer with the help of irrigation.

The per hectare yield of maize in Bihar is 952 kilogrammes,[25] roughly equal to wheat yield. It has registered a negative rate of growth (-6.69 per cent), as a result it has declined from 1020.3 kilogrammes in 1960-61 to 952 kilogrammes in 1970-71. On an average it has shown a declining trend in most of the districts of North and South Bihar Plains, while in Chhotanagpur it has shown an increasing trend in almost all the districts, except Santhal Parganas. Figure No. 13 shows that the per hectare yield of maize varies from region to region

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25 Government of Bihar (1972), Bihar Through Figures, Directorate of Statistics and Evaluation, Secretariat Press, Patna, p. 66.

and also from time to time, for example, during 1960-61 Darbhanga, Patna, Shahabad and Bhagalpur districts of North and South Bihar Plains and Santhal Parganas of Chhotanagpur Plateau were the districts where the per hectare yield of maize was high and ranging between 1217.3 and 1660.2 kilogrammes, while during 1970-71 Gaya and Muzaffarpur districts of South and North Bihar Plains and Singhbhum district of Chhotanagpur are the districts where it is high and ranging between 1103.5 and 1219.5 kilogrammes.[26]

Except Champaran and Muzaffarpur districts, in all other districts of North Bihar Plain the per hectare yield of maize has registered a negative rate of growth. As a result in these districts the per hectare yield of maize which was ranging between 621.6 and 1660.2 kilogrammes in 1960-61, has declined in 1970-71 and ranging between 601.5 and 1103.5 kilogrammes. On account of a very high negative rate of growth (-48.29 per cent) the per hectare yield of maize in Darbhanga has tremendously declined from 1660.2 kilogrammes in 1960-61 to 858.5 kilogrammes in 1970-71. It was ranking first in 1960-61 in the state, but in 1970-71 it has taken 14th position in per hectare yield of maize. On account of a very high rate of positive growth (+77.55 per cent) in Muzaffarpur the per hectare yield of maize has increased from 621.5 kilogrammes in 1960-61 to 1103.5 kilogrammes in 1970-71. In the district of Champaran also there has

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26 See Table No. 14.

BIHAR – YIELD OF MAIZE PER HECTARE IN KILOGRAMMES

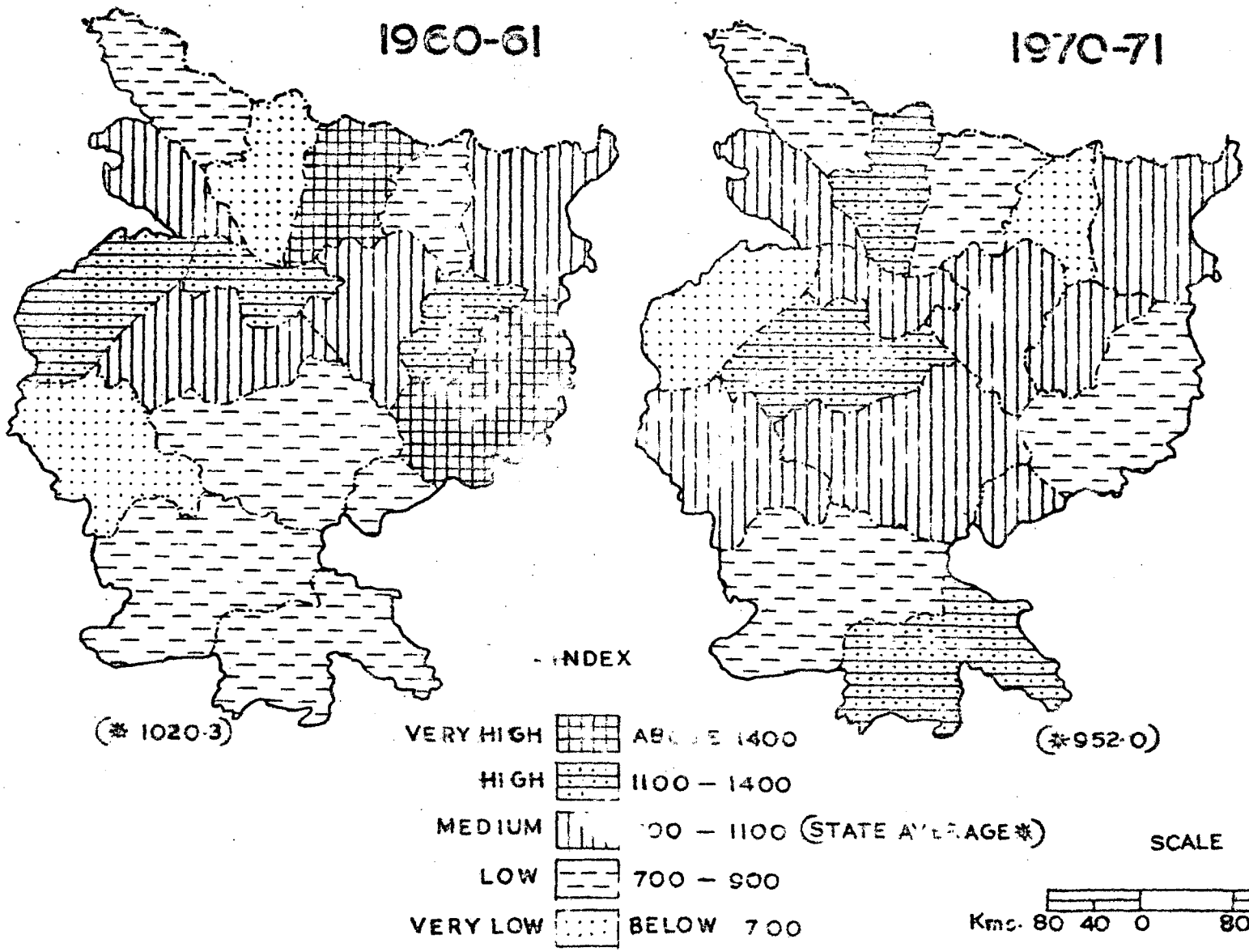

Figure No. 13

Table - 14

Table showing per hectare yield of maize and percentage rate of growth in it during 1960-61 and 1970-71.

Districts	Per hectare yield in Kgs.		Percentage rate of growth in maize yield
	1960-61	1970-71	1961-71
1. Patna	1217.3	954.0	- 21.63
2. Gaya	964.7	1219.5	+ 26.41
3. Shahabad	1332.6	601.5	- 54.86
4. Saran	984.5	918.5	- 6.70
5. Champaran	868.8	880.0	+ 1.29
6. Muzaffarpur	621.6	1103.5	+ 77.53
7. Darbhanga	1660.2	858.5	- 48.29
8. Monghyr	984.0	1057.5	+ 7.47
9. Bhagalpur	1287.6	1035.0	- 19.62
10. Saharsa	758.7	623.5	- 17.82
11. Purnea	994.6	982.0	- 1.27
12. Santhal Parganas	1427.6	876.0	- 38.64
13. Palamau	680.7	959.0	+ 40.88
14. Hazaribagh	757.2	1042.0	+ 37.61
15. Ranchi	719.3	842.0	+ 17.06
16. Dhanbad	719.3	998.5	+ 38.82
17. Singhbhum	719.4	1158.0	+ 60.99
BIHAR	1020.3	952.0	- 6.69

been increase in per hectare yield of maize.

The districts of Patna, Shahabad and Bhagalpur of South Bihar Plain have registered a negative rate of growth in per hectare yield of maize. As a result in these districts the per hectare yield of maize which was ranging from 1217.3 to 1332.6 kilogrammes in 1960-61, now in 1970-71 it has greatly declined and ranging only from 601.5 to 1035 kilogrammes. On the contrary the districts of Gaya and Monghyr of South Bihar Plain have registered a positive rate of growth, as a result in these districts the per hectare yield of maize has increased from 964.7 and 984 kilogrammes in 1960-61 to 1219.5 and 1057.5 kilogrammes in 1970-71 respectively. The district of Gaya, with per hectare yield of 1219.5 kilogrammes, stands first in maize production in the state. Thus on an average the per hectare yield of maize is comparatively higher in the South Bihar Plains than the North Bihar Plains.

Almost all the districts of Chhotanagpur have registered a positive rate of growth, a quite opposite pattern to those of North and South Bihar Plains. As a result in these districts the per hectare yield of maize which was ranging from 680.7 to 757.2 kilogrammes in 1960-61, now in 1970-71 it has increased and ranging from 842 to 1158 kilogrammes. Santhal Parganas is the only district of this region which has registered a negative rate of growth (-38.64 per cent), as a result in this district the per hectare yield of maize has declined from 1427.6

kilogrammes in 1960-61 to 876 kilogrammes in 1970-71.

Thus we come to the conclusion that specially in case of maize yield, sharp change has taken place during this decade. As a result some of the districts have come down from top to bottom, while some have gone up from bottom to top. Secondly, as it is clear from Figure No. 13 that in 1970-71 none of the districts of the state have registered the per hectare yield of maize more than 1400 kilogrammes. Now the strategy for increasing per hectare yield of maize in the state is only to use high yielding variety of maize and more and more use of chemical fertilizer, as it is more responsive of fertilization.

Part - II

OCCUPATIONAL PATTERNS

2.20 The Occupational Patterns of Bihar

The occupational pattern is directly related to economic development of a country or state. As Priyatosh Maitre sums up, "Because economic development, in other words industrialization involves the transformation of society's occupational structure. Thus the pattern of occupational distribution is perhaps the best index of the extent of industrialization and economic development of a country."[1] In order to analyse the relationships between occupations and the social structure and ultimately to determine the levels of economic development, it is necessary to sub-divide the broad range of occupations into reasonably homogeneous categories, since different occupations have widely varied meaning and rewards. For the present study the categorization developed by the Census of India has been taken into consideration. According to 1971 Census all persons are divided into two broad streams of main activity namely, (1) as workers and (2) as non-workers. The workers have been further classified into the following three broad groups and nine categories of main activity:

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1 Priyatosh Maitre, "Changes in Occupational Pattern and Industrialization in India 1901-1961."

Broad groups	Categories of workers	
1. Primary Sector	(i)	Cultivators
	(ii)	Agricultural labourers
	(iii)	Livestock, Forestry, Fishing, Hunting and Plantations, Orchards and allied activities. 2
2. Secondary Sector	(iv)	Mining and Quarrying
	(v)	Manufacturing, Processing, Servicing and Repairs: 3 (a) Household Industry (b) Manufacturing other than household Industry
	(vi)	Construction
3. Tertiary Sector	(vii)	Trade and Commerce
	(viii)	Transport, Storage and Communications
	(ix)	Other Services

Although the occupations are categorized in this manner primarily for convenience, it is evident that this categorization corresponds to a rough approximation of the social stratification system and helps in determining the nature and degree of levels of economic development of a country or state.

2.21 Total Workers

According to 1971 Census a 'worker' was defined clearly as a person whose "main activity" was participation in any

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2 In 1961 categories (iii) and (iv) were clubbed together as category (iii) and were included in Primary Sector.

3 In 1961 category (v) was separated as category (iv) household Industry and (v) Manufacturing other than household Industry.

economically productive work by his/her physical or mental activity. 'Work' involves not only actual work but effective supervision, or direction of work. The reference period was one week prior to the date of enumeration in case of regular work in trade, profession, service or business. A person engaged primarily in household duties such as cooking for one's own household or performing one's household duties or student attending an institution or a rent receiver was classified as "non-worker". While on the other hand in 1961 a person was categorized basically as a 'worker' even if such a person's contribution to work was extremely marginal. Secondly the reference period was two weeks (15 days) prior to the date of enumeration in case of regular work in trade, profession, service or business.

On account of this change in definition of 'worker' between 1961 and 1971, a major change has taken place both in absolute number of workers and in the percentage of workers to total population.[4] In case of the percentage of workers to total population all the districts of Bihar have shown a declining trend, while in case of absolute number of workers this pattern is observe in almost all the districts of the state, except Saharsa, Purnea and Muzaffarpur. On the basis of this decline in the proportion of workers, it is difficult to conclude that the participation rate in the work-force has declined during the

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4 See Table No. 15.

BIHAR - PERCENTAGE OF TOTAL WORKERS TO TOTAL POPULATION

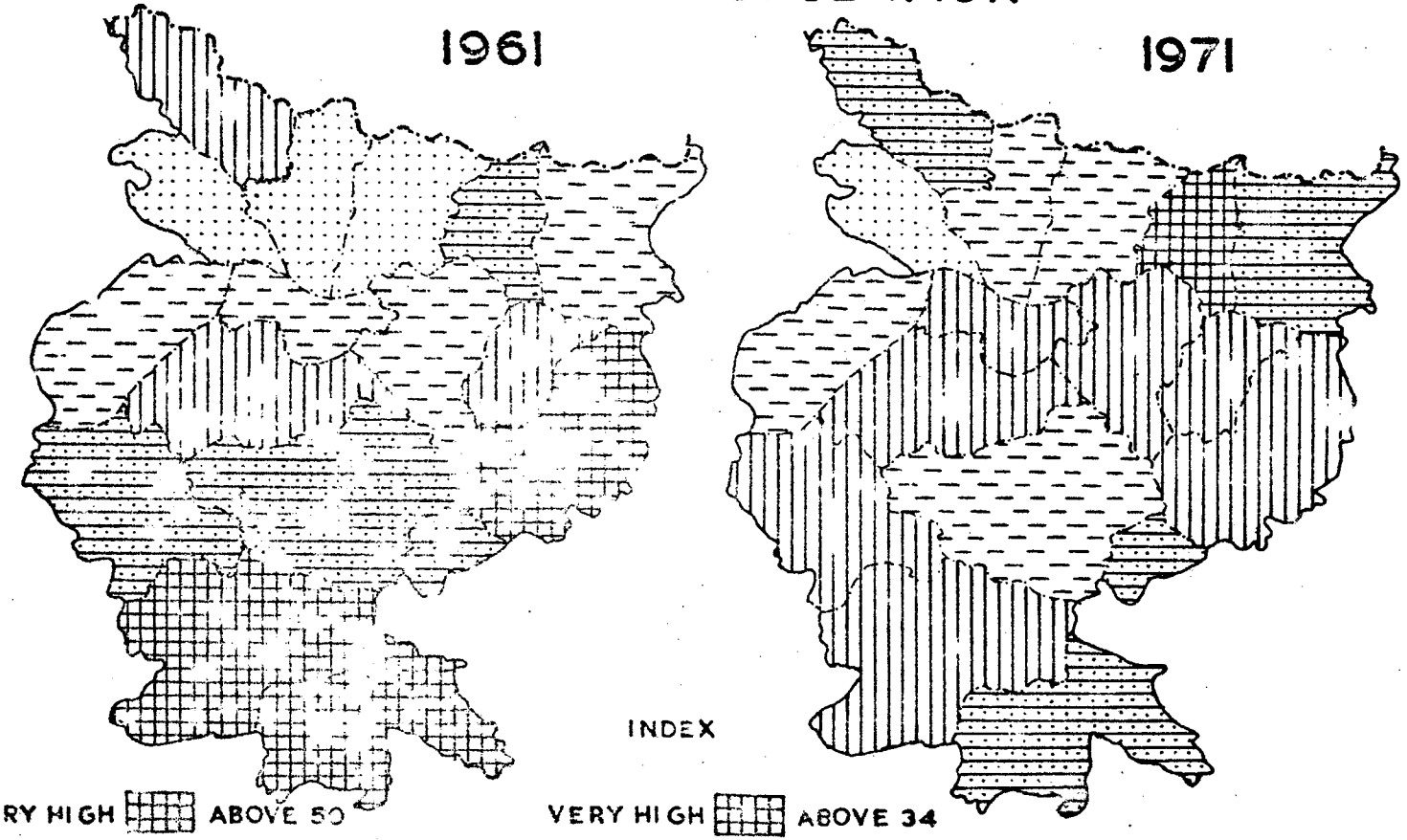

Figure No. 14

Table - 15

Table showing the percentage of total workers to total population during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	37.36	30.84
1. Saran	34.79	26.62
2. Champaran	41.29	33.88
3. Muzaffarpur	33.52	29.43
4. Darbhanga	35.61	29.70
5. Saharsa	45.58	35.30
6. Purnea	39.50	33.23
South Bihar Plain	39.07	30.50
7. Patna	37.59	30.35
8. Gaya	40.98	30.69
9. Shahabad	37.11	29.29
10. Monghyr	38.80	30.82
11. Bhagalpur	41.71	32.01
Chhotanagpur Plateau	51.36	32.04
12. Santhal Parganas	52.45	32.69
13. Palamau	47.76	32.18
14. Hazaribagh	48.41	29.71
15. Ranchi	56.34	31.83
16. Dhanbad	48.79	33.72
17. Singhbhum	51.71	33.19
BIHAR	41.40	31.03

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

decade 1961-71. Because this decline is mainly due to the change in the definition of worker. Thus the temporal variation in work force is hardly comparable during the decade 1961-71. However, in case of the sub-categories of workers we can examine the temporal variation or the pattern of shift during this decade. In case of the total work force, now the only alternative is to examine the relative position of districts in 1961 and 1971 separately or to explain the spatial variation in the distribution of work force.

According to 1971 Census, in Bihar the percentage of workers to total population is 31.03. Thus about 68.97 per cent of the total population of Bihar consists of non-workers. On account of the change in the definition of workers, the proportion of workers has declined from 41.40 per cent in 1961 to 31.03 per cent in 1971. This pattern is observed in all the districts of Bihar during this decade. About 83.22 per cent of the working population of Bihar is engaged in primary activities, while only 7.11 per cent and 9.66 per cent of its working population is engaged in secondary and tertiary activities respectively. In both the periods - 1961 and 1971, the Chhotanagpur Plateau has the largest percentage of workers[5] in Bihar, about 51.36 and 32.04 respectively. In 1961 Singhbhum, Ranchi and Santhal Parganas formed one cluster of districts where the percentage of workers was comparatively very high, ranging between

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5 Ibid.

51 and 57, while Dhanbad, Hazaribagh and Palamau formed another cluster of districts where the proportion of workers was comparatively high, ranging between 47 per cent and 49 per cent. In 1971 the districts of Dhanbad and Singhbhum form one cluster where the proportion of workers is comparatively high, about 33.72 per cent and 33.19 per cent respectively. While the districts of Ranchi, Palamau and Santhal Parganas form another cluster where the proportion of workers is medium or moderate (around the state average), ranging between 31 per cent and 33 per cent. The district of Hazaribagh forms a separate pocket of comparatively low proportion of workers, about 29.71 per cent, below the state average. Thus we find a change in the distributional pattern of workers during the decade 1961-71 (see Figure No. 14), for example, in 1971 none of the districts of Chhotanagpur have a comparatively very high proportion of workers as in 1961. Secondly in 1961 in none of the districts of this region the percentage of workers to total population was below the state average (41.40), while in 1971 in the district of Hazaribagh it is below the state average. It is interesting to note that in the districts of Chhotanagpur the percentage of workers to total population has greatly declined during this decade, for example, in 1961 it was varying between 47 and 57, while in 1971 it is only varying between 29 and 34. It is mainly due to the fact that in these districts the female participation in work force was very high in 1961, and according to

1971 definition of work most of these women whose main activity was household duties have been regarded as non-workers.

South Bihar Plain, with 39.07 per cent of workers, was ranking second in 1961, but in 1971, with 30.50 per cent of workers, it is ranking third in the state. During the decade 1961-71, the percentage of workers to total population has also declined in almost all the districts of South Bihar Plain, but this decline is not upto the extent of Chhotanagpur districts, for example, in 1961 in South Bihar Plain districts it was varying between 37 and 42, while in 1971 it is varying between 29 and 33. In 1961 the districts of Bhagalpur and Gaya formed one cluster where the percentage of workers was moderate or around the state average, 41.71 and 40.98 respectively. Bhagalpur was the only district of South Bihar Plain, where the percentage of workers was above the state average. Shahabad, Patna and Monghyr formed another cluster of districts where the percentage of workers was comparatively low, ranging between 37 and 40, fairly below the state average. It is interesting to note that in South Bihar Plain the distributional pattern of work force has slightly changed in 1971 (see Figure No. 14). For example, in 1971 Patna, Gaya, Monghyr and Bhagalpur form one cluster of districts where the percentage of workers is moderate or around the state average, ranging between 30 and 33. Thus the districts of Patna and Monghyr have improved their position in the proportion of work force during 1971. Bhagalpur is the only

district of this group where the percentage of workers is above the state average, about 32.01. The district of Shahabad forms a separate pocket where the percentage of workers is comparatively low, about 29.29.

North Bihar Plain, with 37.36 per cent of workers was ranking third in 1961, but in 1971, with 30.84 per cent of workers, it is ranking second in the state. Thus it has slightly improved its position in the proportion of work force. In 1961 Saharsa was the only district of North Bihar Plain where the percentage of workers was comparatively high, about 45.58 (above the state average). Except Saharsa, in all the districts of North Bihar Plain the percentage of workers was below the state average. In the districts of Champaran and Purnea the percentage of workers was comparatively moderate (about 41.29) and low (about 39.50) respectively. Saran, Muzaffarpur and Darbhanga formed one cluster of districts, where the percentage of workers was very low, ranging between 33 and 36. In North Bihar Plain also we find a slight change in the distributional pattern of workers during 1971 (see Figure No. 14). For example, the district of Saharsa has comparatively very high proportion of workers, about 35.30 per cent, not only in the North Bihar Plain, but also in the state. Champaran and Purnea form one cluster of districts where the percentage of workers is comparatively high, 33.88 and 33.23 respectively, fairly above the state average. Muzaffarpur and Darbhanga form another cluster of

districts where the proportion of workers is comparatively low, 29.43 per cent and 29.70 per cent respectively, below the state average. The district of Saran forms a separate pocket where the proportion of workers is comparatively very low, about 26.62 per cent. Thus except Saran, almost all the districts of North Bihar Plain have improved their position in proportion of work force. Due to the change in definition of workers, in the districts of North Bihar Plain also the percentage of workers to total population has declined during the decade 1961-71, but here also it is not upto the extent of Chhotanagpur, for example, in 1961 in the North Bihar Plain districts it was varying between 33 and 46, while in 1971 it is varying between 26 and 36.

Thus, it is clear from the above description that on an average the districts of Chhotanagpur Plateau have comparatively higher proportion of workers than the districts of North and South Bihar Plains. It is mainly due to the fact that all the districts of Chhotanagpur have a very high proportion of Scheduled Castes and Scheduled Tribes in which both men and women participate in economic activities, while among other people it is only in the poorer sections that women also work. In other words, in all the districts of Chhotanagpur the proportion of workers is high, because of a very high participation rate of females in the work force. On the other hand, in the districts of North and South Bihar Plains, especially in Saran, Muzaffarpur, Darbhanga and Shahabad, the proportion of workers is

comparatively very low. It is mainly due to emigration of the workers from these districts to other districts or states. In other words, in these districts the proportion of workers is low because they send out their male workers (mainly agricultural) in large number to West Bengal and Assam, as well as to some places within the state.

A low proportion of workers in the population is not a happy sign. It indicates participation in economic activities by a small section of the community, and implies thereby the dependence of a larger number on fewer people. It is bound to accentuate the struggle for existence and lower the standard of living. Although the districts of Saran, Muzaffarpur, Darbhanga and Shahabad have a very low proportion of workers, it will not be quite correct, however, to base any conclusion about the extent of social and economic dependence on these figures alone. The position is rather complicated by the emigration of workers.

2.22 Primary Sector

The workers who are engaged in the production of things which are directly related to the earth are known as primary sector workers. It includes cultivators, agricultural labourers and workers engaged in livestock, forestry, fishing, hunting and plantation, orchards and allied activities. The workers engaged in mining and quarrying were regarded as primary sector workers in 1961, but in 1971 they have been regarded as secondary sector workers. Generally the higher proportion of workers in

primary sector indicates the lower level of economic development. And with the pace of development the proportion of workers in primary sector goes on decreasing. As A.G.B. Fisher has stated, "We may say that in every progressive economy there has been a steady shift of employment and investment from the essential 'primary' activities to secondary activities of all kinds and to a still greater extent into tertiary production."[6]

In Bihar the percentage of workers to total population is 31.03, and about 83.22 per cent of its total workers are engaged in primary activities. This shows that in terms of economic development Bihar as a whole is the most backward state. The percentage of workers engaged in primary activities to total workers has shown an increasing tendency, for example, it has increased from 80.23 in 1961 to 83.22 in 1971. It shows rather a negative aspect of the levels of development. This trend is observed in almost all the districts of Bihar,[7] except Dhanbad, Hazaribagh, Ranchi and Singhbhum where varying degree of industrialization has taken place.

The Figure No. 15 clearly depicts that in Bihar the distributional pattern of workers engaged in primary sector has changed during the decade 1961-71. For example, in 1961 the districts of Champaran and Saharsa of North Bihar Plain formed

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6 A.G.B. Fisher (1945), Economic Progress and Social Security, pp. 5-6.

7 See Table No. 16.

BIHAR – PERCENTAGE OF WORKERS ENGAGED IN PRIMARY SECTOR TO TOTAL WORKERS

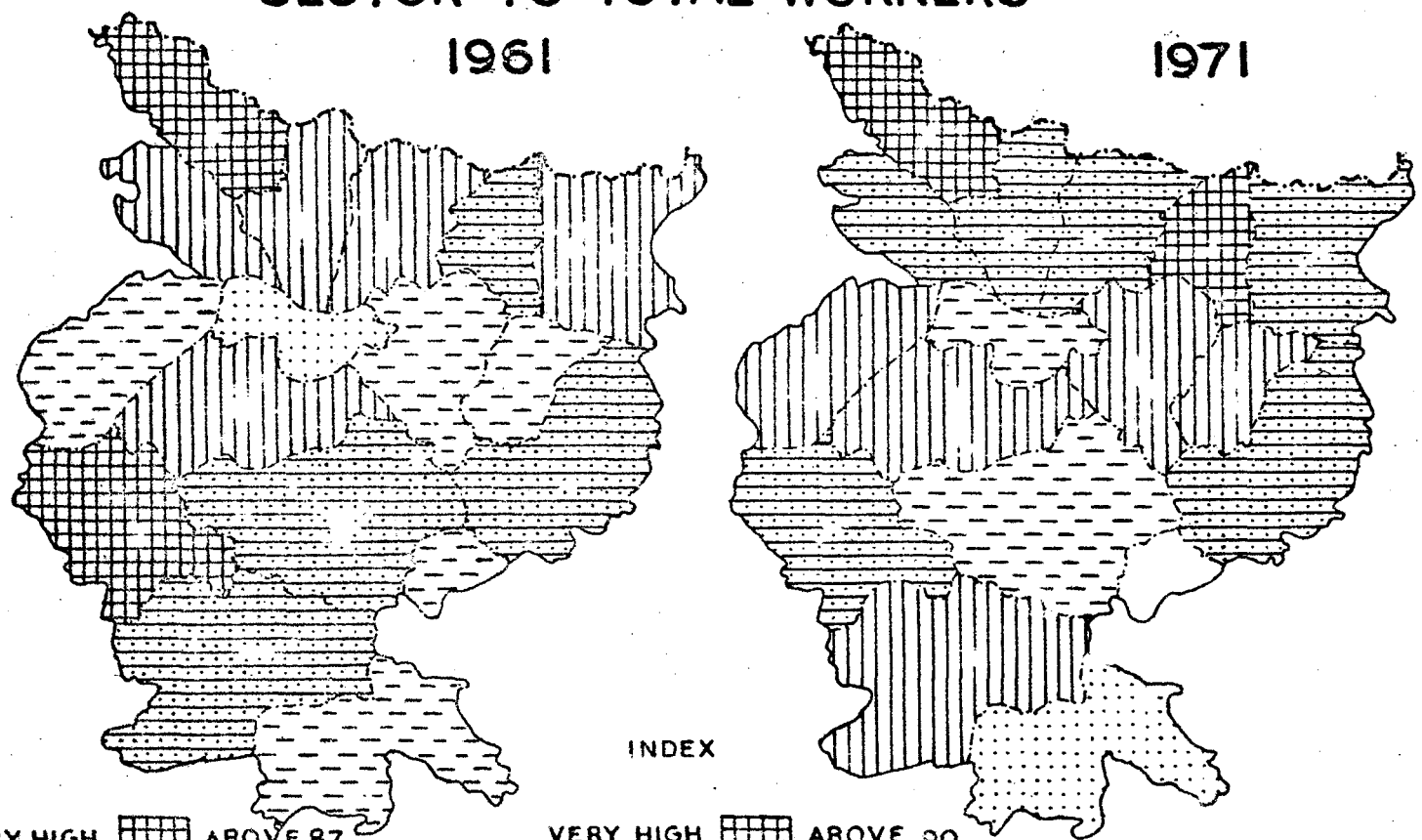

Figure No. 15

Table - 16

Table showing the percentage of workers engaged in primary sector to total workers during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	82.01	88.93
1. Saran	82.29	87.79
2. Champaran	87.09	90.49
3. Muzaffarpur	81.25	88.00
4. Darbhanga	78.42	88.10
5. Saharsa	86.14	92.04
6. Purnea	79.36	88.85
South Bihar Plain	75.33	81.61
7. Patna	68.69	73.95
8. Gaya	82.25	85.01
9. Shahabad	74.45	81.97
10. Monghyr	74.43	83.25
11. Bhagalpur	74.26	83.43
Chhotanagpur Plateau	82.80	75.62
12. Santhal Parganas	86.20	87.42
13. Palamau	87.22	89.66
14. Hazaribagh	85.00	76.92
15. Ranchi	86.39	80.62
16. Dhanbad	74.25	35.75
17. Singhbhum	73.99	69.83
BIHAR	80.23	83.22

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

separate pockets of comparatively very high and high proportion of workers engaged in primary sector, 87 per cent and 86.14 per cent respectively. While in 1971 they form one cluster of districts where it is comparatively very high, 90.49 per cent and 92.04 per cent respectively. On the other hand in 1961 Saran, Muzaffarpur, Darbhanga and Purnea formed one cluster of districts where the proportion of workers engaged in primary sector was moderate, ranging between 78 per cent and 83 per cent, while in 1971 these districts form one cluster where it is comparatively high, ranging between 87 per cent and 90 per cent. Thus, all the districts of North Bihar Plain have shown an increasing tendency in the proportion of workers engaged in primary sector during this decade, i.e. in these districts it was varying between 78 per cent and 87 per cent in 1961, while in 1971 it is varying between 87 per cent and 93 per cent.

Similar to the North Bihar Plain the districts of South Bihar Plain have also shown an increasing tendency in the proportion of workers engaged in primary sector during this decade, i.e. in these districts in 1961 it was varying between 68 per cent and 83 per cent, while in 1971 it is varying between 73 per cent and 85 per cent. In 1961 the districts of Shahabad, Monghyr and Bhagalpur formed one cluster where the proportion of primary sector workers was comparatively low, ranging from 74 per cent to 75 per cent. The district of Patna formed one separate pocket where the proportion of primary sector workers was comparatively very low, about 68.69 per cent, not only in

this region, but also in whole of the state. The district of Gaya also formed a separate pocket where it was moderate, about 82.25 per cent, fairly above the state average. On the other hand in 1971 Shahabad, Gaya, Monghyr and Bhagalpur form one cluster of districts where the proportion of primary sector workers is comparatively moderate, ranging between 81 per cent and 86 per cent. Shahabad is the only district of this group where it is below the state average. The district of Patna form one separate pocket where the proportion of primary sector workers is comparatively low, about 73.95 per cent, below the state average.

Unlike the North and South Bihar Plains, the districts of Dhanbad, Hazaribagh, Ranchi and Singhbhum of Chhotanagpur have shown a decreasing tendency in the proportion of workers engaged in primary sector, i.e. in these districts in 1961 it was varying between 73 per cent and 87 per cent, while in 1971 it is varying between 35 per cent and 81 per cent. It is mainly due to the fact that these are the districts where varying degree of industrialization has taken place. Secondly these are the districts of Chhotanagpur where most of the workers are engaged in mining and quarrying which has been excluded from the primary sector. It is the only cause which has resulted in the substantial decline, from 74.25 per cent in 1961 to 35.75 per cent in 1971, in the proportion of workers engaged in primary sector in the district of Dhanbad. Palamau and Santhal

Parganas are the only districts of this region which have shown an increasing tendency in the proportion of primary sector workers, but that is very slow, i.e. in these districts it has only increased from 87.22 per cent and 86.20 per cent in 1961 to 89.66 per cent and 87.42 per cent in 1971 respectively. In this region also we find a change in the distributional pattern of primary sector workers during this decade. For example, in 1961 the district of Palamau formed one separate pocket where the proportion of workers engaged in primary sector was comparatively very high, about 87.22 per cent, the highest in the state. The districts of Santhal Parganas, Hazaribagh and Ranchi formed one cluster of comparatively high proportion of primary sector workers, ranging from 85 per cent to 86.39 per cent, fairly above the state average. Dhanbad and Singhbhum formed another cluster of districts where it was comparatively low, 74.25 per cent and 73.99 per cent respectively, fairly below the state average. On the other hand in 1971 Palamau and Santhal Parganas form one cluster of districts where it is comparatively high, 89.66 per cent and 87.42 per cent respectively. The district of Ranchi forms a separate pocket where it is moderate, about 80.62 per cent, below the state average. The districts of Hazaribagh and Singhbhum also form separate pockets where it is comparatively low (76.92 per cent) and very low (69.83 per cent) respectively. Dhanbad is the only district of this region where the proportion workers engaged in primary sector is extremely low, about 35.75 per cent.

Thus on an average, in the districts of North Bihar Plain, about 88.93 per cent of the working population is engaged in primary sector. The corresponding figures for South Bihar Plain and Chhotanagpur Plateau districts are 81.61 per cent and 75.62 per cent respectively. On this basis we may conclude that the districts of Chhotanagpur are comparatively more developed than the districts of South Bihar Plain, while the districts of North Bihar Plain are the least developed.

2.23 Cultivators

An individual is treated as a 'cultivator'[8] if he or she is engaged in cultivation by oneself or by supervision or direction in one's capacity as the owner or lessee of land held from Government or as a tenant of land held from private persons or institutions for payment of money, kind or share. It is not necessary that a person should own the land absolutely. Even if the land cultivated is held on lease or under a variety of tenures, the person is regarded as a cultivator. A person who mere owns the land but has given out his land to another person for cultivation and gets a return in the shape of money, kind or share of crop and who does not even supervise or direct cultivation of land is not treated as cultivator.

In Bihar 83.22 per cent of the working population is

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8 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 21.

engaged in primary sector, and about 52.07 per cent of the workers of primary sector are as cultivators. During the decade 1961-71, the percentage of cultivators to total primary sector has shown a declining trend, i.e. it has declined from 67.14 in 1961 to 52.07 in 1971. A similar pattern is observed in almost all the districts of Bihar,[9] except Dhanbad where it has increased from 54.22 in 1961 to 64.97 in 1971. This percentage increase in the district of Dhanbad is on account of heavy reduction (from about 420,000 in 1961 to 177,000 in 1971) in the absolute number of workers engaged in primary sector in 1971, as workers engaged in mining and quarrying have been excluded from primary sector. Figure No. 16 clearly depicts that the distributional pattern of cultivators has almost remained the same in the state during this decade. Darbhanga, Gaya, Dhanbad, Santhal Parganas and Shahabad are the only districts where a slight change has taken place. The former three districts have improved their positions, while the latter two districts have been degraded from their position during the decade 1961-71.

The districts of Chhotanagpur have the largest percentage of cultivators,[10] about 66.66, in the state. In these districts of Chhotanagpur the percentage of cultivators to total primary sector was varying between 54 and 91 in 1961, while in 1971 it is varying between 53 and 76 only. The district of Ranchi has

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9 See Table No. 17.

10 Ibid.

BIHAR- PERCENTAGE OF CULTIVATORS TO TOTAL PRIMARY SECTOR

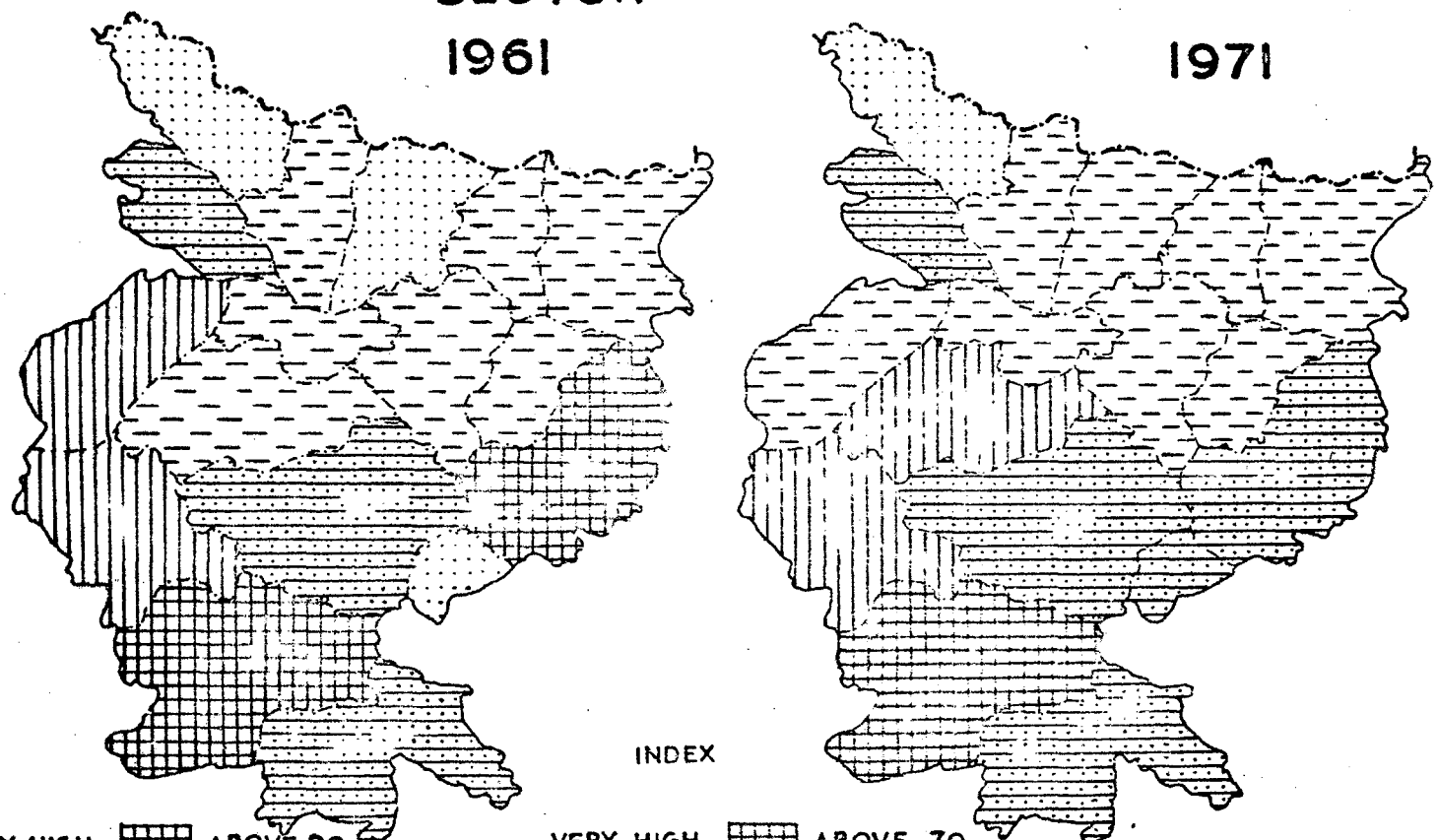

Figure No. 16

Table - 17

Table showing the percentage of cultivators to total primary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	60.78	47.07
1. Saran	76.07	61.60
2. Champaran	55.96	39.26
3. Muzaffarpur	61.75	46.45
4. Darbhanga	53.13	43.06
5. Saharsa	61.15	45.81
6. Purnea	58.30	47.93
South Bihar Plain	61.54	48.30
7. Patna	59.20	48.37
8. Gaya	62.88	52.96
9. Shahabad	65.07	49.47
10. Monghyr	60.51	44.64
11. Bhagalpur	57.76	43.11
Chhotanagpur Plateau	79.99	66.66
12. Santhal Parganas	85.43	69.15
13. Palamau	68.00	53.91
14. Hazaribagh	79.62	69.42
15. Ranchi	90.98	75.97
16. Dhanbad	54.22	64.97
17. Singhbhum	78.81	58.58
BIHAR	67.14	52.07

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

the highest proportion of cultivators,[11] about 75.97 per cent, in this region as well as in the state. Santhal Parganas, Dhanbad, Hazaribagh and Singhbhum form one cluster of districts where the proportion of cultivators is comparatively high, ranging between 58 per cent and 70 per cent. The district of Palamau forms one separate pocket where the proportion of cultivators is moderate, about 53.91 per cent, fairly above the state average. Thus, it is interesting to note that in all the districts of Chhotanagpur the proportion of cultivators is above the state average. It is mainly due to the fact that most of the workers, engaged in the primary sector, are cultivators.

In the districts of South Bihar Plain the proportion of cultivators is comparatively higher, about 48.30 per cent, than the districts of North Bihar Plain where it is 47.07 per cent. The districts of Shahabad, Patna, Monghyr and Bhagalpur of South Bihar Plain and Purnea, Saharsa, Darbhanga and Muzaffarpur of North Bihar Plain form one cluster where the proportion of cultivators is comparatively low, ranging between 43 per cent and 50 per cent, fairly below the state average. In these districts in 1961 it was varying between 53 per cent and 66 per cent. The districts of Gaya of South Bihar Plain and Saran of North Bihar Plain form separate pockets where the proportion of cultivators is comparatively moderate (52.96 per cent) and high (61.60 per

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11 Here Proportion of cultivators means the percentage of cultivators to total primary sector, and not the total workers.

cent) respectively. These are the only districts of Gangetic Plain where the proportion of cultivators is above the state average. The district of Champaran also forms a separate pocket where the proportion of cultivators is comparatively very low, about 39.26 per cent, the lowest in the state.

Thus, we have observed that except Dhanbad, in almost all the districts of Bihar the proportion of cultivators has declined during the decade 1961-71, which appears to be a healthy sign. But when we examine the whole occupational structure of Bihar we find that this decrease is accompanied by an increase in the proportion of agricultural labourers of the primary sector itself, and not in the proportion of workers engaged in the secondary and tertiary sectors, which reveals even more distressing feature of the agricultural economy of Bihar.

2.24 Agricultural Labourers

Any person who does not own any land or has not taken land on lease for cultivation but who works in another person's land for wages in money, kind or share is regarded as an agricultural labourer.[12] He has no risk in the cultivation but he merely works in another person's land for wages. The labourer could have no right of lease or contract on land on which he works. In other words, the agricultural labourer will not have

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12 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 21.

any right to lease the land on which he works nor will he be responsible for the crop sown.

In Bihar 83.22 per cent of the working population is engaged in primary sector, and about 46.76 per cent of the workers of primary sector are as agricultural labourers. In other words about 38.91 per cent of the working population of Bihar is as agricultural labourers. During the decade 1961-71, the percentage of agricultural labourers to total primary sector has shown an increasing tendency, i.e. it has increased from 28.63 in 1961 to 46.76 in 1971. A similar pattern is observed in all the districts of Bihar.[13] As we have noticed earlier that the proportion of cultivator is decreasing in almost all the districts of Bihar, and this decrease is accompanied by an increase in the proportion of agricultural labourers in all the districts of Bihar, which reveals a rather distressing feature of agricultural economy of Bihar.

The districts of Chhotanagpur have the least percentage of agricultural labourers,[14] about 31.91, in the state. In these districts the percentage of agricultural labourers to total primary sector was varying between 5 and 28 in 1961, while in 1971 it is varying between 23 and 45. Thus, in all the districts of this region the proportion of agricultural labourers has greatly increased during the decade 1961-71. In spite of

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13 See Table No. 18.

14 Ibid.

BIHAR – PERCENTAGE OF AGRICULTURAL LABOURERS TO TOTAL PRIMARY SECTOR

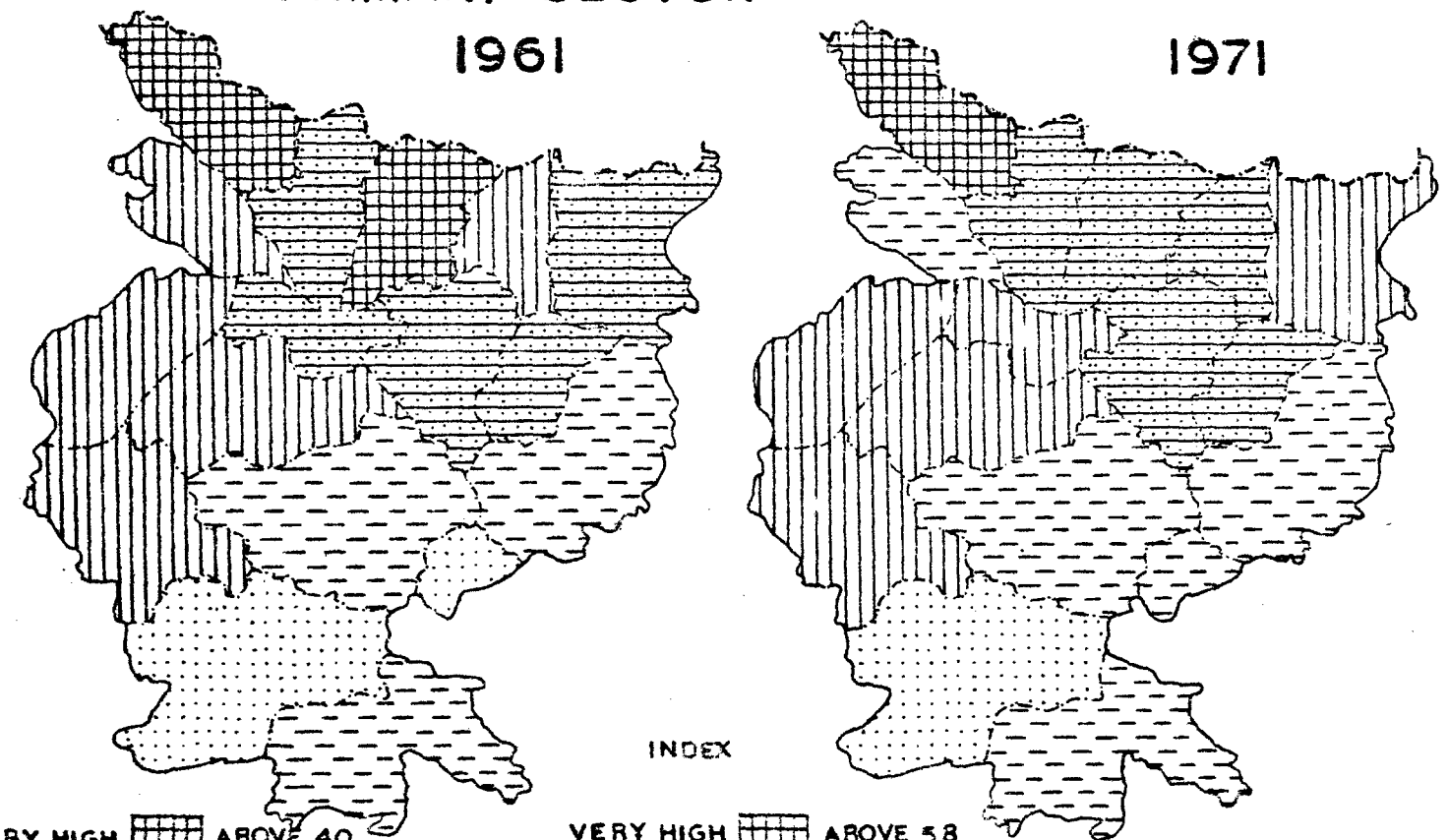

Figure No. 17

Table - 18

Table showing the percentage of agricultural labourers to total primary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	36.76	51.82
1. Saran	23.26	38.00
2. Champaran	42.24	60.09
3. Muzaffarpur	37.29	52.90
4. Darbhanga	44.04	56.13
5. Saharsa	33.84	52.48
6. Purnea	37.13	49.14
South Bihar Plain	35.94	50.72
7. Patna	38.90	50.75
8. Gaya	35.32	46.25
9. Shahabad	31.59	49.47
10. Monghyr	37.27	54.45.
11. Bhagalpur	37.95	55.45
Chhotanagpur Plateau	12.06	31.91
12. Santhal Parganas	10.28	28.97
13. Palamau	27.92	44.93
14. Hazaribagh	11.16	29.27
15. Ranchi	6.48	23.13
16. Dhanbad	5.90	33.33
17. Singhbhum	16.62	39.82
BIHAR	28.63	46.76

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

this increase the distributional pattern of agricultural labourers has almost remained the same during this decade. On account of faster rate of increase it has improved its position. Now the districts of Santhal Parganas, Dhanbad, Hazaribagh and Singhbhum form one cluster where the percentage of agricultural labourers is comparatively low, ranging between 28 and 40 (see Figure No. 17). The district of Palamau forms a separate pocket where their percentage is comparatively moderate, about 44.93, below the state average. The district of Ranchi has the least percentage of agricultural labourers in the state, about 23.13.

The districts of North Bihar Plain have comparatively higher percentage, about 51.82, of agricultural labourers than the districts of South Bihar Plain where it is 50.72. Thus, in the districts of North and South Bihar Plains on an average more than 50 per cent of the workers engaged in primary sector are as agricultural labourers. The distributional pattern of agricultural labourers has also changed in the North and South Bihar Plains during the decade 1961-71 (see Figure No. 17). For example, in 1961 the districts of Champaran and Darbhanga formed one cluster where the percentage of agricultural labourers to total primary sector was comparatively very high, 42.24 and 44.04 respectively. The districts of Patna, Monghyr and Bhagalpur of South Bihar Plain and Muzaffarpur and Purnea of North Bihar Plain formed another cluster where their proportion was comparatively high, ranging between 37 per cent and 39 per cent.

The districts of Gaya and Shahabad of South Bihar Plain and Saran and Saharsa of North Bihar Plain formed a third cluster where the proportion of agricultural labourers was comparatively moderate, ranging between 23 per cent and 36 per cent. Except Saran, in almost all the districts of North and South Bihar Plains the proportion of agricultural labourers was above the state average. On the other hand in 1971 the district of Champaran forms a separate pocket where the percentage of agricultural labourers to total primary sector is the highest (60.09) in the state. Muzaffarpur, Darbhanga and Saharsa of North Bihar Plain and Monghyr and Bhagalpur of South Bihar Plain form one cluster of districts where the proportion of agricultural labourers is comparatively high, ranging between 52 per cent and 57 per cent. The districts of Patna, Gaya and Shahabad of South Bihar Plain and Purnea of North Bihar Plain form another cluster where their proportion is moderate, ranging between 46 per cent and 51 per cent. Gaya is the only district of this group where their proportion is below the state average. The district of Saran forms a separate pocket where the proportion of agricultural labourers is comparatively low, 38 per cent, below the state average.

Thus we have observed that in all the districts of Bihar the proportion of agricultural labourers has shown an increasing tendency which is not a happy sign, as it is clear from the definition of agricultural labourers that economically they are

the weaker section of society. On this basis we may conclude that from economic point of view the districts of Chhotanagpur have better position than the districts of North and South Bihar Plains. And among these, the districts of South Bihar Plain have comparatively better position than the districts of North Bihar Plain.

When we consider cultivators and agricultural labourers combined together we find that they dominate in each and every district in an overwhelming manner. Only Dhanbad, with 35.14 per cent of the total workers in these categories, is an exception. In other districts and even in Bihar as whole they comprise more than three-fourth of the working population.[15] Except Patna (73.30 per cent), Hazaribagh (75.91 per cent), Ranchi (79.90 per cent) and Singhbhum (68.72 per cent), in all other districts of Bihar they comprise more than 80 per cent of the working population. In fact, in three districts - Palamau (88.62 per cent), Champaran (89.89 per cent) and Saharsa (90.47 per cent) - the cultivators and agricultural labourers comprise more than 88 per cent of the working population. These proportions clearly indicate how vastly dependent on agriculture the population of Bihar actually is.

2.25 Secondary Sector

Those activities which are related to the processing and

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15 See Appendix III

manufacturing of goods from primary products are known as secondary activities, and workers engaged in these activities are known as secondary sector workers. It includes the workers engaged in household industries, manufacturing industries other than household, mining and quarrying, and construction. Generally, the higher proportion of workers in secondary sector indicates the higher level of economic development. And with the growth of the economy of a country the workers engaged in agriculture tend to decline relatively with reference to manufacturers, which in their turn decline relatively to the workers engaged in services. This seems to bear the fact that a shift away in the proportion of the working force in agriculture is a necessary condition for rapid economic progress.[16]

In case of Bihar we find that a very small proportion (only 7.11 per cent) of its working population is engaged in secondary sector. Even here the proportion of workers engaged in secondary sector has shown a declining trend, i.e. it has declined from 8.27 per cent in 1961 to 7.11 per cent in 1971. It reflects rather a low level or relative stagnation of economic development. It will not be quite correct to conclude on this basis only, because this decline in proportion of workers in secondary sector may be due to the change in the definition of worker in 1971. A similar pattern of decline in the proportion of workers engaged in secondary sector is also observed in

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16 Dutta and Sundram, Indian Economy, p. 98.

almost all the districts of North and South Bihar Plains and only in Palamau of Chhotanagpur Plateau.[17] Dhanbad, Santhal Parganas, Hazaribagh, Ranchi and Singhbhum are the only districts of Chhotanagpur, which have shown an increasing tendency in the proportion of workers engaged in secondary sector in the state. In these districts this increase may be attributed to the addition of workers of mining and quarrying to the secondary sector and also to the varying degree of industrialization that has taken place in these districts.

Figure No. 18 clearly depicts that during the decade 1961-71, the distributional pattern of workers engaged in secondary sector has greatly changed. For example, in 1961 the districts of South Bihar Plain were having the largest percentage (9.16) of workers engaged in secondary sector. They were followed by the districts of North Bihar Plain (8.03 per cent) and Chhotanagpur (7.40 per cent). While in 1971, the districts of Chhotanagpur are having the largest proportion (13.53 per cent) of workers engaged in secondary sector. They are followed by the districts of South Bihar Plain (6.47 per cent) and North Bihar Plain (3.57 per cent).

A change in the distributional pattern is also noticed at district level. In the districts of Chhotanagpur in 1961 the percentage of workers engaged in secondary sector to total

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17 See Table No. 19.

BIHAR- PERCENTAGE OF WORKERS ENGAGED IN SECONDARY SECTOR TO TOTAL WORKERS

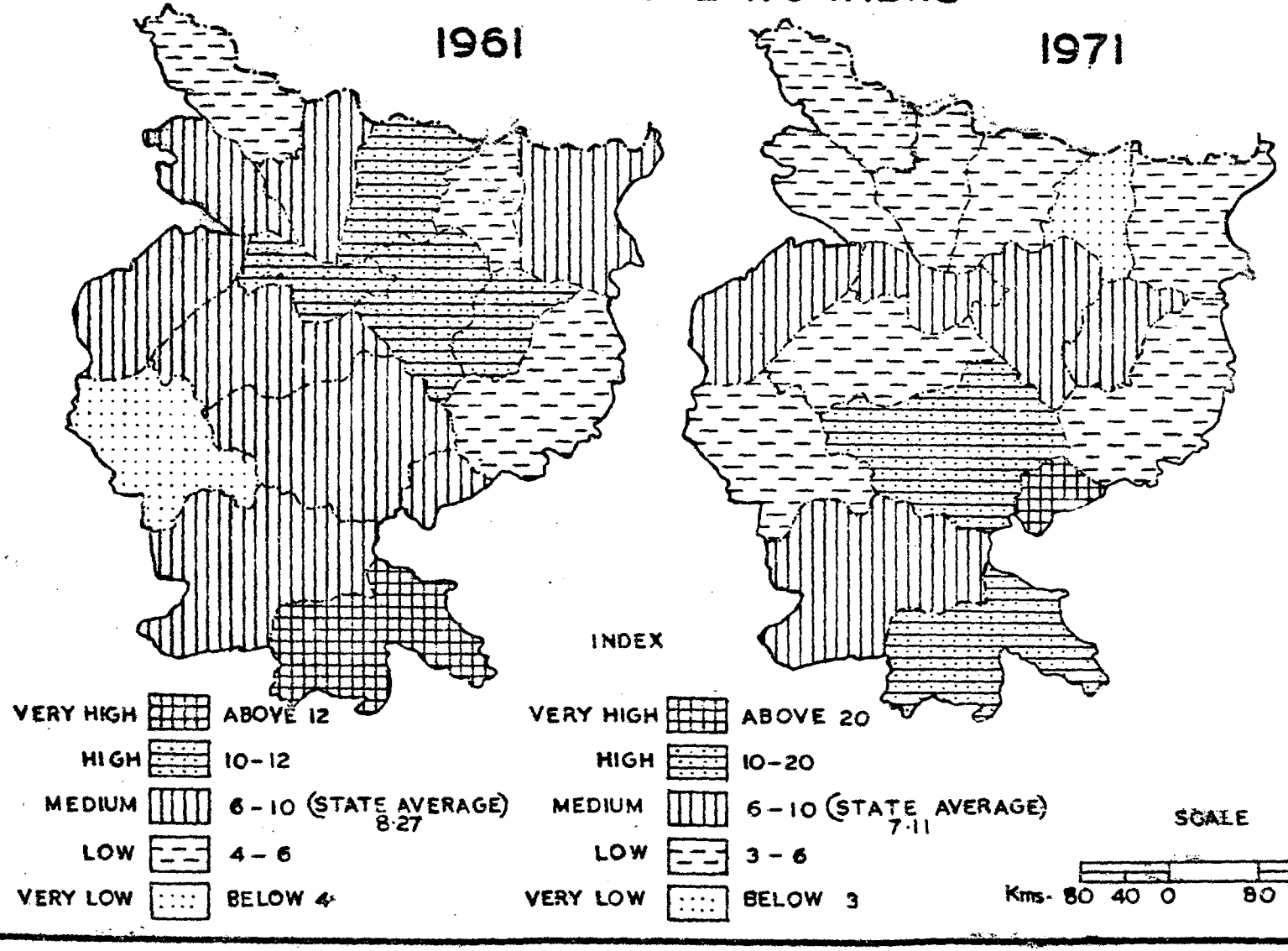

Figure No. 18

Table - 19.

Table showing the percentage of workers engaged in secondary sector to total workers during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	8.03	3.57
1. Saran	8.54	4.38
2. Champaran	5.79	3.41
3. Muzaffarpur	8.46	3.71
4. Darbhanga	11.11	3.85
5. Saharsa	5.10	2.28
6. Purnea	7.23	3.35
South Bihar Plain	9.16	6.47
7. Patna	10.38	7.78
8. Gaya	6.87	5.40
9. Shahabad	9.08	6.32
10. Monghyr	10.29	6.83
11. Bhagalpur	10.13	6.11
Chhotanagpur Plateau	7.40	13.53
12. Santhal Parganas	4.83	5.08
13. Palamau	3.74	3.71
14. Hazaribagh	7.01	13.48
15. Ranchi	6.12	7.94
16. Dhanbad	9.47	43.83
17. Singhbhum	13.54	17.55
BIHAR	8.27	7.11

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

workers was varying between 3.74 and 13.54, while in 1971 it is varying between 3.71 and 43.83. In 1961 the district of Singhbhum was having the highest proportion (13.54 per cent) of workers engaged in secondary sector in the state. The districts of Dhanbad, Hazaribagh and Ranchi of Chhotanagpur formed one cluster where the proportion of workers engaged in secondary sector was moderate, ranging between 6 per cent and 10 per cent. Only in Dhanbad district of this group their proportion (9.47 per cent) was above the state average. The district of Santhal Parganas formed a separate pocket of comparatively low proportion of workers in secondary sector. The district of Palamau was having the least proportion (3.74 per cent) of workers in secondary sector in the state, while in 1971 the district of Dhanbad has the highest proportion of workers (43.83 per cent) in secondary sector. The districts of Singhbhum and Hazaribagh form one cluster where their proportion is comparatively high, 17.55 per cent and 13.48 per cent respectively. The district of Ranchi forms a separate pocket where their proportion is moderate (7.94 per cent), fairly above the state average. The districts of Palamau and Santhal Parganas form another cluster where their proportion is comparatively low, 3.71 per cent and 5.08 per cent respectively, fairly below the state average.

In the districts of South Bihar Plain in 1961, the percentage of workers engaged in secondary sector to total workers was varying between 6.87 and 10.38, while in 1971, it is varying

between 5.40 and 7.78 only. In 1961 the districts of Patna, Monghyr and Bhagalpur formed one cluster where the proportion of workers engaged in secondary sector was comparatively high, ranging between 10.13 per cent and 10.38 per cent. Shahabad and Gaya formed another cluster of districts where their proportion was moderate, 9.08 per cent and 6.87 per cent respectively, the former having above the state average and the latter below the state average. While in 1971, Shahabad, Patna, Monghyr and Bhagalpur form one cluster of districts where their proportion is moderate, ranging between 6.11 per cent and 7.78 per cent. In this group only Patna district has their proportion (the proportion of workers engaged in secondary sector) above the state average. The district of Gaya forms a separate pocket where their proportion is comparatively low, 5.40 per cent, below the state average.

In the districts of North Bihar Plain in 1961 the percentage of workers engaged in secondary sector to total workers was varying between 5.10 and 11.11, while in 1971 it is varying between 2.28 and 4.38 only. Thus in these districts there has been a great decline in their proportion during this decade. In 1961 the district of Darbhanga formed a separate pocket where their proportion was comparatively high, 11.11 per cent, above the state average. The districts of Saran, Muzaffarpur and Purnea formed one cluster where their proportion was moderate, ranging between 7 per cent and 9 per cent. Champaran and Saharsa formed one group of districts where their proportion was

comparatively low, 5.79 per cent and 5.10 per cent respectively. While in 1971, Saran, Champaran, Muzaffarpur, Darbhanga and Purnea form one cluster of districts where the proportion of workers engaged in secondary sector is comparatively low, ranging between 3.35 per cent and 4.38 per cent, fairly below the state average. The district of Saharsa forms a separate pocket where their proportion is comparatively very low (2.28 per cent), the least in the state.

Thus, during the decade 1961-71 we find a great spatial variation in the distributional pattern of workers engaged in secondary sector. On the basis of the proportion of workers engaged in secondary sector we may conclude that the districts of Chhotanagpur are comparatively more developed. They are followed by the districts of South Bihar Plain. And the districts of North Bihar Plain are the least developed.

2.26 Household Industry

A household industry[18] is defined as an industry conducted by the Head of the household himself/herself and/or mainly by the members of the household at home or within the village in rural areas, and only within the premises of the house where the household lives in urban areas. A household industry relates to production, processing, servicing, repairing or making

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18 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 22.

and selling (but not merely selling) of goods. The household industry should not be run on the scale of a registered factory. Under the existing Factory Act, establishments not using power and employing 20 or more persons or using some kind of power and employing 10 or more persons are termed as factories. A household industry should not come under the above definition of a factory, it can, however, use machinery and employ power like stream, electricity, oil, etc. to drive the machinery. Persons engaged in household industries are included in this category of workers.

In Bihar 7.11 per cent of the working population is engaged in secondary sector, and about 34.80 per cent of the workers of secondary sector are engaged in household industries. In other words only 2.47 per cent of the working population of Bihar is engaged in household industries. The percentage of workers engaged in household industries to total secondary sector has shown a declining trend in the state, i.e. it has declined from 66.44 in 1961 to 34.80 in 1971. A similar pattern is observed in almost all the districts of Bihar.[19] This decline in the proportion of workers engaged in household industries may be attributed to the change in the definition of worker.

The distributional pattern of the workers engaged in household industry has also changed during the decade 1961-71

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19 See Table No. 20.

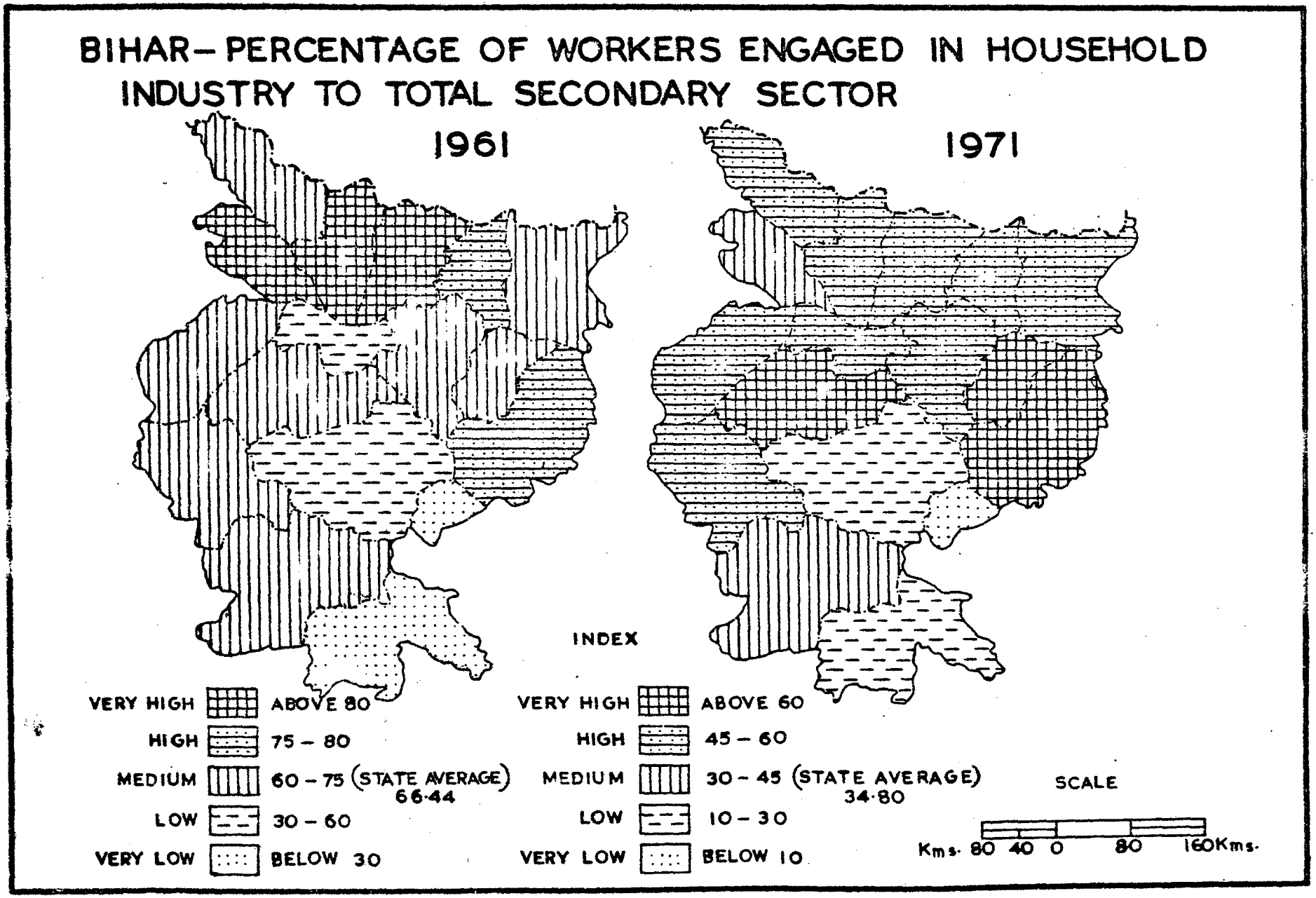
BIHAR – PERCENTAGE OF WORKERS ENGAGED IN HOUSEHOLD INDUSTRY TO TOTAL SECONDARY SECTOR
1961
1971
INDEX
VERY HIGH ABOVE 80
HIGH 75 – 80
MEDIUM 60 – 75 (STATE AVERAGE) 66·44
LOW 30 – 60
VERY LOW BELOW 30
VERY HIGH ABOVE 60
HIGH 45 – 60
MEDIUM 30 – 45 (STATE AVERAGE) 34·80
LOW 10 – 30
VERY LOW BELOW 10
SCALE
Kms. 80 40 0 80 160Kms.

Figure No. 19

Table - 20

Table showing the percentage of workers engaged in household industry to total secondary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	79.74	50.93
1. Saran	81.66	40.00
2. Champaran	70.34	46.34
3. Muzaffarpur	84.25	54.71
4. Darbhanga	86.80	56.66
5. Saharsa	76.62	57.89
6. Purnea	66.56	52.27
South Bihar Plain	64.77	52.25
7. Patna	52.68	47.61
8. Gaya	69.20	60.81
9. Shahabad	65.20	47.94
10. Monghyr	69.50	47.56
11. Bhagalpur	68.21	63.41
Chhotanagpur Plateau	49.04	18.31
12. Santhal Parganas	78.90	60.37
13. Palamau	68.97	50.00
14. Hazaribagh	55.23	15.70
15. Ranchi	64.54	36.36
16. Dhanbad	26.27	4.14
17. Singhbhum	29.00	14.08
BIHAR	66.44	34.80

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

(see Figure No. 19). For example, in 1961 the districts of North Bihar Plain were having the largest percentage of workers engaged in household industry, about 79.74. They were followed by the districts of South Bihar Plain (64.77) and Chhotanagpur (49.04). While in 1971 the districts of South Bihar Plain have the largest proportion of workers engaged in household industry, about 52.25 per cent. They are followed by the districts of North Bihar Plain (50.93 per cent) and Chhotanagpur (18.31 per cent). Thus we find that more than 50 per cent (or more than half) of the workers of secondary sector are engaged in household industry in the districts of North and South Bihar Plains.

The districts of Chhotanagpur have the least proportion of workers engaged in household industry. It is mainly due to the fact that in these districts manufacturing industries and mining and quarrying are mostly developed. In 1961 in these districts the proportion of workers engaged in household industry was varying between 26 per cent and 79 per cent, while in 1971 in these districts their proportion is varying between 4.14 per cent and 60.37 per cent. The district of Santhal Parganas has comparatively very high proportion of workers engaged in household industry to total secondary sector (about 60.37 per cent). It is followed by the district of Palamau where their proportion is comparatively high, about 50 per cent. The district of Ranchi forms a separate pocket where their proportion is moderate, about 36.36 per cent. The districts of Singhbhum

and Hazaribagh form one cluster where their proportion is comparatively low, 14.08 per cent and 15.70 per cent respectively, fairly below the state average. Dhanbad is the only district where their proportion is comparatively very low, about 4.14 per cent, the lowest in the state. It is mainly due to the fact that in this district the mining and quarrying and manufacturing industries are greatly developed, which comprise about 67.28 per cent and 20.27 per cent of the workers engaged in secondary sector respectively.

In the districts of South Bihar Plain in 1961 the percentage of workers engaged in household industry to total secondary sector was varying between 65.20 and 69.50, while in 1971 it is varying between 47.56 and 63.41. On the other hand in the districts of North Bihar Plain their proportion in 1961 was varying between 66 per cent and 87 per cent, while in 1971 their proportion is varying between 40 per cent and 58 per cent. Thus on an average the districts of South Bihar Plain have comparatively higher proportion of workers engaged in household industry than the districts of North Bihar Plain. Gaya and Bhagalpur of South Bihar Plain form one group of districts where their proportion is comparatively very high, 60.81 per cent and 63.41 per cent respectively. The districts of Shahabad, Patna and Monghyr of South Bihar Plain and Purnea, Saharsa, Darbhanga, Muzaffarpur and Champaran of North Bihar Plain form one cluster where their proportion is comparatively high, ranging between 46 per cent and

58 per cent, fairly above the state average. Saran is the only district of North Bihar Plain where their proportion is moderate, about 40 per cent, above the state average. Thus, in none of the districts of North and South Bihar Plains the proportion of workers engaged in household industry to total secondary sector is below the state average.

The distributional pattern of workers engaged in household industry makes it clear that the household industries are highly related with the agricultural resources, i.e. the proportion of workers engaged in household industry is generally high in the districts of North and South Bihar Plains which are rich in agricultural resources, while their proportion is low in the districts of Chhotanagpur which are rich in mineral resources. Thus we may conclude that there are better prospects of developing household industries in the districts of North and South Bihar Plains than the districts of Chhotanagpur Plateau.

2.27 Manufacturing Industry

Manufacturing industries are those where goods or articles are manufactured on a large scale by machines. They are run on the scale of registered factories. Thus, this category includes all workers engaged in manufacturing other than household industries.

In Bihar 7.11 per cent of the working population is engaged in secondary sector, and about 36.57 per cent of the workers of secondary sector are engaged in manufacturing industries,

a little more than household industries. In other words about 2.60 per cent of the working population of Bihar is engaged in manufacturing industries. The percentage of workers engaged in manufacturing industries to total secondary sector has shown an increasing tendency in the state, i.e. it has increased from 26.75 in 1961 to 36.57 in 1971. One possible explanation is that Bihar is getting a major share of its secondary activity in the manufacturing sector. In other words the manufacturing industries are developing at a faster rate than the household industries in the state. A similar pattern of increase in proportion of workers of manufacturing industries is observed in almost all the districts of Bihar,[20] except Dhanbad and Hazaribagh. The districts of Dhanbad and Hazaribagh have shown a declining trend in their proportion because they have very high proportion of workers engaged in mining and quarrying, 67.28 per cent and 62.81 per cent respectively, which have been included in secondary sector in 1971.

The distributional pattern of workers engaged in manufacturning industry has changed during the decade 1961-71 (see Figure No. 20). For example, in 1961 the districts of Chhotanagpur were having the largest percentage[21] of workers engaged in manufacturing industry, about 42.41. They were followed by the districts of South Bihar Plain (27.76 per cent) and North

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20 See Table No. 21.

21 Ibid.

BIHAR-PERCENTAGE OF WORKERS ENGAGED IN MANUFACTURING OTHER THAN HOUSEHOLD INDUSTRY TO TOTAL SECONDARY SECTOR

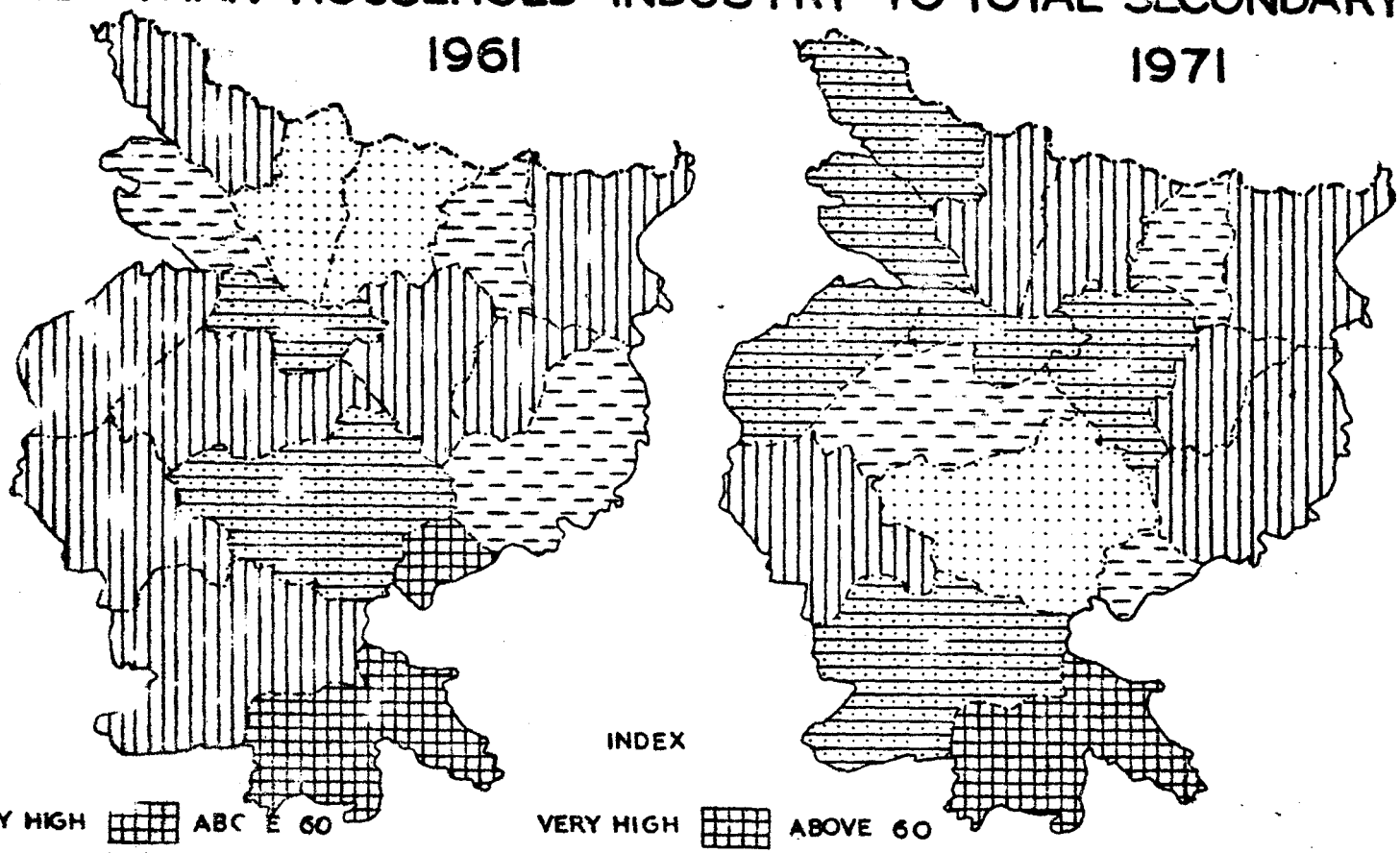

Figure No. 20

Table - 21

Table showing the percentage of workers engaged in manufacturing other than household industry to total secondary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	15.11	39.70
1. Saran	14.06	52.00
2. Champaran	23.26	43.90
3. Muzaffarpur	10.74	35.84
4. Darbhanga	10.52	36.66
5. Saharsa	16.39	26.31
6. Purnea	24.02	36.36
South Bihar Plain	27.76	37.85
7. Patna	35.78	40.47
8. Gaya	22.43	25.67
9. Shahabad	27.77	41.09
10. Monghyr	25.46	46.34
11. Bhagalpur	26.89	31.70
Chhotanagpur Plateau	42.41	34.52
12. Santhal Parganas	17.45	30.18
13. Palamau	23.35	33.33
14. Hazaribagh	37.21	14.04
15. Ranchi	25.03	51.51
16. Dhanbad	63.10	20.27
17. Singhbhum	61.16	67.60
BIHAR	26.75	36.57

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

Bihar Plain (15.11 per cent). While in 1971 the districts of North Bihar Plain are having the largest percentage of workers engaged in manufacturing industry, about 39.70. They are followed by the districts of South Bihar Plain (37.85 per cent) and Chhotanagpur (34.52 per cent). In the districts of Chhotanagpur the percentage of workers engaged in manufacturing to total secondary sector is comparatively low because in these districts the percentage of workers engaged in mining and quarrying is as high as 40.51.

In 1961 in the districts of Chhotanagpur the percentage of workers engaged in manufacturing industry to total secondary sector was varying between 17.45 and 63.10, while in 1971 in these districts it is varying between 14.04 and 67.60. Dhanbad and Hazaribagh are the only districts of Chhotanagpur where the proportion of workers engaged in manufacturing industry has declined in 1971. In the district of Dhanbad the percentage of workers engaged in manufacturing industry to total secondary sector has declined, but their percentage to total workers has increased from 5.97 in 1961 to 8.88 in 1971. But in Hazaribagh district their percentage has declined in both respect. In other four districts of Chhotanagpur their percentage has increased to both secondary sector and total workers.[22] In the district of Singhbhum the percentage of workers engaged in manufacturing industry to total secondary sector is the highest in the

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22 See Table No. 21 and Appendix II and III.

state, about 67.60. It is followed by the district of Ranchi where their proportion is comparatively high, about 51.51 per cent. The districts of Palamau and Santhal Parganas form one group where their proportion is moderate or close to the state average, 33.33 per cent and 30.18 per cent respectively. The districts of Dhanbad and Hazaribagh form separate pockets where their proportion is comparatively low and very low, 20.27 per cent and 14.04 per cent respectively.

In the districts of North Bihar Plain the proportion of workers engaged in manufacturing industry to total secondary sector was varying between 10.52 per cent and 24.2 per cent in 1961, while in 1971 it is varying between 26.31 per cent and 52 per cent. On the other hand in the districts of South Bihar Plain their proportion was varying between 22.43 per cent and 35.78 per cent in 1961, while in 1971 it is varying between 25.67 per cent and 46.34 per cent. Thus on an average in the districts of North Bihar Plain their proportion is comparatively higher than the districts of South Bihar Plain. The districts of Saran and Champaran of North Bihar Plain and Shahabad, Patna and Monghyr of South Bihar Plain form one cluster where their proportion is comparatively high, ranging between 40.47 per cent and 52 per cent. The districts of Muzaffarpur, Darbhanga and Purnea of North Bihar Plain and Bhagalpur of South Bihar Plain form another cluster where their proportion is moderate or close to the state average, ranging between 31.70 per cent and 36.66

per cent. Except Darbhanga, in all the districts of this group their proportion is below the state average. The districts of Gaya of South Bihar Plain and Saharsa of North Bihar Plain form two separate pockets where their proportion is comparatively low, 25.67 per cent and 26.31 per cent respectively, fairly below the state average. In the districts of North and South Bihar Plain their proportion is comparatively high, because in these districts the proportion of workers engaged in mining and quarrying is either nil or very low, and whatever is the number of workers engaged in secondary sector, most of them are either engaged in manufacturing industries or household industries and a little in construction.

It is interesting to note that although in the districts of North Bihar Plain the proportion of workers engaged in manufacturing industries to total secondary sector is the highest in the state, their proportion to total workers is the lowest in the state. In other words in these districts only 1.39 per cent of the working population is engaged in manufacturing industries. On the other hand in the districts of Chhotanagpur where their proportion to total secondary is the lowest in the state, but their proportion to total workers is the highest, i.e. in these districts 4.91 per cent of the working population is engaged in manufacturing industries. They are followed by the districts of South Bihar Plain in which on an average 2.44 per cent of the working population is engaged in manufacturing industries. On

this basis we may conclude that in manufacturing industries districts of Chhotanagpur are the most developed in the state. They are followed by the districts of South Bihar Plain. While the districts of North Bihar Plain are the least developed in respect of manufacturing industries.

2.28 Construction

This category of workers relates to those engaged in 'construction'. In other words in this category only those workers are included who are engaged in construction and maintenance of roads, railways, runways, ports, harbours, bridges, tunnels, pipelines, buildings, telegraph and telephone lines, waterways and water reservoirs including dams, canals, tanks, wells, etc., industrial plants and hydro and thermal electric projects.[23]

In Bihar 7.11 per cent of the working population is engaged in secondary sector, and about 7.87 per cent of the workers of secondary sector are engaged in construction. In other words only 0.56 per cent of the working population of Bibar is engaged in construction. The percentage of workers engaged in construction to total secondary sector has shown an increasing trend, i.e. it has increased from 6.80 in 1961 to 7.87 in 1971. It means that in terms of construction Bihar is improving its position.

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23 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 29.

A similar pattern is observed in almost all the districts of Bihar,[24] except Dhanbad, Ranchi, Singhbhum, Palamau, Hazaribagh, Monghyr and Bhagalpur.

During the decade 1961-71 the distributional pattern of workers engaged in construction has slightly changed, i.e. in 1961 the districts of Chhotanagpur were having the largest percentage[25] of workers (8.54) engaged in construction. They were followed by the districts of South Bihar Plain (7.45) and North Bihar Plain (5.14). On the other hand in 1971 the districts of North Bihar Plain have the largest percentage of workers (9.36) engaged in construction. They are followed by the districts of South Bihar Plain (8.19) and Chhotanagpur Plateau (6.64).

In the districts of North Bihar Plain in 1961 the percentage of workers engaged in construction to total secondary sector was varying between 2.66 and 9.41, while in 1971 it is varying between 6.66 and 15.78. The districts of Purnea and Saharsa form one cluster where their percentage or proportion is comparatively very high (see Figure No. 21), 11.36 and 15.78 respectively. The district of Saharsa has the highest proportion (15.78 per cent) of workers engaged in construction in the state. It is mainly due to the development of Kosi Project. The same factor is also responsible for a very high proportion of workers in this category in the district of Purnea. The district of

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24 See Table No. 22.

25 Ibid.

BIHAR–PERCENTAGE OF WORKERS ENGAGED IN CONSTRUCT-ION TO TOTAL SECONDARY SECTOR

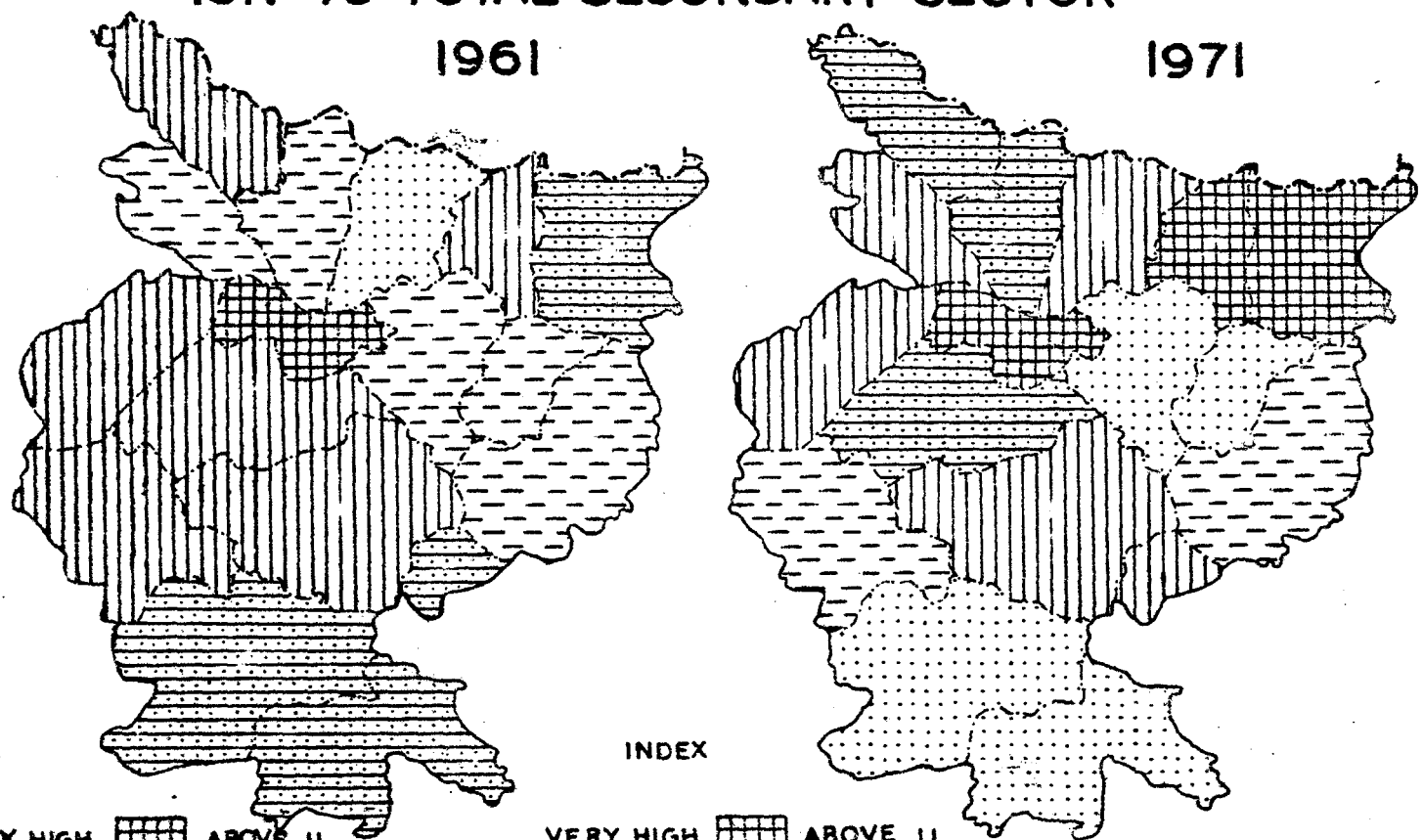

Figure No. 21

Table - 22

Table showing the percentage of workers engaged in construction to total secondary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	5.14	9.36
1. Saran	4.26	8.00
2. Champaran	6.39	9.75
3. Muzaffarpur	4.99	9.43
4. Darbhanga	2.66	6.66
5. Saharsa	6.98	15.78
6. Purnea	9.41	11.36
South Bihar Plain	7.45	8.19
7. Patna	11.53	11.90
8. Gaya	8.35	9.45
9. Shahabad	7.02	8.21
10. Monghyr	5.02	4.87
11. Bhagalpur	4.89	4.87
Chhotanagpur Plateau	8.54	6.64
12. Santhal Parganas	3.63	5.66
13. Palamau	7.67	5.55
14. Hazaribagh	7.54	7.43
15. Ranchi	10.42	4.54
16. Dhanbad	10.62	8.29
17. Singhbhum	9.82	4.92
BIHAR	6.80	7.87

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

Champaran and Muzaffarpur form another cluster where their proportion is comparatively high, 9.75 per cent and 9.43 per cent respectively. Saran and Darbhanga form one group of districts where their proportion is close to the state average (moderate), 8 per cent and 6.66% respectively. In these districts the increase in their proportion may be attributed to the development of Gandak Project and roads - both metalled and unmeatalled.

In the districts of South Bihar Plain in 1961 the percentage of workers engaged in construction to total secondary sector was varying between 4.89 and 11.53, while in 1971 it is varying between 4.87 and 11.90. The districts of Patna has the second highest proportion of workers (11.90) engaged in construction in the state. It is obvious because it includes the capital city of Bihar, that is Patna. The districts of Gaya and Shahabad form separate pockets where their proportion is comparatively high and moderate, 9.45 per cent and 8.21 per cent respectively. The districts of Monghyr and Bhagalpur form one cluster where their proportion is comparatively very low, 4.87 per cent and 4.87 per cent respectively. These are the only districts of South Bihar Plain region which have shown a declining trend in the proportion of workers engaged in construction to total secondary sector during the decade 1961-71.

In the districts of Chhotanagpur in 1961 the percentage of workers engaged in construction to total secondary sector was varying between 3.63 and 10.62, while in 1971 it is varying between 4.54 and 8.29. Thus on an average in these districts their

proportion has declined from 8.54 per cent in 1961 to 6.64 per cent in 1971. Except Santhal Parganas, all the districts of Chhotanagpur have witnessed a decline in their proportion during the decade 1961-71. Except Dhanbad, in all the districts of Chhotanagpur their proportion is below the state average. The districts of Dhanbad and Hazaribagh form one cluster (see Figure No. 21) where their proportion is moderate or close to state average, 8.29 per cent and 7.43 per cent respectively. Santhal Parganas and Palamau form one group of districts where their proportion is comparatively low, 5.66 per cent and 5.55 per cent respectively. The districts of Ranchi and Singhbhum form another cluster where their proportion is comparatively very low, 4.54 per cent and 4.92 per cent respectively.

It is interesting to note that although in the districts of Chhotanagpur the proportion of workers engaged in construction to total secondary sector is the lowest (6.64 per cent), their proportion to total workers is the highest (1.05 per cent) in the state. On the contrary in the districts of North Bihar Plain their proportion to total secondary sector is the highest (9.36 per cent), but their proportion to total workers is the lowest (0.34 per cent) in the state. While the districts of South Bihar Plain, with 8.19 per cent of total secondary sector and 0.51 per cent of total workers, occupy middle position in both respects. Thus, on this basis we may conclude that the districts of Chhotanagpur are more developed in respect of construction than elsewhere

in the state. They are followed by the districts of South Bihar Plain. While the districts of North Bihar Plain are the least developed in this respect.

2.29 Tertiary Sector

The third major group of workers is tertiary sector. It includes only those workers who are engaged in trade and commerce; transport, storage and communications; and other services. Colin Clark has observed that in the process of economic growth the expansion of tertiary sector is more rapid than the secondary sector, therefore, in connection with the labour force there is a larger absorption of labour force in tertiary sector than secondary. But in a country like India "It would be safe conclusion to state that in periods of development tertiary services may expand somewhat more than the manufacturing industries, but the order of magnitude of the difference in the rate of expansion, is unlikely to be very large".[26]

Colin Clark's observation holds it good in case of Bihar. For example, in Bihar the proportion of workers engaged in tertiary sector is higher (9.66 per cent) than the secondary sector (7.11 per cent). Although the proportion of workers engaged in tertiary sector is higher than the secondary sector, it is very small in comparison of primary sector. The proportion of workers engaged in tertiary sector, similar to secondary sector, has

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26 Planning Commission, Papers relating to the Formulation of the Second Five Year Plan, p. 268.

shown a declining trend, i.e. it has declined from 11.48 per cent in 1961 to 9.66 per cent in 1971. It reflects rather a negative aspect of the levels of economic development. But it will not be quite correct to conclude on this basis only, because this decline in their proportion may be due to the change in the definition of worker in 1971. A similar pattern of decline in the proportion of workers engaged in tertiary sector is observed in almost all the districts of Bihar,[27] except Dhanbad, Hazaribagh and Ranchi.

During the decade 1961-71 the distributional pattern of workers engaged in tertiary sector has slightly changed in the state (see Figure No. 22). For example, in 1961 the districts of South Bihar Plain were having the largest percentage of workers (15.49) engaged in tertiary sector. They were followed by the districts of North Bihar Plain (9.94) and Chhotanagpur (9.49). On the other hand in 1971 again the districts of South Bihar Plain are having the largest percentage of workers (11.84) in tertiary sector, but the second position is taken by the districts of Chhotanagpur (with 10.79 per cent) and the third by the districts of North Bihar Plain (with 7.37 per cent).

The districts of North Bihar Plain are having the lowest percentage of workers in tertiary sector, only 7.37, in the state. In these districts in 1961 the percentage of workers engaged in tertiary sector to total workers was varying between

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27 See Table No. 23.

BIHAR – PERCENTAGE OF WORKERS ENGAGED IN TERTIARY SECTOR TO TOTAL WORKERS

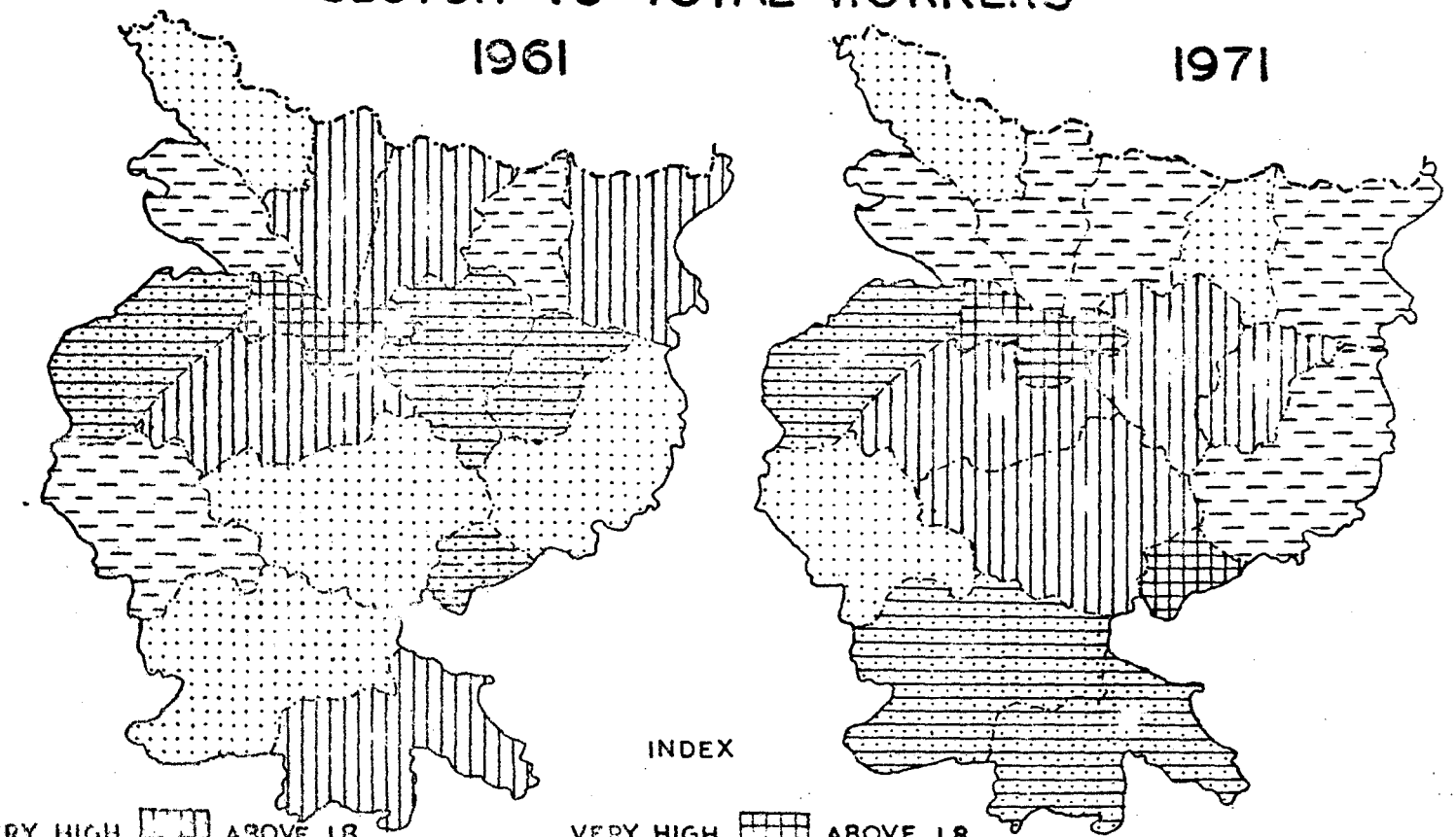

Figure No. 22

Table - 23

Table showing the percentage of workers engaged in tertiary sector to total workers during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	9.94	7.37
1. Saran	9.15	7.90
2. Champaran	7.09	6.00
3. Muzaffarpur	10.27	8.06
4. Darbhanga	10.45	7.97
5. Saharsa	8.75	5.66
6. Purnea	13.39	7.78
South Bihar Plain	15.49	11.84
7. Patna	20.92	18.25
8. Gaya	10.87	9.64
9. Shahabad	16.45	11.69
10. Monghyr	15.27	9.75
11. Bhagalpur	15.58	10.00
Chhotanagpur Plateau	9.49	10.79
12. Santhal Parganas	7.92	7.48
13. Palamau	8.41	6.61
14. Hazaribagh	7.99	9.81
15. Ranchi	7.49	11.43
16. Dhanbad	16.27	20.00
17. Singhbhum	12.45	12.36
BIHAR	11.48	9.66

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

7 per cent and 14 per cent, while in 1971 it is varying between 5 per cent and 9 per cent, fairly below the state average. Saran, Muzaffarpur, Darbhanga and Purnea form one cluster of districts (see Figure No. 22) where their proportion is comparatively low, ranging between 7.78 per cent and 8.06 per cent. The districts of Champaran and Saharsa form separate pockets of comparatively very low proportion of workers in tertiary sector, 6 per cent and 5.66 per cent respectively.

As mentioned above the districts of South Bihar Plan are having the highest percentage (11.84) of workers in tertiary sector in the state. In these districts in 1961 the percentage of workers in tertiary sector to total workers was varying between 10 and 21, while in 1971 in these districts it is varying between 9 and 20. The district of Patna has the second highest percentage of workers (20.0) in tertiary sector in the state. It is mainly due to the Capital city of Patna. The district of Shahabad forms a separate pocket where their proportion is comparatively high, 11.69 per cent. The districts of Gaya, Monghyr and Bhagalpur form one cluster of districts where their proportion is moderate or close to state average, ranging between 9.64 per cent and 10 per cent. Gaya is the only district of this group where their proportion is below the state average.

The districts of Chhotanagpur have the second highest percentage (10.79) of workers in tertiary sector in the state. In these districts in 1961 the percentage of workers engaged in

tertiary sector to total workers was varying between 7 and 17, while in 1971 it is varying between 6 and 20. In the district of Dhanbad their proportion is the highest (20 per cent) in the state. It is followed by the districts of Singhbhum and Ranchi which form one cluster where their proportion is comparatively high, 12.36 per cent and 11.43 per cent respectively. In the district of Hazaribagh their proportion is close to state average, 9.81 per cent. The district of Santhal Parganas forms a separate pocket where their proportion is comparatively low, 7.48 per cent. Similarly the district of Palamau forms a separate pocket where their proportion is comparatively very low, 6.61 per cent. Dhanbad, Hazaribagh and Ranchi are the only districts of Chhotanagpur Plateau region, as well as in the whole of the state, which have witnessed an increase in the percentage of workers engaged in tertiary sector during the decade 1961-71. This increase may be attributed to the higher degree of urbanization and varying degree of industrial development in these districts.

The proportion of workers engaged in tertiary sector indicates the levels of economic development of a region. The higher is the proportion of workers in tertiary sector in a region, the higher will be economic development in that region. Thus, on the basis of distribution of workers engaged in tertiary sector we may conclude that on an average the districts of South Bihar Plain are the most developed. They are followed by the

districts of Chhotanagpur Plateau. The districts of North Bihar Plain are the least developed.

2.210 Trade and Commerce

Trade and commerce cover all sorts of wholesale and retail trade as well as restaurants and hotels. Commercial activities like banking, money lending, stocks, shares, etc., insurance, real estates, legal services and other business services fall under this category. Thus all those workers, who are engaged in these activities, are included in the category of trade and commerce.

In Bihar 9.66 per cent of the working population is engaged in tertiary sector, and about 33.70 per cent of the workers of tertiary sector are engaged in trade and commerce. In other words 3.25 per cent of the working population of Bihar is engaged in trade and commerce. In Bihar the percentage of workers engaged in trade and commerce to total tertiary sector has shown an increasing trend, i.e. it has increased from 23.66 in 1961 to 33.70 in 1971. A similar pattern of increase in their proportion is observed in almost all the districts of Bihar.[28] It means that trade and commerce is making progress in almost all the districts of Bihar.

During the decade 1961-71 the distributional pattern has almost remained the same in the state at regional level. For

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28 See Table No. 24.

BIHAR–PERCENTAGE OF WORKERS ENGAGED IN TRADE AND COMMERCE TO TOTAL TERTIARY SECTOR

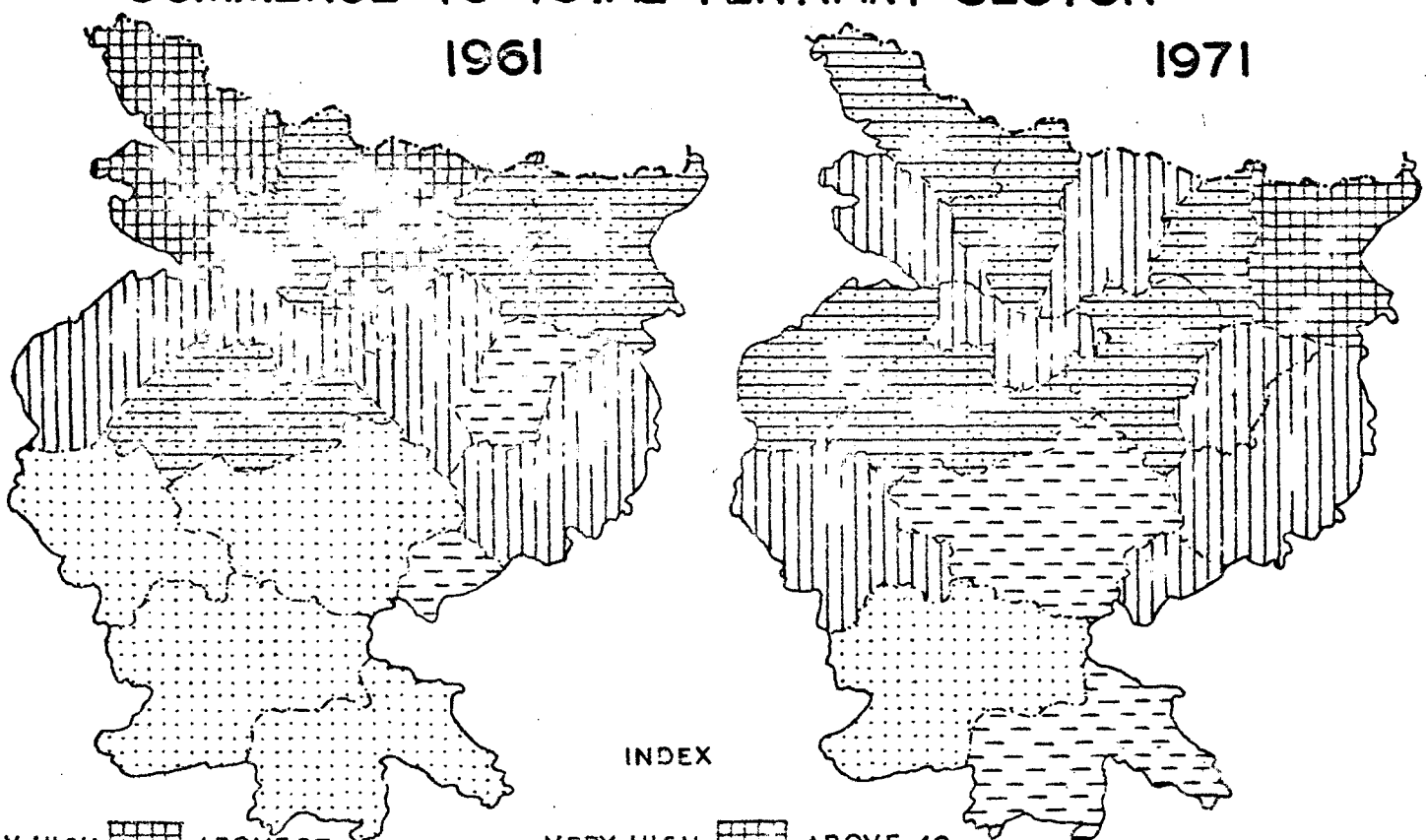

Figure No. 23

Table - 24

Table showing the percentage of workers engaged in trade and commerce to total tertiary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	27.05	36.00
1. Saran	27.94	33.33
2. Champaran	28.02	36.11
3. Muzaffarpur	25.74	35.65
4. Darbhanga	27.86	33.06
5. Saharsa	26.40	36.17
6. Purnea	26.49	42.15
South Bihar Plain	23.43	35.33
7. Patna	23.52	32.99
8. Gaya	25.97	37.87
9. Shahabad	23.47	36.29
10. Monghyr	22.48	35.89
11. Bhagalpur	21.17	34.32
Chhotanagpur Plateau	19.58	29.67
12. Santhal Parganas	22.66	32.05
13. Palamau	18.50	31.25
14. Hazaribagh	19.53	29.54
15. Ranchi	17.73	25.26
16. Dhanbad	21.16	33.33
17. Singhbhum	17.58	28.00
BIHAR	23.66	33.70

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

example, in 1961 the districts of North Bihar Plain were having the largest percentage (27.05) of workers engaged in trade and commerce in the state. They were followed by the districts of South Bihar Plain (23.43) and Chhotanagpur Plateau (19.58). In 1971 also the districts of North Bihar Plain are having the largest percentage (36.00) of workers engaged in trade and commerce. They are followed by the districts of South Bihar Plain (35.33) and Chhotanagpur Plateau (29.67). However, there has been some change in the distributional pattern of workers engaged in trade and commerce at district level during this decade (see Figure No. 23).

In the districts of North Bihar Plain in 1961 the percentage of workers engaged in trade and commerce to total tertiary sector was varying between 25.74 and 28.03, while in 1971 it is varying between 33.06 and 42.15. The district of Purnea has the largest proportion of workers (42.15 per cent) engaged in trade and commerce in the state. Champaran, Muzaffarpur and Saharsa form one group of districts where their proportion is comparatively high, ranging between 35.65 per cent and 36.17 per cent. Saran and Darbhanga form another group of districts where their proportion is close to the state average, 33.33 per cent and 33.06 per cent respectively (see Figure No. 23).

In the districts of South Bihar Plain in 1961 the percentage of workers engaged in trade and commerce to total tertiary sector was varying between 21.17 and 25.97, while in 1971 it is

varying between 32.99 and 37.87. The districts of Shahabad, Gaya and Monghyr form one cluster where their proportion is comparatively high, ranging between 35.89 and 37.87. The districts of Patna and Bhagalpur form separate pockets where their proportion is moderate, 32.99 per cent and 34.32 per cent respectively, the former having below the state average while the latter above the state average.

In the districts of Chhotanagpur in 1961 the percentage of workers engaged in trade and commerce to total tertiary sector was varying between 17.58 and 22.66, while in 1971 it is varying between 25.26 and 33.33. Dhanbad, Santhal Parganas and Palamau form one group of districts where their proportion is moderate, ranging between 31.25 per cent and 33.33 per cent, below the state average. Hazaribagh and Singhbhum form another group of districts where their proportion is comparatively low, 29.54 per cent and 28 per cent respectively. The district of Ranchi forms a separate pocket where their proportion is comparatively very low, 25.26 per cent, the lowest in the state (see Figure No. 23).

As it is mentioned earlier that on an average the percentage of workers engaged in trade and commerce to total tertiary sector is the highest in the districts of North Bihar Plain, and they are followed by the districts of South Bihar Plain and Chhotanagpur Plateau, but it is interesting to note that in terms of the percentage of workers engaged in trade and commerce to

total workers the districts of South Bihar Plain have the highest percentage, about 4.17. They are followed by the districts of Chhotanagpur (3.39 per cent) and North Bihar Plain (2.60 per cent). On this basis we may conclude that in respect of trade and commerce, on an average, the districts of South Bihar Plain are comparatively the most developed. They are followed by the districts of Chhotanagpur. And the districts of North Bihar Plain are the least developed in this respect.

2.211 Transport, Storage and Communications

Workers engaged in transport, storage and communication works are grouped in this category. Transport by all modes like land, water, air, etc., and also services incidental to transport such as packing, travel agencies, etc., are grouped in this category. Ware-housing, storage and also all types of communications like postal, telegraphic, wireless and signal and telephone communications fall under this category.[29]

In Bihar 9.66 per cent of the working population is engaged in tertiary sector, and about 15.67 per cent of the workers of tertiary sector are engaged in transport, storage and communications. In other words about 1.51 per cent of the working population of Bihar is engaged in transport, storage and

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29 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 30.

communications. The percentage of workers engaged in transport, storage and communications to total tertiary sector has shown an increasing trend, i.e. it has increased from 10.43 in 1961 to 15.67 in 1971. A similar pattern is observed in almost all the districts of Bihar.[30] It means that in respect of transport, storage and communications also all the districts of Bihar are progressing.

During the decade 1961-71 the distributional pattern of workers engaged in transport, storage and communications has almost remained the same at regional level. For example, in 1961 the districts of Chhotanagpur were having the largest percentage of workers (12.90) engaged in transport, storage and communications. They were followed by the districts of South Bihar Plain (10.64 per cent) and North Bihar Plain (8.29 per cent). On the other hand in 1971 also the districts of Chhotanagpur are having the largest percentage of workers (20.73) engaged in transport, storage and communications. They are followed by the districts of South Bihar Plain (14.66 per cent) and North Bihar Plain (12.18 per cent). However, there has been some change in the distributional pattern of workers engaged in transport, storage and communications at district level during this decade (see Figure No. 24).

The districts of North Bihar Plain have the lowest percentage of workers (12.18) engaged in transport, storage and

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30 See Table No. 25.

BIHAR - PERCENTAGE OF WORKERS ENGAGED IN TRANSPORT, STORAGE AND COMMUNICATIONS TO TOTAL TERTIARY SECTOR

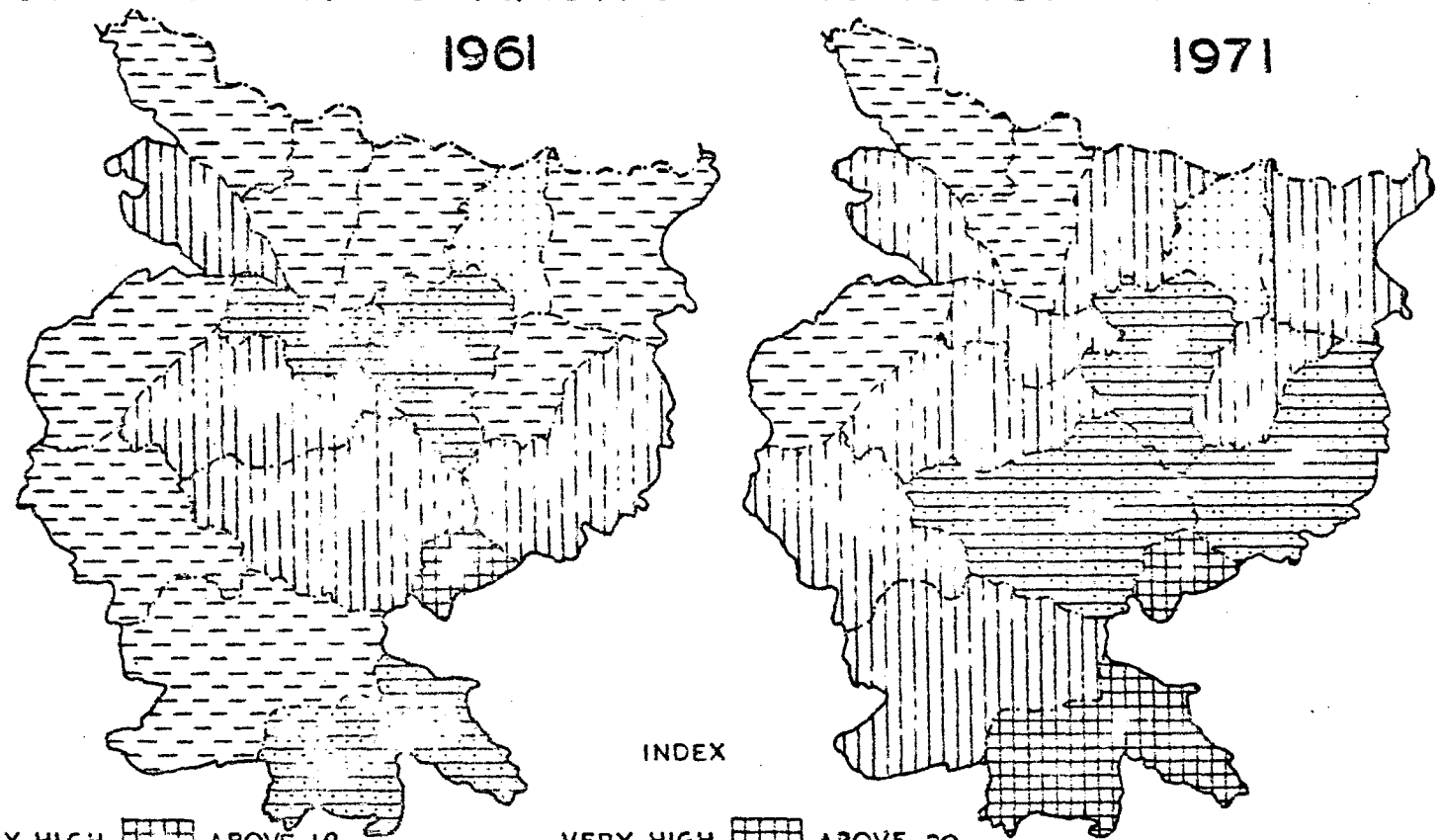

Figure No. 24

Table - 25

Table showing the percentage of workers engaged in transport, storage and communication to total tertiary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	8.29	12.18
1. Saran	10.15	13.33
2. Champaran	7.63	9.72
3. Muzaffarpur	7.91	10.43
4. Darbhanga	8.26	14.51
5. Saharsa	4.81	6.38
6. Purnea	9.16	14.70
South Bihar Plain	10.64	14.66
7. Patna	12.48	15.22
8. Gaya	10.16	13.63
9. Shahabad	7.29	11.85
10. Monghyr	13.38	18.80
11. Bhagalpur	8.47	13.43
Chhotanagpur Plateau	12.90	20.73
12. Santhal Parganas	10.43	17.94
13. Palamau	9.20	15.62
14. Hazaribagh	10.91	17.04
15. Ranchi	8.63	13.66
16. Dhanbad	19.53	30.30
17. Singhbhum	16.01	25.00
BIHAR	10.43	15.67

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

communications in the state. In these districts in 1961 their percentage to total tertiary sector was varying between 4.81 and 10.15, while in 1971 it is varying between 6.38 and 14.70. Saran, Darbhanga and Purnea districts form separate pockets where their proportion is moderate, ranging between 13.33 per cent and 14.70 per cent, fairly below the state average. Champaran and Muzaffarpur form one cluster of districts where their proportion is comparatively low, 9.72 per cent and 10.43 per cent respectively. The district of Saharsa forms a separate pocket where their proportion is comparatively very low, 6.38 per cent, the lowest in the state.

The districts of South Bihar Plain have comparatively higher proportion of workers engaged in transport, storage and communications than the districts of North Bihar Plain. In these districts in 1961 the percentage of workers engaged in transport, storage and communications to total tertiary sector was varying between 7.29 and 13.38, while in 1971 it is varying between 11.85 and 18.80. The district of Monghyr forms a separate pocket where their proportion is comparatively high, 18.80 per cent. Patna, Gaya and Bhagalpur form one group of districts (see Figure No. 24) where their proportion is moderate, ranging between 13.43 per cent and 15.22 per cent, fairly below the state average. The district of Shahabad forms a separate pocket where their proportion is comparatively low, 18.85 per cent.

The districts of Chhotanagpur have the highest proportion of workers engaged in transport, storage and communications in the state. In these districts in 1961 the percentage of workers engaged in this category to total tertiary sector was varying between 8.63 and 19.53, while in 1971 it is varying between 13.68 and 30.30. The districts of Dhanbad and Singhbhum form one group where the percentage of workers engaged in transport, storage and communications to total tertiary sector is comparatively very high, 30.30 and 25.00 respectively, the highest in the state. It is mainly due to the fact that in these districts a very high degree of urbanization and industrialization has taken place. The districts of Hazaribagh and Santhal Parganas form one cluster where their proportion is comparatively high, 17.04 per cent and 17.94 per cent respectively. Palamau and Ranchi form another cluster of districts where their proportion is moderate, 15.62 per cent and 13.68 per cent respectively, fairly below the state average.

Thus we find a close relationship between the degree of urbanization and the proportion of workers engaged in transport, storage and communications, i.e. the districts of Chhotanagpur, with higher degree of urbanization, have also the higher proportion of workers engaged in transport, storage and communications. On the other hand the districts of North Bihar Plain, with lower degree of urbanization, have also the lower proportion of workers engaged in transport, storage and communications. As it

is mentioned earlier that in the districts of Chhotanagpur the proportion of workers engaged in this category to total tertiary sector is the highest in the state, and they are followed by the districts of South Bihar Plain and North Bihar Plain. Similarly in the districts of Chhotanagpur the percentage of workers engaged in transport, storage and communications to total workers is also the highest (2.46) in the state. They are followed by the districts of South Bihar Plain (with 1.71 per cent) and North Bihar Plain (with 0.85 per cent). Thus on this basis we may conclude that in the respect of transport, storage and communications the districts of Chhotanagpur are the most developed. They are followed by the districts of South Bihar Plain. And the districts of North Bihar Plain are the least developed in this respect.

2.212 Other Services

Other services include Governmental services, educational, medical, health, veterinary, personal services, community services and general and casual labourers who do not have any fixed place of work. Recreational and cultural services, scientific and research services and also sanitary services are covered by this category. Persons engaged in laundries, cleaning and dyeing, hair dressing, portrait and commercial photographic studios are also covered by this group.[31] Thus all the workers

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31 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 30.

who are engaged in these services are included in this category.

In Bihar 9.66 per cent of the working population is engaged in tertiary sector, and about 50.62 per cent of the workers of tertiary sector are engaged in other services. In other words about 4.89 per cent of the working population of Bihar is engaged in other services. The percentage of workers engaged in other services to total tertiary sector has shown a declining trend, i.e. it has declined from 65.90 in 1961 to 50.62 in 1971. A similar pattern of decline is observed in almost all the districts of Bihar.[32] This shows rather a negative aspect of the levels of economic development. But it will not be quite correct to conclude on this basis only, because this decline may be due to change in the definition of worker in 1971.

During the decade 1961-71 the distributional pattern of workers engaged in other services has changed both at regional level and district level (see Figure No. 25). For example, in 1961 the districts of Chhotanagpur were having the largest percentage of workers (67.51) engaged in other services. They were followed by the districts of South Bihar Plain (65.92 per cent) and North Bihar Plain (64.65 per cent). While in 1971 the districts of North Bihar Plain are having the largest percentage of workers (51.81) in this category. They are followed by the

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32 See Table No. 26.

BIHAR – PERCENTAGE OF WORKERS ENGAGED IN OTHER SERVICES TO TOTAL TERTIARY SECTOR

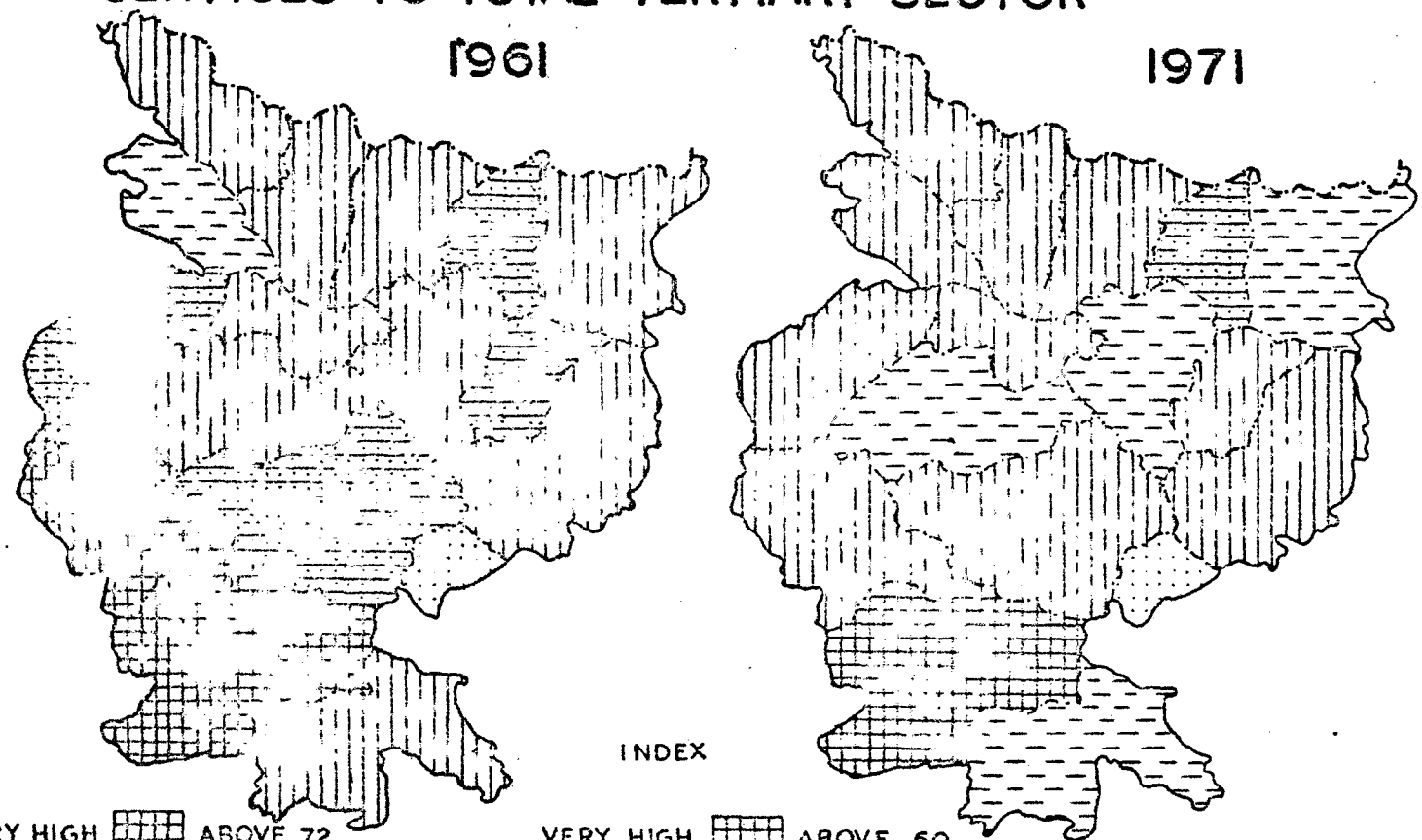

Figure No. 25

Table - 26

Table showing the percentage of workers engaged in other services to total tertiary sector during 1961 and 1971.

Districts/Regions	1961	1971
North Bihar Plain	64.65	51.81
1. Saran	61.90	53.33
2. Champaran	64.33	54.16
3. Muzaffarpur	66.34	53.91
4. Darbhanga	63.87	52.41
5. Saharsa	68.77	57.44
6. Purnea	64.34	43.13
South Bihar Plain	65.92	50.00
7. Patna	63.98	51.77
8. Gaya	63.86	48.48
9. Shahabad	69.23	51.85
10. Monghyr	64.13	45.29
11. Bhagalpur	70.34	52.23
Chhotanagpur Plateau	67.51	49.59
12. Santhal Parganas	66.90	50.00
13. Palamau	72.29	53.12
14. Hazaribagh	69.54	53.40
15. Ranchi	73.63	61.05
16. Dhanbad	59.50	36.36
17. Singhbhum	66.40	47.00
BIHAR	65.90	50.62

Source: Bihar Through Figures - 1972, Directorate of Statistics and Evaluation, Government of Bihar, pp. 20-21.

districts of South Bihar Plain (50 per cent) and Chhotanagpur (49.59 per cent).

In the districts of North Bihar Plain more than half of the workers of tertiary sector are engaged in other services. In these districts in 1961 the percentage of workers engaged in other services to total tertiary sector was varying between 61.90 and 68.77, while in 1971 it is varying between 43.13 and 57.44. The district of Saharsa has the second highest percentage of workers (57.44) engaged in this category in the state. The districts of Saran, Champaran, Muzaffarpur and Darbhanga form one cluster (see Figure No. 25) where their proportion is moderate, ranging between 52.41 per cent and 54.16 per cent, fairly above the state average. The district of Purnea forms a separate pocket where their proportion is comparatively low, 43.13 per cent.

In the districts of South Bihar Plain about half (50 per cent) of the workers of tertiary sector are engaged in other services. In these districts in 1961 the percentage of workers engaged in other services to total tertiary sector was varying between 63.86 and 70.34, while in 1971 it is varying between 45.29 and 52.23. Patna, Shahabad and Bhagalpur form one group of districts where the proportion of workers engaged in other services is moderate, ranging between 51.77 per cent and 52.23 per cent, fairly above the state average. The districts of Gaya and Monghyr form one cluster where their proportion is

comparatively low, 48.48 per cent and 45.29 per cent respectively.

In the districts of Chhotanagpur a little less than half (49.59 per cent) of the workers of tertiary sector are engaged in other services. In these districts in 1961 the percentage of workers engaged in this category to total tertiary sector was varying between 59.30 and 73.63, while in 1971 it is varying between 36.36 and 61.05. The district of Ranchi has the highest percentage (61.05) of workers engaged in this category in the state. Santhal Parganas, Hazaribagh and Palamau form one cluster of districts where their proportion is close to state average, ranging between 50 per cent and 53.40 per cent. The district of Singhbhum forms a separate pocket where their proportion is comparatively low, 47 per cent. The district of Dhanbad has the lowest percentage of workers (36.36) engaged in this category not only in this region but the whole of the state.

It is mentioned above that on an average the percentage of workers engaged in other services to total tertiary sector is the highest in the districts of North Bihar Plain, and they are followed by the districts of South Bihar Plain and Chhotanagpur Plateau, but it is interesting to note that in terms of the percentage of workers engaged in other services to total workers the districts of South Bihar Plain have the highest percentage, about 5.96. They are followed by the districts of Chhotanagpur Plateau (5.42 per cent) and North Bihar Plain (3.76 per cent). On this basis we may conclude that in respect

of other services, on an average, the districts of South Bihar Plain are the most developed. They are followed by the districts of Chhotanagpur Plateau. And the districts of North Bihar Plain are the least developed in this respect.

Part - III

SOCIO-ECONOMIC CHARACTERISTICS

2.31 Density of Population

One of the most important aspects of a geographical study of population is the examination of the spatial distribution and density of population in relation to the habitat. This is all the more important in the understanding of population problems in a densely populated area with predominantly rural economy, like Bihar. The density of population in Bihar appears to be closely related to the type of environment, and the present environmental resources - appear generally to place upper and lower limits on the density. It is, therefore, reasonable to examine the density figures in relation to the environmental types and their resources.

Although Bihar, occupying only 5.3 per cent of the total Indian territory, contains about 10.40 per cent of the Indian population. Bihar, with a density of 324 persons per square kilometre, is the third most densely populated state of India after Kerala (549) and West Bengal (504). In Bihar the density of population has registered a positive rate of growth about +21.35 per cent during the decade 1961-71, as a result it has increased from 267 in 1961 to 324 persons per square kilometre in 1971. This increasing trend in density of population[1] is

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1 See Table No. 27.

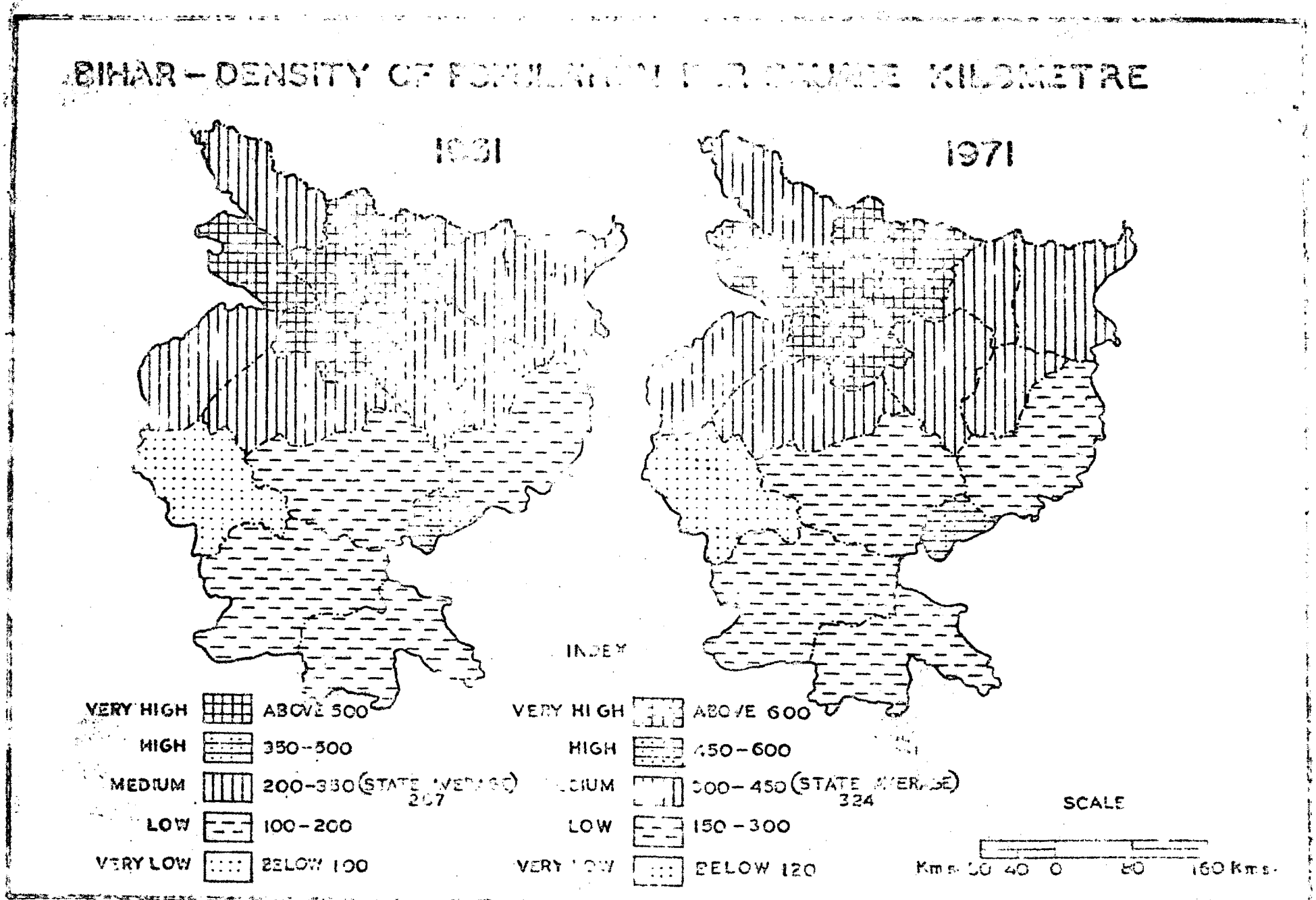
BIHAR – DENSITY OF POPULATION PER SQUARE KILOMETRE
1931
1971
INDEX
VERY HIGH ABOVE 500
HIGH 350–500
MEDIUM 200–350 (STATE AVERAGE) 207
LOW 100–200
VERY LOW BELOW 100
VERY HIGH ABOVE 600
HIGH 450–600
MEDIUM 300–450 (STATE AVERAGE) 324
LOW 150–300
VERY LOW BELOW 120
SCALE
Kms. 80 40 0 80 160 Kms.

Figure No. 26

Table - 27

Table showing the density of population and its percentage rate of growth during 1961 and 1971.

Districts	Density of population per square kilometre		Percentage of rate of growth in density of population 1961-71
	1961	1971	
1. Patna	526	643	+ 22.24
2. Gaya	296	361	+ 21.96
3. Shahabad	282	348	+ 23.40
4. Saran	519	616	+ 18.69
5. Champaran	327	385	+ 17.74
6. Muzaffarpur	527	618	+ 17.27
7. Darbhanga	509	603	+ 18.47
8. Monghyr	329	396	+ 20.36
9. Bhagalpur	303	370	+ 22.11
10. Saharsa	318	399	+ 25.47
11. Purnea	280	358	+ 27.86
12. Santhal Parganas	189	226	+ 19.58
13. Palamau	93	119	+ 27.96
14. Hazaribagh	132	167	+ 26.52
15. Ranchi	117	142	+ 21.37
16. Dhanbad	402	490	+ 21.89
17. Singhbhum	152	181	+ 19.08
BIHAR	267	324	+ 21.35

Source: Bihar Statistical Hand Book - 1971, Directorate of Statistics and Evaluation, Government of Bihar.

observed in all the districts of Bihar during this decade. With this temporal variation there also exits spatial variation in the density of population (see Figure No. 26), for example, North and South Bihar Plains are more densely population than Chhotanagpur Plateau, even within these regions there are some districts which have very high density of population, while others have very low density of population. In spite of temporal and spatial variations in the density of population, its distributional pattern has almost remained the same during the decade 1961-71 (see Figure No. 26). It means that the districts having high density of population are becoming denser and denser.

North Bihar Plain is the most densely populated part of the state. South Bihar Plain is comparatively less densely populated than its northern counterpart. The district of Patna of South Bihar Plain and the districts of Saran, Muzaffarpur and Darbhanga of North Bihar Plain form one cluster (see Figure No. 26) where the density of population is very high, ranging from 603 to 643 persons per square kilometre. Patna, with 643 persons per square kilometre, is the most densely populated district of Bihar. It is due to the Metropolis of Patna. Muzaffarpur, with 618 persons per square kilometre, is the second most densely populated district of the state, but is first in North Bihar Plain. In these districts the density of population is very high, because of dead level plain which has been the seat of ancient civilization, fertile alluvial soil with its greater

productivity, adequate rainfall, adequate irrigation facilities, very high percentage of cultivated area and less forest cover. The districts of Shahabad, Gaya, Monghyr and Bhagalpur of South Bihar Plain and Champaran, Saharsa and Purnea of North Bihar Plain form another cluster of high density of population, ranging from 348 to 399 persons per square kilometre, fairly above state average. An important factor responsible for depressing the densities of population in these districts is the mixed nature of their terrain. The southern portions of the South Bihar Plain districts, contiguous to the Chhotanagpur Plateau, are covered by uplands and forests, and are rather scantily populated. These districts are also deficient in rainfall and have comparatively less fertile soil. In Champaran district the density of population is comparatively low because its northern parts are heavily forested and comprise the foothills of the Himalayas. In the districts of Saharsa and Purnea the density of population is low because of the ravages of Kosi-river. With the development of Kosi Project these districts have registered a very high positive rate of growth[2] in the density of population about +25.47 per cent and +27.86 per cent respectively, as a result in these districts it has increased from 318 and 280 in 1961 to 399 and 358 persons per square kilometre in 1971 respectively.

In almost all the districts of Chhotanagpur the density

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2 Ibid.

of population is low, fairly below state average, Dhanbad being the sole exception. Dhanbad, with 490 persons per square kilometres, is the most densely populated district of this region. It is the only district in which mining and industrialization have really made visible impact on the population density. The districts of Santhal Parganas, Hazaribagh, Ranchi and Singhbhum form one cluster where the density of population varies between 142 and 226. The districts of Singhbhum, Ranchi and Hazaribagh have also undergone varying degrees of industrial development but its effect on the population density is hardly perceptible. Palamau, with 119 persons per square kilometre, is the most scantily populated district of this region as well as the state. In all the districts of Chhotanagpur the density of population is very low, because of hilly terrain, less fertile soil, low percentage of cultivated area, less irrigation facilities and a very high percentage of forest cover. Thus we came to the conclusion that the density of population in Bihar is closely related to the type of environment, and the present environmental resources generally place upper and lower limits on the density.

2.32 Scheduled Castes and Scheduled Tribes

Scheduled Castes and Scheduled Tribes are those castes and tribes which are notified under Article 341 of the Constitution of India. In Bihar there are various castes and tribes

which are socially and economically deprived. The Government of Bihar has prepared lists of these castes and tribes to give special attention to improve their social and economic conditions. According to the "Scheduled Castes and Scheduled Tribes lists" (modification) order 1956, the following castes and tribes are regarded as Scheduled Castes and Scheduled Tribes:

(a) Scheduled Castes

1. Bauri
2. Bhogta
3. Chamar or Mochi
4. Bantar
5. Chaupal
6. Dabgar
7. Dhobi
8. Dom or Dhangad
9. Dusadh, including Dhari or Dharhi
10. Ghasi
11. Halalkhor
12. Kanjar
13. Kurariar
14. Lalbegi
15. Musahar
16. Nat
17. Pan or Sawasi
18. Pasi

19. Rajwar
20. Turi
21. Hari, Mehtar or Bhangi
22. Bhuiya[3]

(b) Scheduled Tribes

1. Chik Baraik
2. Gond
3. Gorait
4. Ho
5. Karmali
6. Kharia
7. Kharwar
8. Mal Paharia
9. Munda
10. Oraon
11. Parhaiya
12. Santhal
13. Sauria Paharia
14. Savar
15. Bhumij[4]

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3 Except Bhuiya all other castes are found throughout the state. Bhuiya caste is found only in Patna, Shahabad, Gaya and Palamau districts.

4 Bhumij tribe is found only in Patna and Tirhut divisions, and in the districts of Monghyr, Bhagalpur, Purnea and Palamau.

In Bihar the percentage of Scheduled Castes and Scheduled Tribes to total population is 22.9. Although the Scheduled Castes and Scheduled Tribes population has registered a positive rate of growth about +19.94 per cent during the decade 1961-71, its percentage to total population has declined from 23.1 in 1961 to 22.9 in 1971. It is mainly due to the fact that the rate of growth of the total population is higher than the Scheduled Castes and Scheduled Tribes population[5] during this decade. A similar trend is observed in all the districts of Chhotanagpur region, in Saharsa and Purnea districts of North Bihar Plain. and in Monghyr and Bhagalpur districts of South Bihar Plain. In rest of the districts of North and South Bihar Plains the percentage of Scheduled Castes and Scheduled Tribes has shown an increasing tendency. It is mainly, because in these districts the rate of growth of Scheduled Castes and Scheduled Tribes population is higher than the total population.[6] In spite of the temporal variation in Scheduled Castes and Scheduled Tribes population, the distributional pattern is almost the same during the decade 1961-71, for example, in all the districts of North and South Bihar Plains, except Gaya, the percentage of Scheduled Castes and Scheduled Tribes to total population is low, fairly below the state average, on the 'other hand in all the districts

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5 See Table No. 28.

6 Ibid.

BIHAR - PERCENTAGE OF SCHEDULED CASTES AND SCHEDULED TRIBES TO TOTAL POPULATION

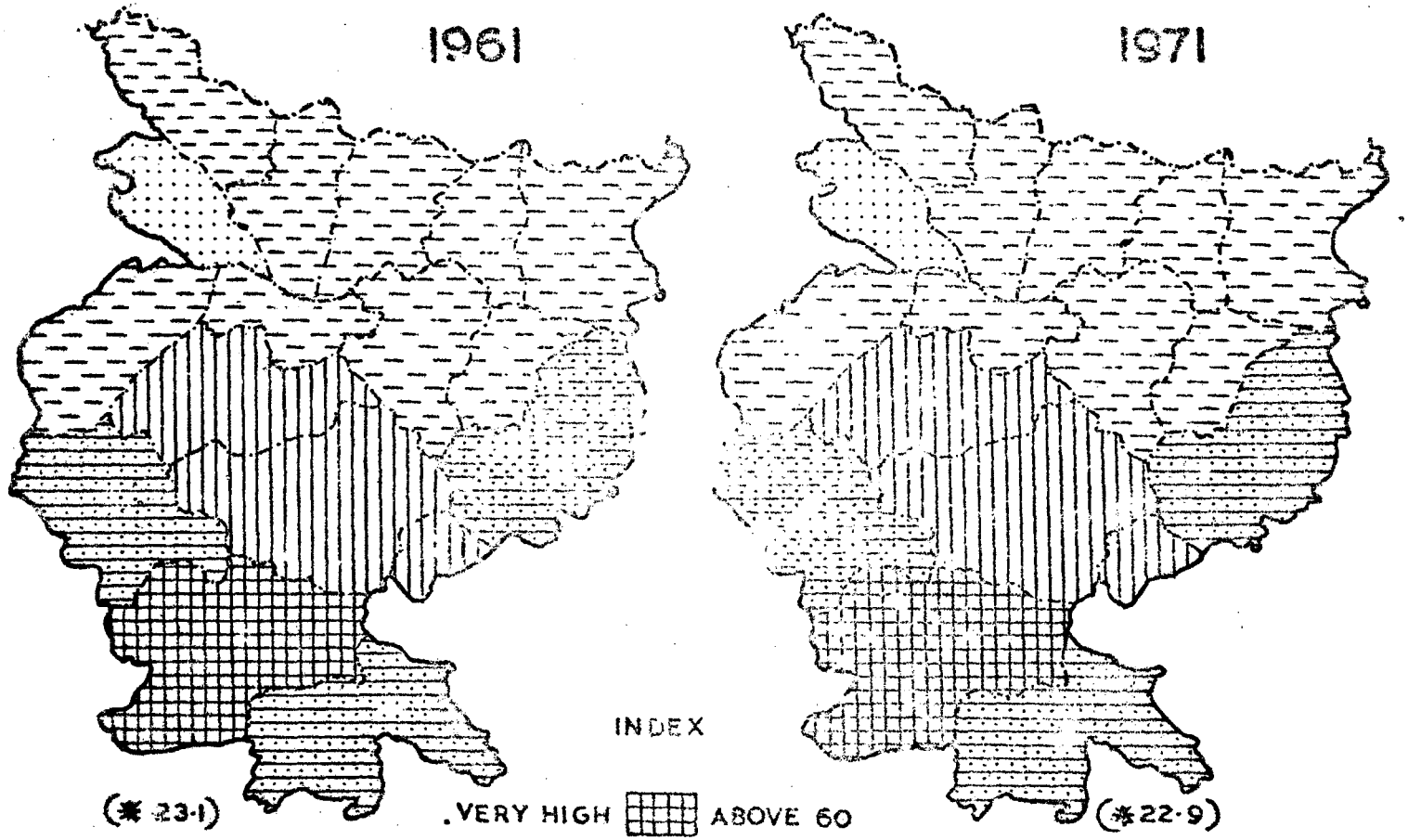

Figure No. 27

Table - 28

Table showing the proportion and rate of growth of Scheduled Castes and Scheduled Tribes during 1961 and 1971.

Districts	Percentage of Scheduled Castes and Scheduled Tribes to total population		Persentage rate of growth during 1961-71	
	1961	1971	Scheduled Castes and Scheduled Tribes	Total Population
1. Patna	16.1	16.6	+ 24.14	+ 20.58
2. Gaya	24.6	24.7	+ 22.86	+ 22.19
3. Shahabad	16.7	17.6	+ 29.28	+ 22.41
4. Saran	10.3	11.3	+ 30.45	+ 19.37
5. Champaran	14.7	14.8	+ 19.14	+ 17.86
6. Muzaffarpur	14.9	15.8	+ 24.85	+ 17.54
7. Darbhanga	14.7	14.9	+ 20.17	+ 18.60
8. Monghyr	17.2	16.9	+ 12.93	+ 14.93
9. Bhagalpur	15.3	14.4	+ 14.92	+ 22.21
10. Saharsa	17.6	17.1	+ 32.07	+ 36.36
11. Purnea	16.2	15.3	+ 20.90	+ 27.60
12. Santhal Parganas	45.8	43.4	+ 12.89	+ 19.13
13. Palamau	45.2	44.5	+ 24.82	+ 26.65
14. Hazaribagh	23.8	23.1	+ 21.90	+ 26.03
15. Ranchi	66.2	62.9	+ 16.12	+ 22.11
16. Dhanbad	28.9	25.8	+ 12.80	+ 26.57
17. Singhbhum	50.3	49.7	+ 17.61	+ 18.92
BIHAR	23.1	22.9	+ 19.94	+ 21.23

Source: Bihar Statistical Hand Book - 1971, Directorate of Statistics and Evaluation, Government of Bihar.

of Chhotanagpur it is very high, fairly above the state average (see Figure No. 27).

Chhotanagpur Plateau region comprises 46.44 per cent of the total Scheduled Castes and Scheduled Tribes population of the state. In all the districts of this region the percentage of Scheduled Castes and Scheduled Tribes is very high, fairly above the state average. It is interesting to note that it has shown a declining trend in all these districts, for example, in these districts in 1961 it was varying between 23.8 and 66.2, while in 1971 it is varying between 23.1 and 62.9. The district of Ranchi has the highest percentage (about 62.9) of Scheduled Castes and Scheduled Tribes in this region as well as in the state. It is followed by the districts of Singhbhum, Palamau and Santhal Parganas where the percentage of Scheduled Castes and Scheduled Tribes is 49.7, 44.5 and 43.4 respectively. Dhanbad and Hazaribagh of Chhotanagpur and Gaya of South Bihar Plain form one cluster where the percentage of Scheduled Castes and Scheduled Tribes is around 25. Thus it is interesting to recall that nowhere in this region the percentage of Scheduled Castes and Scheduled Tribes is below the state average (22.9).

The North and South Bihar Plains comprise a very low percentage of Scheduled Castes and Scheduled Tribes, about 27.60 and 25.96 respectively. Gaya is the only district of South Bihar Plain where their percentage is fairly above the state average, about 25.8. Except Gaya in all the districts of

North and South Bihar Plains their percentage is fairly below the state average. The districts of Shahabad, Patna, Monghyr and Bhagalpur of South Bihar Plain and Saharsa, Purnea, Darbhanga, Muzaffarpur and Champaran of North Bihar Plain form one cluster (see Figure No. 27) where the percentage of Scheduled Castes and Scheduled Tribes is low, ranging from 14.4 to 17.6. Saran district of North Bihar Plain forms one separate pocket of very low percentage (about 11.3) of Scheduled Castes and Scheduled Tribes.

Thus on the basis of the distributional pattern of Scheduled Castes and Scheduled Tribes we may conclude that the Chhotanagpur region is socially more backward than the South and North Bihar Plains.

2.33 Literacy

It has been established beyond doubt that literacy is both the cause and the effect of social and economic development. Its development does not in itself cure poverty, hunger and disease, but it is the first and indispensable remedial step. Bihar's economic development is retarded considerably because of its human factor. Efficiency and productivity of the worker in the factory or the farmer in his field are conditioned by his ability to acquire knowledge and skills through education and training and to apply the same in work. Literacy is a necessary foundation for this requirement.

According to 1971 Census "a person who can both read and

write with understanding in any language is taken as literate.[7] A person who can merely read but can not write is not a literate. It is not necessary that a person who is literate should have received any formal education or should have passed any minimum educational standard". In spite of a positive rate of growth (+31.47 per cent) in literacy, the percentage of literacy in Bihar has declined from 21.7 in 1961 to 19.9 in 1971. This phenomenon is observed in almost all the districts of Bihar.[8] Shahabad and Ranchi are the only districts where the percentage of literacy has increased during this decade. The main cause of increase in the percentage of literacy in these two districts, is a comparatively very high positive rate of growth (+38.09 per cent and +48.29 per cent respectively). Except these two districts, the percentage of literacy has shown a declining trend in all other districts of the state and also in the state average. It is mainly due to the change in the definition of literate persons and a marginal positive rate of growth in literacy in comparison of total population.[9]

Figure No. 28 depicts that there exist spatial and temporal variations in the percentage of literacy. For example, the

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7 Government of India (1971), Census of India, General Population Tables, Series 1, Part II-A(i), The Controller of Publications, Delhi, p. 20.

8 See Table No. 29.

9 Ibid.

BIHAR–PERCENTAGE OF LITERACY

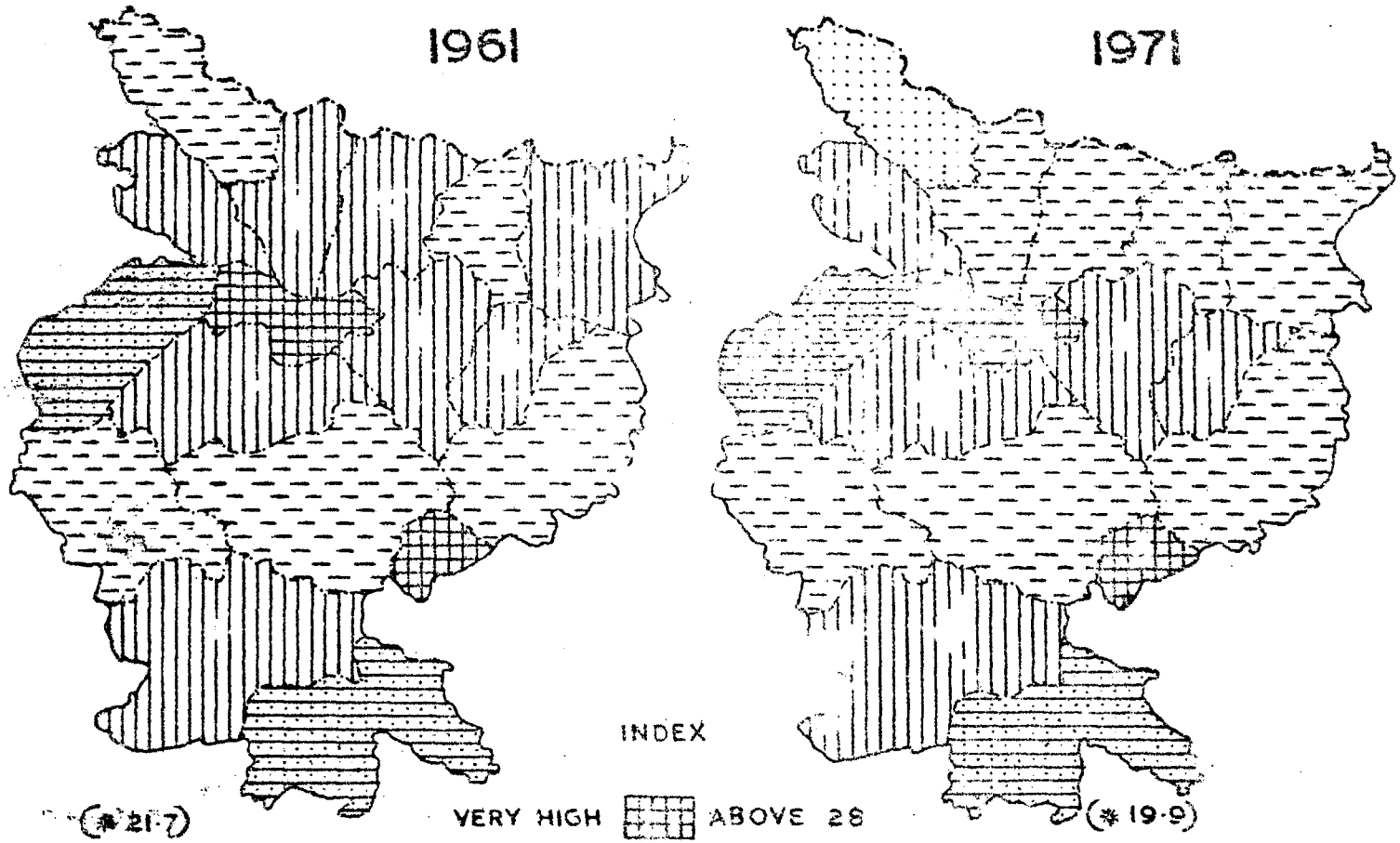

Figure No. 28

Table - 29

Table showing the percentage of literacy and its rate of growth during 1961 and 1971.

Districts	Percentage of literacy		Percentage of rate of growth during 1961-71	
	1961	1971	Literacy	Total Population
1. Patna	33.7	30.1	+ 26.21	+ 20.58
2. Gaya	22.7	21.6	+ 37.81	+ 22.19
3. Shahabad	25.6	27.1	+ 38.09	+ 22.41
4. Saran	21.5	19.2	+ 25.71	+ 19.37
5. Champaran	15.5	14.2	+ 26.79	+ 17.86
6. Muzaffarpur	20.1	17.3	+ 18.68	+ 17.54
7. Darbhanga	19.8	18.0	+ 27.66	+ 18.60
8. Monghyr	22.4	20.4	+ 23.52	+ 14.93
9. Bhagalpur	23.9	21.5	+ 29.42	+ 22.21
10. Saharsa	16.7	15.5	+ 50.80	+ 36.36
11. Purnea	19.5	15.7	+ 24.47	+ 27.60
12. Santhal Parganas	17.3	15.9	+ 29.78	+ 19.13
13. Palamau	16.4	15.1	+ 41.12	+ 26.65
14. Hazaribagh	17.3	16.4	+ 43.01	+ 26.03
15. Ranchi	22.7	23.2	+ 48.29	+ 22.11
16. Dhanbad	29.8	29.5	+ 46.58	+ 26.57
17. Singhbhum	26.9	25.9	+ 34.13	+ 18.92
BIHAR	21.7	19.9	+ 31.47	+ 21.31

Source: Bihar Statistical Hand Book - 1971, Directorate of Statistics and Evaluation, Government of Bihar.

districts of South Bihar Plain are the most literate parts of the state, where the percentage of literacy varies between 20 and 31. It is remarkable that throughout this region, the percentage of literacy is nowhere below the state average. Patna, with 30.1 per cent of literacy, is the most literate district of this region as well as the state. Shahabad is the only district of this region where the percentage of literacy has increased from 25.6 in 1961 to 27.1 in 1971. As a result of this increase Shahabad has improved its position and now regarded as the third most literate district of the state. Except this, in all other districts of this region the percentage of literacy has shown a declining trend[10] during 1961-71. It is clear from the fact that in this region the percentage of literacy in 1961 was varying between 22 and 34, but in 1971 it is only varying between 20 and 31.

The North Bihar Plain, with its teeming millions, mainly agricultural economy and low urban content, is much behind the state average. The percentage of literacy does not exceed the state average (19.9) in any district of this region. Saran, with 19.2 per cent, is the most literate district of this region. In Darbhanga and Muzaffarpur the percentages of literacy are around 18 and in Purnea and Saharsa they fall to around 16 and a more 14.2 in Champaran. Thus Champaran, with 14.2 per cent,

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10 Ibid.

is the least literate district of this region. In this region also the percentage of literacy has shown a general trend of decline, for example, in this region during 1961 it was varying between 15.5 and 21.5, while during 1971 it is varying between 14.2 and 19.2.

The Chhotanagpur Plateau is a region of great contrast. While in Dhanbad (29.5 per cent) and Singhbhum (25.9 per cent) high peaks (next to Patna and Shahabad respectively) of literacy are reached, Palamau, Hazaribagh and Santhal Parganas constitute a continuous belt of low literacy districts, between 15 and 17 per cent (see Figure No. 28). The percentage of literacy in Ranchi is 23.2, fairly above the state average. It is the only district of this region where the percentage of literacy has shown an increasing tendency, and increased from 22.7 in 1961 to 23.2 in 1971. Except this, the percentage of literacy has shown a declining trend in almost all the districts of this region during the decade - 1961-71.

It is clearly depicted by the Figure No. 28 that there are distinct zones of high and low literacy by clusters of districts in the state. Five districts of the South Bihar Plain, viz., Patna, Gaya, Shahabad, Monghyr and Bhagalpur, and three southern districts of the Chhotanagpur Plateau, viz., Dhanbad, Singhbhum and Ranchi comprise two separate and distinct clusters having comparatively high literacy (above the state average). The whole of North Bihar Plain and the rest of Chhotanagpur

Plateau form low literacy zones (below state average). Saran and Champaran are the two districts where literacy is comparatively high and very low respectively. Muzaffarpur, Darbhanga, Saharsa and Purnea of North Bihar Plain and Palamau, Hazaribagh and Santhal Parganas of Chhotanagpur comprise a second cluster of low literacy districts.

It is interesting to observe that in most of the districts, there is some correlation between the levels of literacy and urbanization. The three top districts in literacy - Patna, Dhanbad and Singhbhum are also top districts in regard to urbanization, though not in the same order. On the other hand, the three most illiterate districts - Champaran, Palamau and Saharsa - are also the least urbanized districts in the state. This phenomenon is quite understandable because urban areas have better educational facilities and greater diversification of the economy in trade, professions and occupations, particularly those in which literacy is a sine qua non. The district of Shahabad, however, does not quite fit into this pattern. Though its urbanization level (8.2 per cent) is comparatively low, it has a fairly high ranking (3rd) in literacy (27.1 per cent). The explanation, perhaps lies in a number of factors such as proximity to Patna and relatively smaller proportion of Scheduled Castes and Scheduled Tribes in the district. Hazaribagh affords an example of the converse type, that is, a district with relatively high level of urbanization (12.9 per cent) but low level of literacy (16.4 per

cent, 12th rank in the state). It may be noted that nearly one-fourth of the population of Hazaribagh district comprises of persons belonging to the Scheduled Castes and Scheduled Tribes, among them literacy is generally low. It is true that Ranchi and Singhbhum have much higher percentage of Scheduled Castes and Scheduled Tribes (62.9 and 49.7 per cent respectively) but in their cases the literacy rates do not seem to be affected because of widespread influence of Christian missionaries who have penetrated deep into the area and provide great fillip to the cause of literacy.

Thus we came to the conclusion that literacy is a very important input in the infrastructure for Bihar's economic development. Therefore the present need is to increase the percentage of literacy in the state. It can be increased by giving it a top priority by a stable and determined Government and also by strong political motivation.

2.34 Urbanization

The urban population is that population of a district or a state or a region, which lives in towns and cities. Most of these town and city dwellers are generally engaged in secondary and tertiary activities. It is an established fact that the higher is the participation rate in secondary and tertiary activities, the higher will be economic development. Thus, the proportion of urban population or the degree of urbanization in a region is an indicator of the economic development of that

region. A true measure of urbanization is, however, given by the percentage of urban population to total population in any area.

The percentage of urban population to total population in Bihar is 10.0. This is much below the national average of about 20 per cent (19.9 per cent) in 1971. During the decade 1961-71, the urban population has registered a positive rate of growth about +43.95 per cent, as a result its percentage has increased from 8.4 in 1961 to 10.0 in 1971. A similar trend of urbanization[11] is also observed in almost all the districts of the state. Bhagalpur is the only exception which has shown a declining trend. It is mainly due to the fact that the percentage increase in urban population (+18.82) is less than the total population (+22.21). Palamau and Saran are the districts where the percentages of urban population to total population (4.7 and 4.2 respectively) are almost constant during this decade. It is mainly due to the fact that in these districts both the percentage increase in urban population and the total population[12] are roughly equal.

Figure No. 29 clearly depicts that the percentage of urban population varies from district to district and also from time to time. In spite of that the distributional pattern has almost remained the same during this decade. In other words the

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11 See Table No. 30.

12 Ibid.

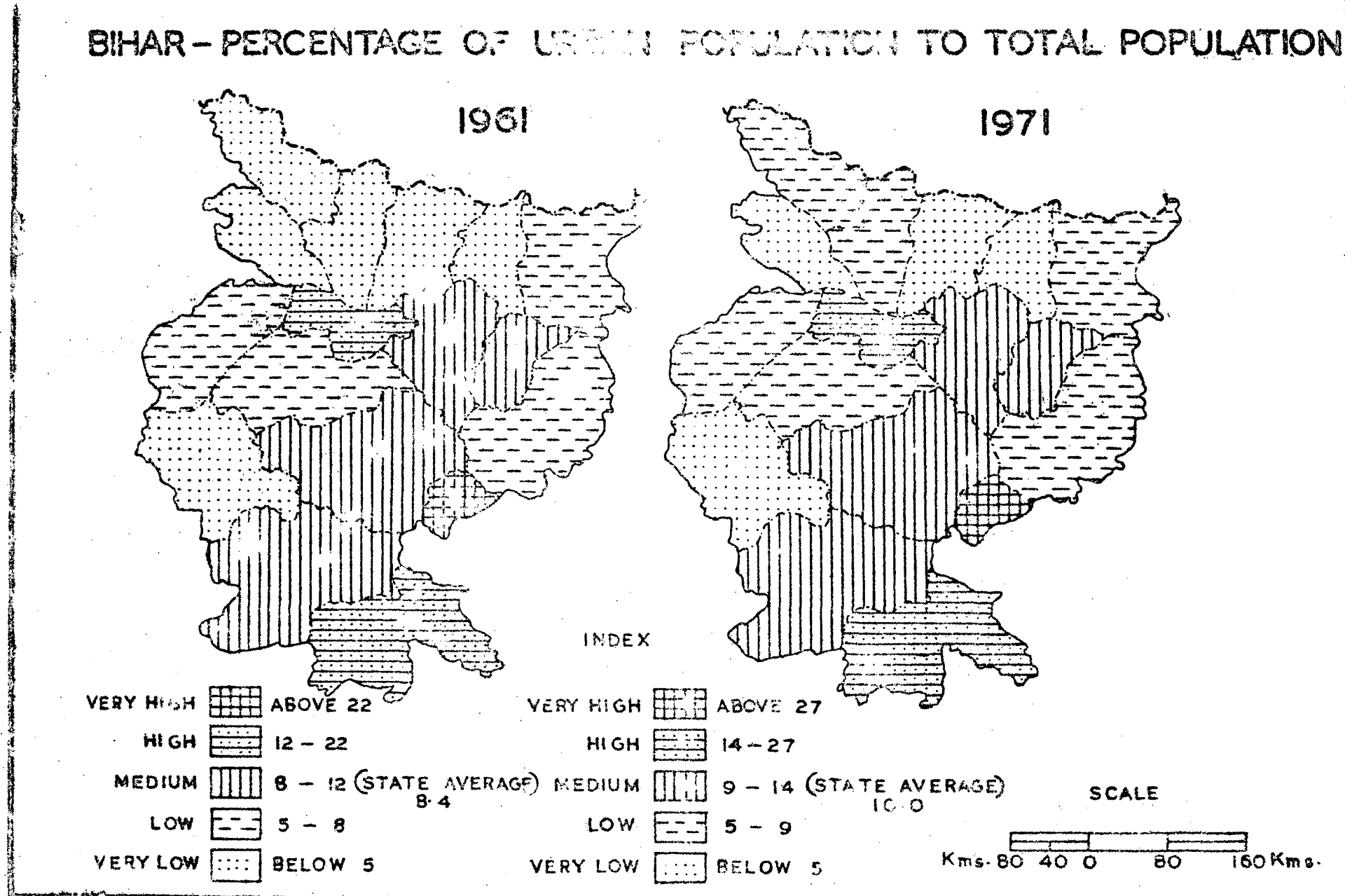
BIHAR – PERCENTAGE OF URBAN POPULATION TO TOTAL POPULATION
1961
1971
INDEX
VERY HIGH ABOVE 22
HIGH 12 – 22
MEDIUM 8 – 12 (STATE AVERAGE 8·4)
LOW 5 – 8
VERY LOW BELOW 5
VERY HIGH ABOVE 27
HIGH 14 – 27
MEDIUM 9 – 14 (STATE AVERAGE 10·0)
LOW 5 – 9
VERY LOW BELOW 5
SCALE
Kms. 80 40 0 80 160 Kms.

Figure No. 29

Table - 30

Table showing the percentage of urban population and its rate of growth during 1961 and 1971.

Districts	Percentage of urban population to total population		Percentage rate of growth during 1961-71	
	1961	1971	Urban Population	Total Population
1. Patna	20.1	22.5	+ 35.01	+ 20.58
2. Gaya	7.3	7.6	+ 28.26	+ 22.19
3. Shahabad	7.2	8.2	+ 39.78	+ 22.41
4. Saran	4.2	4.2	+ 19.76	+ 19.37
5. Champaran	4.8	5.2	+ 26.82	+ 17.86
6. Muzaffarpur	4.6	5.2	+ 34.50	+ 17.54
7. Darbhanga	4.3	4.4	+ 21.75	+ 18.60
8. Monghyr	11.1	11.9	+ 23.15	+ 14.93
9. Bhagalpur	10.9	10.6	+ 18.82	+ 22.21
10. Saharsa	3.9	4.5	+ 57.91	+ 36.36
11. Purnea	6.0	6.3	+ 34.72	+ 27.60
12. Santhal Parganas	5.3	5.8	+ 28.42	+ 19.13
13. Palamau	4.7	4.7	+ 25.63	+ 26.65
14. Hazaribagh	8.4	12.9	+ 93.25	+ 26.03
15. Ranchi	9.5	13.7	+ 76.28	+ 22.11
16. Dhanbad	25.0	43.5	+120.08	+ 26.57
17. Singhbhum	21.5	26.2	+ 45.19	+ 18.92
BIHAR	8.4	10.0	+ 43.95	+ 21.31

Source: Bihar Statistical Hand Book - 1971, Directorate of Statistics and Evaluation, Government of Bihar.

districts or regions which are having high percentage of urban population in 1961, are also having high in 1971. On an average the Chhotanagpur Plateau region is the most urbanized part of the state. The district of Dhanbad, with 43.5 per cent of urban population, is the most urbanized district of this region as well as the state. It has registered a very high positive rate of growth about +120.08 per cent, as a result in this district the percentage of urban population has increased from 25.0 in 1961 to 43.5 in 1971. It is followed by Singhbhum where the percentage of urban population has increased from 21.5 in 1961 to 26.2 in 1971. In Ranchi and Hazaribagh districts also the proportion of urban population is comparatively high (above state average). These districts have also registered a very high positive rate of growth in urban population (about +76.28 per cent and +93.25 per cent respectively) during the decade 1961-71. In these districts of Chhotanagpur the rate of urbanization is very high because of the development of a number of mining and manufacturing industries. Santhal Parganas, with 5.8 per cent of urban population, is the less urbanized district of this region. Even more Palamau, with 4.7 per cent of urban population, is the least urbanized district of this region. It is the only district of this region where the rate of urbanization is very low, 25.63 per cent. Thus the Chhotanagpur region has shown a great variation in growth of urban population, for example, in 1961 here the percentage of urban population was

only varying between 4 and 25, while in 1971 it is varying between 4 and 44.

On an average the South Bihar Plain is comparatively less urbanized than Chhotanagpur Plateau region. However, it has the second largest percentage of urban population (38.15) in Bihar. During the decade 1961-71, it has shown less variation in growth of urban population, for example, in 1961 in this region the percentage of urban population was varying between 7 and 21, while in 1971 it is varying between 7 and 23. It is mainly due to the fact that the percentage increase in urban population of this region is comparatively low, ranging between 18 and 40 per cent.[13] Patna, with 22.5 per cent of urban population, is the most urbanized district of this region. It is mainly due to the fact that it has been the capital of the state since Ashoka's time. It is followed by the districts of Monghyr and Bhagalpur where the percentage of urban population is around 12, fairly above state average. Shahabad and Gaya are the least urbanized districts of this region where the percentage of urban population is around 8, fairly below the state average. In these districts there has been less urbanization because of mainly rural agricultural economy and less industrial development.

On an average North Bihar Plain is the least urbanized part of the state. "North Bihar Plain is a land of large villages

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13 Ibid.

but few towns", wrote the Census Superintendent of 1931. Even forty years later, the observation seems to hold good basically though it is now slightly better off. The urban content of population in this region, however, continues to be strikingly small (21.42 per cent). Nowhere in this region the percentage of urban population is above the state average. In this region the urban population has registered a slow positive rate of growth, ranging between 19 and 35 per cent, as a result the percentage of urban population which was varying between 3 and 6 in 1961 has slightly increased, and now in 1971 it is varying between 4 and 7, fairly below the state average. Saharsa is the only district which has registered a very high positive rate of growth about +57.91 per cent, as a result in this district the percentage of urban population has increased from 3.9 in 1961 to 4.5 in 1971. It is mainly due to the salubrious effect of the flood-protective embankments of the Kosi Project. Purnea, with 6.3 per cent of urban population, is the most urbanized district of this region. It is followed by Champaran and Muzaffarpur, where the percentage of urban population is around 5. Saran, Darbhanga and Saharsa are the least urbanized districts of this region, where the urban population is around 4 per cent. Thus there has been less urbanization in this region as a whole, mainly because of rural agricultural economy and the least industrial development.

It is interesting to note that the North Bihar Plain

containing over 42 per cent of the state's total population, has less than 22 per cent of its urban population. On the other hand, the South Bihar Plain and the Chhotanagpur Plateau containing barely 31.83 per cent and 25.25 per cent respectively of the total population of the state, have about 38.15 per cent and 40.43 per cent of its urban population.

Thus we can sum up that although fast urbanization is taking place in Bihar, it is at a faster rate in the mineralized and industrially developed districts of Chhotanagpur Plateau than the agricultural districts of North and South Bihar Plains. For a balanced urban growth in the state, attempts should be made to develop more and more agro-based industries in the districts of North and South Bihar Plains.

2.35 Density of Roads

Roads are the arteries of a nation. By ensuring smooth flow of goods and traffic they foster the development of trade, commerce, industries, education, etc. The extent of backwardness or otherwise of an area can, therefore, be measured in terms of its road development. Thus, the transport facilities are rightly considered as a gateway to economic development. Dr. A.T. Mosher has included transport as one of the universal requirements for agricultural development.[14] The chief contribution of the transport facilities to the agricultural sector are

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14 A.T. Mosher (1965), Getting Agriculture Moving, The Agricultural Development Council, New York, p. 61.

summed up below.[15]

Transport facilities guarantee better prices for agricultural products and higher income levels for farmers. The introduction of transportation facilities make it possible for the farmers to take the farm products to big markets in the townships and sell for better prices. In the absence of transportation links, the farmers sell their products on the farm itself to middle-men at unreasonably low prices.

Agricultural production being a dispersed economic activity, transport facilities help the agriculturist to carry out farm operation more efficiently and economically. Manures, fertilizers, seeds and other inputs have to be reached to the farm from distant places, and output has to be transported to markets. If all these activities are to be carried on by head-loads, it would be too expensive and time consuming for the farmers.

Transport facilities open new areas for cultivation. Hitherto uncultivated land or under-utilized areas can be brought under cultivation, and thus help to extend the area under cultivation.

Transportation facilitates the growth of many agro-based industries. Many types of processing industries and industries that depend upon agricultural products would be started in the

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15 A.V. Daniel (1976), Strategy for Agricultural Development, Vora & Co. Publishers Pvt. Ltd., Bombay, pp. 75-76.

countryside, if good transport links are created. The transportation facilities would accelerate the process of concurrent growth between agriculture and industrial sector.

By assuring higher income-levels to farmers and by giving commercial orientation to agriculture, the transportation facilities motivate the peasants to use modern inputs.

In spite of these contributions to agricultural sector, they also help in exploiting forest and mineral resources and also developing heavy metallurgical industries.

After summing up the manifold contribution of transport, let us examine the position of Bihar in road transport. The road mileage density is often a measure of the economic development of a region. Bihar has 141.7 miles of road[16] per 1000 square miles of its area. During the decade 1961-71, the road mileage density[17] in Bihar has registered a high positive rate of growth about +37.04 per cent, as a result it has increased from 103.4 in 1960-61 to 141.7 miles in 1970-71. A similar pattern of increase is observed in all the districts of Bihar,[18] Hazaribagh being sole exception where it has increased from 92.9 in 1960-61 to 86.1 miles in 1970-71, on account of a negative rate of growth of about -7.32 per cent. On account of a

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16 For the present study only P.W.D. roads have been taken into consideration.

17 Road Mileage Density refers to the miles of road per 1000 square miles of the area.

18 See Table No. 31.

BIHAR—P.W.D. ROAD MILEAGE DENSITY PER 1000 SQUARE MILES

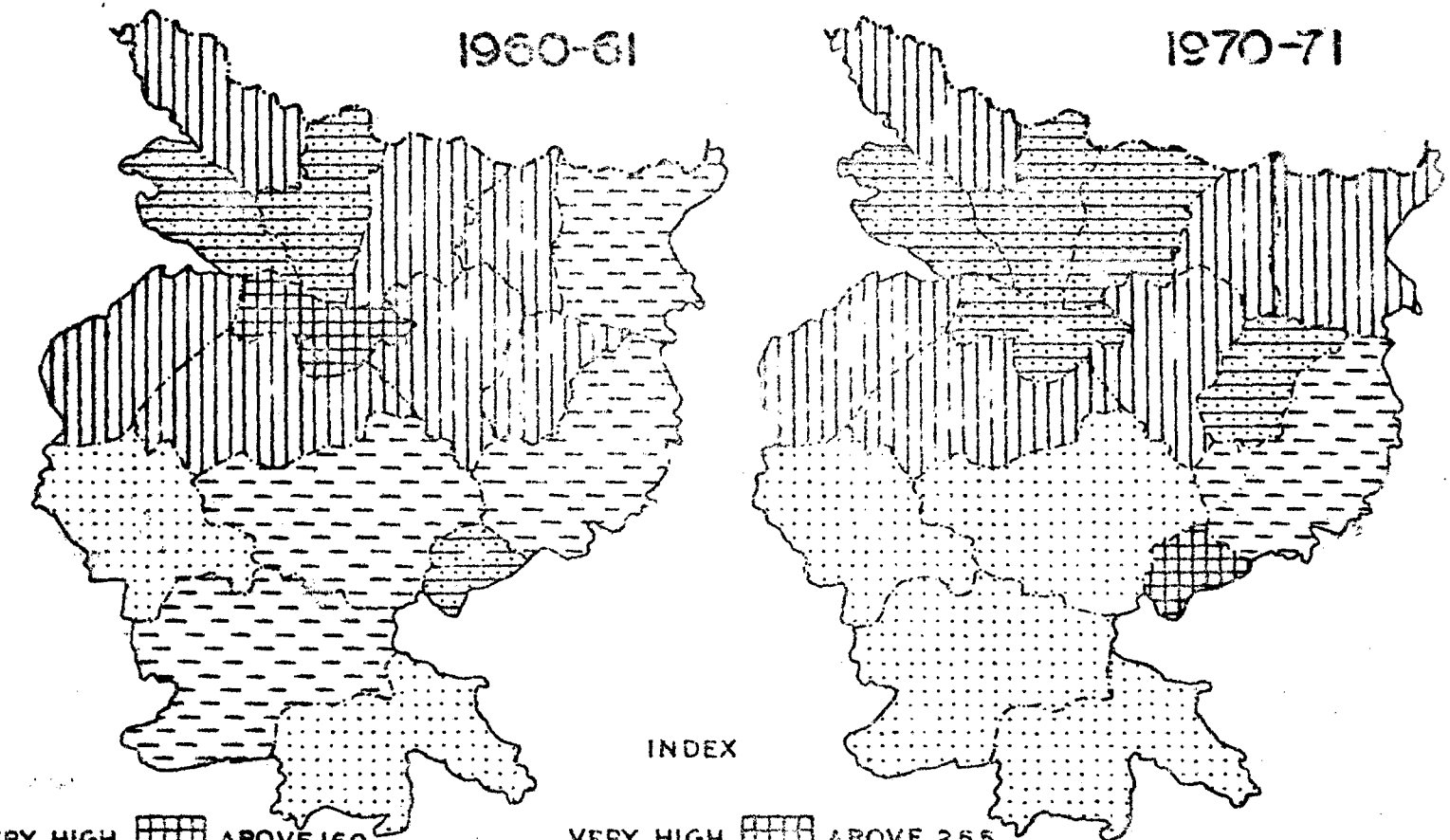

Figure No. 30

Table - 31

Table showing the road mileage density and its percentage rate of growth during 1960-61 and 1970-71.

Districts	P.W.D. Road mileage density per 1000 square miles		Percentage rate of growth in road mileage density
	1960-61	1970-71	1961-71
1. Patna	190.4	252.8	+ 32.77
2. Gaya	109.5	138.9	+ 26.85
3. Shahabad	109.1	132.5	+ 21.45
4. Saran	143.5	223.7	+ 55.89
5. Champaran	119.6	155.1	+ 29.68
6. Muzaffarpur	158.1	200.1	+ 26.57
7. Darbhanga	114.8	209.0	+ 82.06
8. Monghyr	113.7	149.9	+ 31.84
9. Bhagalpur	108.1	189.2	+ 75.02
10. Saharsa	101.8	156.2	+ 53.44
11. Purnea	83.8	132.5	+ 58.11
12. Santhal Parganas	92.3	128.7	+ 39.44
13. Palamau	73.7	89.9	+ 21.98
14. Hazaribagh	92.9	86.1	- 7.32
15. Ranchi	85.1	96.9	+ 13.87
16. Dhanbad	138.2	404.8	+192.91
17. Singhbhum	64.5	102.1	+ 58.29
BIHAR	103.4	141.7	+ 37.04

Source: Bihar Statistical Hand Book - 1971, Directorate of Statistics and Evaluation, Government of Bihar.

high positive rate of growth, the distribution pattern of road mileage density has slightly changed during this decade (see Figure No. 30).

In the districts of North and South Bihar Plains the road mileage density is comparatively higher than the districts of Chhotanagpur, except Dhanbad. An important factor affecting the road mileage density appears to be the nature of terrain. In the districts of North and South Bihar the road mileage density is higher, because of the presence of dead level plain where the construction of roads is comparatively easier. On the other hand in the districts of Chhotanagpur the road mileage density is low because of the presence of hilly terrain, escarped slopes and dense forests, where it is difficult to construct roads. Dhanbad is the only district of Chhotanagpur Plateau where the road mileage density is very high (404.8 miles). It is mainly due to the development of a number of mining and other industries in the district.

The districts of Saran, Muzaffarpur and Darbhanga of North Bihar Plain and Patna and Bhagalpur of South Bihar Plain form one cluster (see Figure No. 30) where the road mileage density is comparatively high, ranging from 189.2 to 252.8 miles. It is interesting to note that these are the districts where the density of population is also very high. The districts of Darbhanga and Saran have registered a very high positive rate of growth about +82.06 per cent and 55.89 per cent respectively, as

a result in these districts the road mileage density has increased from 114.8 and 143.5 miles in 1960-61 to 209.0 and 223.7 miles in 1970-71. The district of Patna, with a road mileage density of 252.8 miles, ranks first in this cluster of districts but second in the state after Dhanbad. The district of Bhagalpur has also registered a very high positive rate of growth about +75.02 per cent during this decade, as a result in this district the road mileage density has increased from 108.1 miles in 1960-61 to 189.2 miles in 1970-71. The districts of Shahabad, Gaya and Monghyr of South Bihar Plain and Purnea, Saharsa and Champaran of North Bihar Plain form another cluster where the road mileage density is moderate (around the state average), ranging between 132.5 and 156.2 miles. In the three districts of Shahabad, Gaya and Purnea the road mileage density is below the state average, ranging between 132 and 139 miles. While in the rest of the districts of this group the road mileage density is fairly above the state average, ranging between 149 and 157 miles.

Dhanbad district of Chhotanagpur has the highest road mileage density in the state, about 404.8 miles. It has also registered a very high positive rate of growth, about +192.91 per cent in the road mileage density, as a result it has increased tremendously from 138.2 miles in 1960-61 to 404.8 miles in 1970-71. Except Dhanbad, in all the districts of Chhotanagpur the road mileage density is very low, fairly below the state

average. The district of Santhal Parganas form a separate pocket of low road mileage density, where it is 128.7 miles. On the other hand Singhbhum, Ranchi, Palamau and Hazaribagh form a cluster of districts where the road mileage density is very low, ranging only between 86 and 103 miles.

It is interesting to note that the road mileage density is very much coinciding with the population density and also it is generally high in the districts which are economically more developed. Thus, we may conclude that it is one of the important indicators of levels of development.

Chapter III

PROCESS OF DEVELOPMENT AND PATTERNS OF ASSOCIATION

Chapter III

PROCESS OF DEVELOPMENT AND PATTERNS OF ASSOCIATION

In order to know the process of development and patterns of association it becomes necessary to relate the basic data on agriculture, occupational patterns and socio-economic characteristics with one another. Such correlation, if made at the 'Anchal or Block' level would have yielded interesting results, and possibly shown some more realistic link between them. This was beyond the scope of the present study because of the time constraints and non-availability of secondary data without field visits. We had, therefore, to content ourselves with a comparison at the district and regional level only.

3.1 Density of Population

In Bihar the distributional pattern of the density of population is very much related with the physical features, such as nature of terrain, forest cover, rainfall, soil, etc. It is at once evident with the fact that the districts of North and South Bihar Plain with level plains and least forest cover have the highest density of population. On the other hand the districts of Chhotanagpur Plateau with rugged terrain and high percentage of forest cover have the lowest density of population, Dhanbad being the sole exception. Dhanbad is the only district in which mining and industrialization have really made visible impact on population density. Even among the districts in the plains such as Saran, Muzaffarpur, Darbhanga and Patna belong to

one density pattern (see Figure No. 26), while Shahabad, Gaya, Monghyr, Bhagalpur, Purnea, Saharsa and Champaran belong to another. An important factor responsible for depressing the average densities of districts in the latter group is the mixed nature of their terrain and comparatively higher forest cover.

Fertile soil with its greater productivity naturally favours high concentration of population. But it is ineffective unless it is supported by adequate rainfall or irrigation facilities. Although the normal annual rainfall has shown a negative correlation (-.57) with density of population, it is interesting to observe that many of the districts, Muzaffarpur, Darbhanga, Saharsa, Purnea, etc., with poor irrigation facilities are high up in the density list. This explains that it is mainly due to fertile soil supported by adequate rainfall. However, mere adequacy of rainfall as in Chhotanagpur region can not by itself lead to greater productivity in otherwise poor type of soil, and this explains why the comparative distribution of population in the Chhotanagpur region is not much affected despite heavy rainfall.

A correlation of density and crops attempted in 1901 led to the conclusion that "the tracts which can support most people are those where rice is grown".[1] A correlation of density

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1 Government of India (1961), Census of India, Bihar, vol. IV, Part I-A (i), General Report on the Census, The Manager of Publications, Delhi, p. 82.

and crops[2] has been also worked out for the present study and found that the rice acreage is negatively correlated (-0.35), and rice yield which is positively correlated (0.17) is also insignificant. Thus the conclusion of 1901 seems to have no validity at present time (1970-71). It is interesting to note that in 1970-71 both wheat acreage and yield have shown positive correlation,[3] 0.50 and 0.43 respectively, with the density of population, which are also significant at 95 per cent and 90 per cent level of confidence respectively. However, on this basis we may conclude that "now the wheat growing areas may support more people." But in case of Muzaffarpur, Darbhanga and Dhanbad districts it also does not have any decisive effect on the density pattern.

It is remarkable to observe that except Dhanbad in almost all the districts of Bihar, there is high positive correlation between the percentage of net area sown and density of population. The four top districts, Patna (77.2 per cent), Muzaffarpur(73.6 per cent), Saran (71.2 per cent) and Darbhanga (69.8 per cent), in the percentage of net area sown to total area of the district are also top districts in regard to the density of population in the same order with 643, 618, 616 and 603 persons per square kilometre respectively. On the other hand the five districts of

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2 Crops include only major crops, such as Rice, Wheat and Maize.

3 See Appendix IV.

Chhotanagpur, Santhal Parganas, Ranchi, Singhbhum, Palamau and Hazaribagh, having low percentage of net area sown (ranging between 41 and 19) are also having the low density of population (ranging between 226 and 119 persons per square kilometre), below the state average. None of the districts (except Dhanbad with 28.6 per cent and Monghyr with 48.5 per cent) having higher density of population than the state average has less than 53 per cent of net area sown in 1970-71. A similar correlation is also observed between the percentage of area sown more than once and the density of population.

A reliable index to the pressure of population in any area is provided by the per capita availability of cultivated land. This is particularly true of predominantly agricultural and less industrialized areas such as Bihar. While the average for the state as a whole is 0.48 acres, it is much lower in the districts of Dhanbad (0.15), Hazaribagh (0.32), Darbhanga (0.37), Saran (0.38), Muzaffarpur (0.39), Monghyr (0.39), Singhbhum (0.43) and Patna (0.44). Dhanbad, incidentally, has as low a ratio as 0.15 acres but with over 64 per cent of its working population engaged in non-agricultural pursuits, it should not be a cause for any great anxiety. The same observation applies to Singhbhum and Hazaribagh, though with less force.

Irrigation helps to improve the capability of land to support population by making up deficiencies in the extent and distribution of rainfall. As irrigation has shown a very positive

low correlation (0.19) with density of population, it is difficult to conclude that there is any decisive effect of irrigation on the density pattern of population in the state. However, we may say that to some extent, certainly, irrigation has affected the density pattern in the state, especially in case of the rain deficient districts of South Bihar Plain.

A high density of population accompanied by a low proportion of workers is bound to accentuate the struggle for existence and lower the standard of living. It is seen that the districts of Muzaffarpur, Saran and Darbhanga combine both the characteristics. An obvious explanation for this is furnished by the emigration of the significant portion of the working population. The proportion of workers is comparatively high in the Chhotanagpur area because of its large tribal population among whom there is much higher participation of females in economic activities than among the non-tribal people. Thus the high proportion of workers accompanied by the low density of population in the districts of Chhotanagpur explain their better economic position in the state.

The road mileage density has shown a high positive correlation (0.71) with the density of population,[4] which is also significant at 99 per cent level of confidence. This could be expected particularly because of the association between low

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4 Ibid.

productivity and population density. It is at once evident with the fact that the five top districts of Dhanbad, Patna, Saran, Darbhanga and Muzaffarpur in road mileage density are also top districts in regard to density of population, though not in the same order. On the other hand, the five districts of Chhotanagpur, such as Santhal Parganas, Singhbhum, Ranchi, Palamau and Hazaribagh, having low road mileage density are also having the low density of population. It is remarkable that the proportion of road mileage to area is higher than the state average in all the high density districts except Gaya, Shahabad and Purnea. It is also remarkable that none of the low density districts has higher ratio of road mileage than the state average.

3.2 Literacy

In Bihar literacy has shown a high positive correlation (0.76) with urbanization, which is significant even at 99 per cent level of confidence. This high positive correlation between the levels of literacy and urbanization is quite evident in most of the districts of Bihar. For example, the three top districts in literacy - Patna, Dhanbad and Singhbhum - are also top districts in regard to urbanization, though not in the same order. On the other hand, the three districts with low literacy - Champaran, Palamau and Saharsa - are also the least urbanized districts in the state. This phenomenon is quite understandable because urban areas have better educational facilities and greater diversification of the economy in trade, professions and

occupations, particularly those in which literacy is a sine qua non. The district of Shahabad, however, does not quite fit into this pattern. Though its urbanization level (8.2 per cent) is comparatively low, it has a fairly high rank (3rd) in literacy (27.1 per cent) in the state. The explanation, perhaps lies in a number of factors such as proximity to Patna and relatively smaller proportion of Scheduled Castes and Scheduled Tribes in the district. Hazaribagh affords an example of the converse type, that is, a district with relatively high level of urbanization (12.9 per cent) but low level of literacy (16.4 per cent, 12th rank in the state). It may be noted that nearly one-fourth of the population of Hazaribagh district comprises of persons belonging to the Scheduled Castes and Scheduled Tribes, among whom literacy is generally low. It is true that Ranchi and Singhbhum have much higher percentage of Scheduled Castes and Scheduled Tribes (62.9 and 49.7 per cent respectively) but in their cases the literacy rates do not seem to be affected because of widespread influence of Christian missionaries who have penetrated deep into the area and provide great fillip to the cause of literacy.

Literacy has shown a high negative correlation (-0.72) with primary sector in Bihar. On the other hand it has shown a high positive correlation with tertiary sector (0.92) and secondary sector (0.59). It means that with an increase in literacy percentage the proportion of workers engaged in tertiary and secondary sectors may increase. It is interesting to note

that literacy has shown a comparatively higher positive correlation with tertiary sector than the secondary sector, which leads to the conclusion that the increase in the proportion of workers in tertiary sector may be comparatively higher than the secondary sector. Among secondary sector household industry has shown negative correlation (-0.43) with it, while manufacturing industry has shown a positive correlation (0.22). It means that among secondary sector the chances of increase in proportion of workers are greater in manufacturing industry. Among tertiary sector only transport and storage have shown a positive correlation (0.51) with it. It means that with increase in the percentage of literacy the chances of increase in the proportion of workers in transport and storage are greater than the other categories of tertiary sector.

Literacy has also shown a positive correlation (0.48) with the density of road mileage. It appears that the literacy is somewhat affected by road mileage density, in other words with an increase in road mileage density there is some possibility of increase in literacy in the state. Thus we may say with confidence that literacy is both the cause and the effect of social and economic development.

3.3 Scheduled Castes and Scheduled Tribes

In 1961 the proportion of Scheduled Castes and Scheduled Tribes was highly correlated[5] (r= 0.87) with the proportion of

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5 See Appendix V.

total workers. That is why it was said that in the districts of Chhotanagpur the high proportion of workers is due to the high proportion of Scheduled Castes and Scheduled Tribes. But in 1971 the proportion of Scheduled Castes and Scheduled Tribes has shown a weak correlation[6] (r= 0.29) with the proportion of total workers. This leads to the conclusion that although there is some relationship between the proportion of Scheduled Castes and Scheduled Tribes and the proportion total workers, the fact remains that several other factors also operate in order to determine the proportion of total workers in the state. It is clear with the fact that the districts of Saharsa and Champaran with low proportion of Scheduled Castes and Scheduled Tribes (17.1 per cent and 14.8 per cent respectively) have comparatively high proportion of total workers (35.30 per cent and 33.88 per cent respectively) in the state.

It is interesting to observe that there is a high positive correlation (r= 0.69) between the Scheduled Castes and Scheduled Tribes and the cultivators. For example, in all the districts of Chhotanagpur and Gaya district of South Bihar Plain the percentage of both the cultivators and the Scheduled Castes and Scheduled Tribes is above the state average. On the other hand, the districts of Darbhanga, Champaran and Bhagalpur having the lowest percentage of Scheduled Castes and Scheduled Tribes, are

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6 See Appendix IV.

also having the lowest percentage of cultivators in the state, though not in the same order. However, the district of Saran does not fit into this pattern, i.e. though it has the lowest percentage of Scheduled Castes and Scheduled Tribes (about 11.3 per cent) in the state, it has comparatively high percentage of cultivators (about 61.60 per cent of the total primary sector). This leads to the conclusion that most of the Scheduled Castes and Scheduled Tribes participating in economic activity are as cultivators. On the other hand the percentage of Scheduled Castes and Scheduled Tribes has shown some weak positive correlations[7] with manufacturing industry (r= 0.28), transport and storage (r= 0.35) and other services (r= 0.17). It reveals that although Scheduled Castes and Scheduled Tribes participate in all kinds of economic activities, their participation rate in secondary and tertiary activities is comparatively less.

The percentage of Scheduled Castes and Scheduled Tribes has shown a very weak positive correlation with literacy (r= 0.11). This reflects upon the variations in the utilization of some of the available services and facilities among different sections of the people in the state. It has also shown a weak positive correlation with urbanization (r= 0.23). This indicates that most of the Scheduled Castes and Scheduled Tribes are rural people, which may partly explain low literacy among them.

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7 Ibid.

3.4 Urbanization

Urbanization has shown a comparatively high positive correlation (r= 0.59) with road mileage density in the state. It is evident only in case of Dhanbad, Patna, Monghyr and Bhagalpur districts where both the proportion of urban population and the road mileage density are above the state average or comparatively high. The districts of Singhbhum, Ranchi and Hazaribagh do not fit into this pattern. In these districts high degree of urbanization is accompanied by low road mileage density. The districts of Saran, Muzaffarpur, Darbhanga and Saharsa afford an example of the converse type. These are the districts where low urbanization is accompanied by relatively high road mileage density. Thus we come to the conclusion that although there is some relationship between urbanization and road mileage density, the fact remains that there are some other factors also which determine the pattern of road mileage density in the state.

Urbanization has shown a very high negative correlation[8] (r= -0.97) with primary sector. It indicates that with increasing urbanization the proportion of workers engaged in primary sector may go on decreasing. While on the other hand, it has shown a very high positive correlation with secondary and tertiary sectors (r= 0.93 and 0.90 respectively). It indicates

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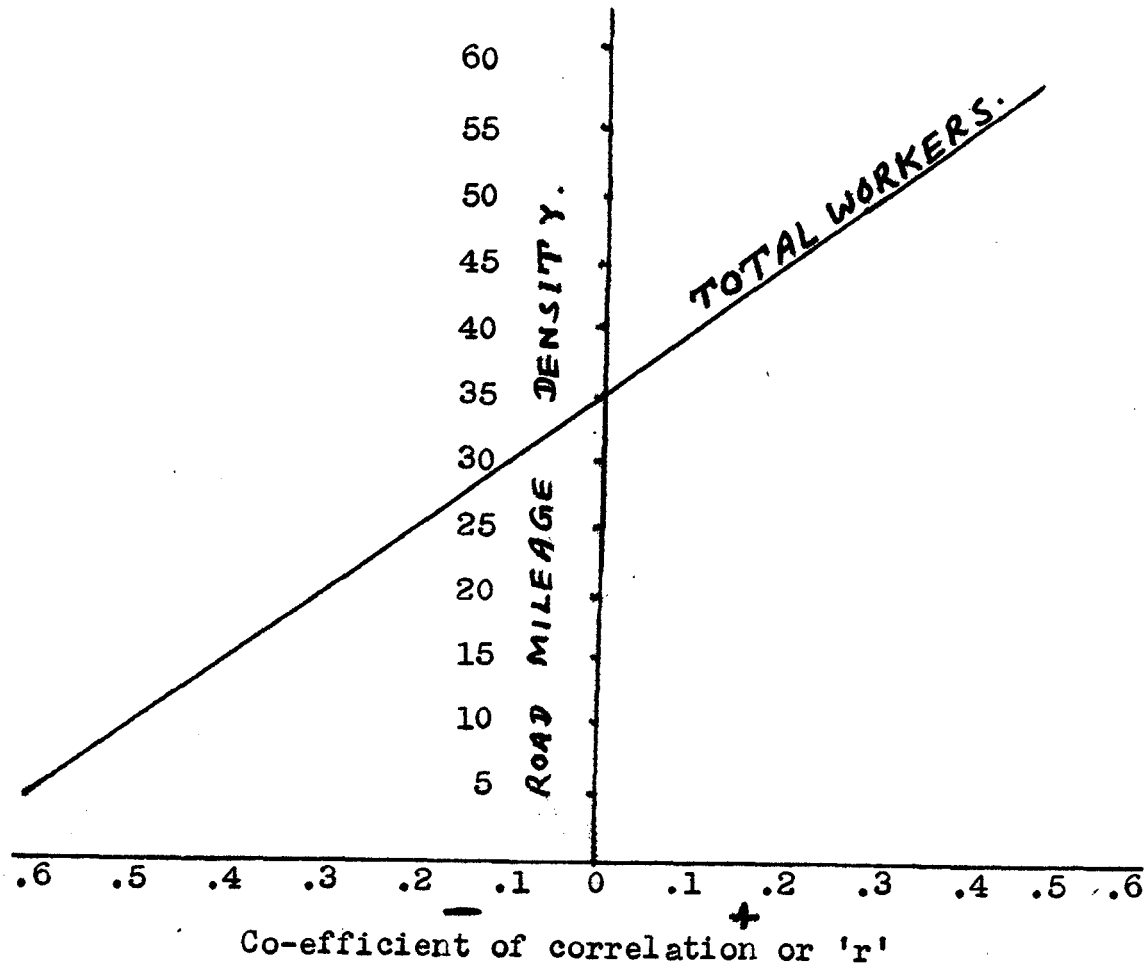
8 See Appendix IV.

that with an increase in urban population, the chances of increase in the proportion of workers in secondary and tertiary sectors are more. This phenomenon is understandable, because in urban areas generally secondary and tertiary activities are carried on.

3.5 Density of Roads

The correlation between road mileage density and total workers has declined from -0.62 in 1961 to -0.03 in 1971,[9] which is a happy trend (see diagram below).



9 See Appendix IV and V.

This leads to the conclusion that a positive relationship between road mileage density and participation in economic activity (or the proportion of total workers) can not be altogether denied, but the fact remains that several other factors also operate in order to determine the pattern of participation in economic activity. These would seem to explain the relatively high road mileage density in Saran, Muzaffarpur and Darbhanga not being accompanied by correspondingly high participation rates in them.

The primary sector comprising mainly workers in agriculture, dominates the scene everywhere in the state. The relatively high road mileage density in Saran, Muzaffarpur and Darbhanga being accompanied by correspondingly high proportion of workers engaged in primary sector on one hand, and relatively low road mileage density in Singhbhum, Ranchi and Hazaribagh being accompanied by correspondingly low proportion of workers engaged in primary sector on the other hand, are likely to give an erroneous impression that high road mileage density go hand in hand with high participation rate in the primary sector and vice-versa. But this erroneous impression is at once removed when we see the correlation matrix[10] and find that the road mileage density has shown a comparatively high negative correlation (r= -0.66) with primary sector.

In the districts of Dhanbad and Patna relatively high road

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10 See Appendix IV.

mileage density is accompanied by correspondingly high proportion of workers in tertiary and secondary sectors. While in Palamau district low road mileage density is accompanied by low proportion of workers in secondary and tertiary sectors. The districts of Saran, Muzaffarpur and Darbhanga do not quite fit into this pattern. In these districts high road mileage density is accompanied by low proportion of workers in secondary and tertiary sectors. The districts of Ranchi, Singhbhum and Hazaribagh afford an example of converse type, i.e. in those districts low road mileage density is accompanied by comparatively high proportion of workers in secondary and tertiary sectors. But on the whole the road mileage density has shown a comparatively high positive correlation with secondary and tertiary sectors in the state (r= 0.63 and 0.62 respectively), which indicates that an increase in road mileage density may lead to more participation of workers in secondary and tertiary activities.

Road mileage density has also shown though weak but positive correlation[11] with cultivated area as percentage of cultivable land, acreages and yields of rice, wheat and maize. It appears that with an increase in road mileage density there is some possibility of an overall growth of agriculture in the state.

3.6 Occupational Patterns

So far as a shift or change in occupational pattern is

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11 Ibid.

concerned, it is very difficult to decide because of the change in the definition of worker in 1971. However, on the basis of proportion of workers, we may say that the primary sector, with 83.22 per cent of total workers, is the most predominant in the state. Comprising mainly workers in agriculture, it dominates the scene everywhere. It is followed by the tertiary and secondary sectors, with 9.66 per cent and 7.11 per cent of the total workers respectively.

So far as pattern of association is concerned, it is interesting to note that the districts of Saharsa, Champaran, Palamau, Purnea, Darbhanga and Muzaffarpur with comparatively very high proportion of workers in primary sector (88 per cent and above) have comparatively very low proportion of workers in secondary sector (below 4 per cent) and tertiary sector (below 8.1 per cent). On the other hand the districts of Dhanbad, Singhbhum, Patna, Hazaribagh and Ranchi with comparatively very low proportion of workers in primary sector have comparatively very high proportion of workers in secondary and tertiary sectors. This pattern of association becomes even more clear when we see the correlation matrix[12] and find that the primary sector has shown a comparatively very high negative correlation with secondary and tertiary sectors (r= -0.98 and -0.87 respectively). On this basis we may conclude that with increase in the proportion of workers in secondary and tertiary sectors, the

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12 Ibid.

proportion of workers in primary sector will go on decreasing.

Primary sector has shown a comparatively high positive correlation with household industry of secondary sector and other services of tertiary sector (r= 0.78 and 0.64 respectively). In the districts where the proportion of workers in primary sector is high, the proportion of workers in household industry[13] and other services[14] is also high. On the other hand, in the districts where the proportion of workers in primary sector is low, the proportion of workers in household industry and other services is also low. However, the districts of Purnea, Ranchi and Hazaribagh do not quite fit into this pattern in case of other services. In Purnea district a comparatively high proportion of workers in primary sector is accompanied by a comparatively low proportion of workers in other services. While in Ranchi and Hazaribagh districts a comparatively low proportion of workers in primary sector is accompanied by a comparatively high proportion of workers in other services.

It is interesting to observe that there is a comparatively high positive correlation (r= 0.76) between the proportion of workers in secondary sector and tertiary sector. The districts of Dhanbad, Singhbhum, Hazaribagh, Ranchi and Patna with comparatively high proportion of workers in secondary sector have

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13 The proportion of workers engaged in household industry is to the total secondary sector.

14 The proportion of workers engaged in other services is to the total tertiary sector.

comparatively high proportion of workers in tertiary sector. On the other hand, the districts of Saharsa, Purnea, Champaran and Palamau with comparatively low proportion of workers in secondary sector have comparatively low proportion of workers in tertiary sector. However, the district of Shahabad does not fit into this pattern. In this district comparatively low proportion (6.32 per cent) of workers in secondary sector is accompanied by comparatively high proportion (11.69 per cent) of workers in tertiary sector. On the basis of a comparatively high positive correlation between secondary and tertiary sectors we may say that the increase in proportion of workers in secondary and tertiary sectors may go on side by side.

The proportion of workers in transport and storage has also shown a comparatively high positive correlation with secondary and tertiary sectors (r= 0.85 and 0.66 respectively). It is clear by the fact that in the districts where the proportion of workers in secondary and tertiary sectors is high, the proportion of workers in transport and storage is also high and vice-versa. The districts of Santhal Parganas and Shahabad do not fit into this pattern. In the district of Santhal Parganas comparatively low proportion of workers in secondary and tertiary sectors is accompanied by a comparatively high proportion of workers in transport and storage. While in the district of Shahabad a comparatively high proportion of workers in secondary and tertiary sectors is accompanied by comparatively low proportion

of workers in transport and storage.

3.7 Agriculture - Irrigation

Irrigation is one of the most important infrastructures which supports the agricultural development. It is interesting to observe that in most of the districts there is some correlation between the proportion of gross area irrigated and net area sown. For example, the districts of Patna and Shahabad with comparatively high proportion of gross irrigated area (above 51 per cent) have comparatively high proportion of net area sown (above 67 per cent). On the other hand, the districts of Ranchi, Dhanbad, Singhbhum, Hazaribagh and Santhal Parganas of Chhotanagpur Plateau with comparatively low proportion of gross irrigated area (8.8 per cent and below) have comparatively low proportion of net area sown (below 40.5 per cent). However, the districts of Muzaffarpur, Purnea and Darbhanga do not quite fit into this pattern, that is, in these districts a comparatively low proportion of gross irrigated area (below 10.5 per cent) is accompanied by a comparatively high proportion of net area sown (above 66 per cent). The districts of Palamau and Gaya afford an example of converse type. In Palamau district a comparatively moderate proportion of gross irrigated area (21.4 per cent) is accompanied by a comparatively low proportion of net area sown (21.4 per cent). While in Gaya district a comparatively very high proportion of gross irrigated area (63.7 per cent) is accompanied by a comparatively moderate proportion of net area

sown (58.5 per cent).

A similar pattern of association is also observed between the proportion of gross irrigated area and area sown more than once. For example, the two top districts in the proportion of area sown more than once - Patna and Shahabad - are also top districts in regard to the proportion of gross irrigated area, though not in the same order. On the other hand, the five districts of Chhotanagpur - Ranchi, Dhanbad, Singhbhum, Hazaribagh and Santhal Parganas - with comparatively low proportion of gross irrigated area (8.8 per cent and below) have comparatively low proportion of area sown more than once[15] (below 6 per cent). However, the districts of Muzaffarpur, Purnea and Darbhanga do not quite fit into this pattern, that is, in these districts a comparatively low proportion of gross irrigated area (below 10.5 per cent) is accompanied by a comparatively high proportion of area sown more than once (22 per cent and above). The districts of Gaya and Palamau afford an example of converse type. In Gaya district a comparatively very high proportion of gross irrigated area (63.7 per cent) is accompanied by a comparatively moderate proportion of area sown more than once (16.9 per cent). While in the district of Palamau a comparatively moderate proportion of gross irrigated area (21.4 per cent) is accompanied by a comparatively low proportion of

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15 The percentage of area sown more than once is to total area.

area sown more than once (5.2 per cent). Thus we may conclude that the increased irrigation facilities may lead to more intensification of cultivation in the state.

The proportion of gross irrigated area has shown a negative correlation with rice and maize acreage[16] (r= -0.36 and -0.17 respectively). It indicates that with an increase in irrigation facilities, there is no possibility of an increase in the acreage of rice and maize. This phenomenon is understandable because rice and maize are generally grown during rainy season when irrigation is not needed. It is interesting to note that the proportion of gross irrigated area has shown a positive correlation with wheat acreage and also yields of rice and wheat (r= 0.61, 0.46 and 0.32 respectively). It indicates that increased irrigation facilities may lead to an increase in wheat acreage and also in yields of rice and wheat. Thus we come to the conclusion that irrigation is the most important factor which supports the agricultural development. Therefore, special attention should be given to increase the irrigation facilities in the state.

3.8 Normal Rainfall

There is some positive correlation between rice acreage and normal rainfall (r= 0.49). For example, the districts of Dhanbad, Santhal Parganas, Ranchi,

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16 See Appendix IV.

Singhbhum and Purnea with comparatively high annual normal rainfall (above 1310 mm) have comparatively high proportion of area under rice (above 53 per cent). On the other hand, the districts of Patna, Shahabad, Saran, Bhagalpur, Muzaffarpur and Monghyr with comparatively low annual normal rainfall (below 1207 mm) have also comparatively low proportion of area under rice (below 45 per cent). However, the districts of Saharsa and Palamau do not quite fit into this pattern, that is, in these districts a comparatively high annual normal rainfall (1385.4 and 1335.1 mm respectively) is accompanied by a comparatively low proportion of area under rice (40.93 per cent and 29.99 per cent respectively). The district of Gaya affords an example of converse type, that is, in this district a comparatively low annual normal rainfall (1150.8 mm) is accompanied by a comparatively high proportion of area under rice (53.06 per cent).

Annual normal rainfall has shown a negative correlation with wheat and maize acreage and also cultivated area as percentage of cultivable land (r= -0.51, -0.34 and -0.40 respectively). It has also shown a negative correlation with the yields of rice, wheat and maize (r= -0.44, -0.20 and -0.09 respectively). It is clear by the fact that the yields of rice, wheat and maize and also the proportion of area under wheat, maize and cultivated area are low in the districts where annual normal rainfall is high. This leads to the conclusion that there are other factors which operate in order to determine the proportion of area under

wheat, maize and cultivated area and also the yields of rice, wheat and maize in the state.

3.9 Rice

Rice acreage has shown a comparatively high negative correlation with wheat and maize acreage and also cultivated area as percentage of cultivable land (r= -0.69, -0.67 and -0.45 respectively). It indicates that in the districts where the proportion of area under wheat, maize and cultivated area is comparatively high the proportion of area under rice is comparatively low and vice-versa. Rice acreage has shown a very weak positive correlation with rice yield (r= 0.08). It also indicates that the districts with comparatively high proportion of area under rice do not have comparatively high per hectare yield of rice. For example, except Palamau, in all the districts of Chhotanagpur where the proportion of area under rice is comparatively high (ranging between 55 per cent and 84 per cent) the per hectare yield of rice is comparatively low (ranging between 683 and 813 kilogrammes per hectare) below the state average.

3.10 Wheat

Wheat acreage has shown a comparatively high positive correlation (r= 0.75) with cultivated area as percentage of cultivable land. It means that the proportion of area under wheat is generally high in the districts where the proportion of cultivated area is high and vice-versa. Wheat acreage has also shown a

comparatively high positive correlation with per hectare yield of wheat (r= 0.56). It means that the districts with comparatively high proportion of area under wheat have also comparatively high per hectare yield of wheat. This leads to the conclusion that the cropping pattern which has emerged in 1970-71 (in respect of wheat) is the most suitable one.

3.11 Maize

Maize acreage has shown a weak positive correlation (r= 0.12) with the per hectare yield of maize. It means that the districts with comparatively high proportion of area under maize generally do not have comparatively high per hectare yield of maize.

3.12 Net Area Sown and Area Sown More Than Once

In Bihar the distributional pattern of the proportion of net area sown and area sown more than once is very much related to the physical features, such as nature of terrain and soil etc. For example, all the districts of North and South Bihar Plains with fertile alluvial soil have comparatively high proportion of net area sown and area sown more than once (above 53 per cent and 15 per cent respectively), above the state. Monghyr is the only district of South Bihar Plain where the proportion of net area sown is below the state average (48.5 per cent). On the other hand, all the districts of Chhotanagpur with rugged terrain and less fertile soil have comparatively low

proportion of net area sown and area sown more than once (below 41 per cent and 6 per cent respectively), below the state average.

Thus it is quite clear from the above discussion that how the factors contributing to the development are associated with one another in Bihar as a whole or in a particular district. For making development plans the knowledge of these associations are of prime importance. In other words, while making development plans one must keep in mind these associations and work accordingly.

Chapter IV

VARIATIONS IN LEVELS OF DEVELOPMENT: SPATIAL AND TEMPORAL (1961-1971)

Chapter IV

VARIATIONS IN LEVELS OF DEVELOPMENT: SPATIAL AND TEMPORAL (1961-1971)

The development means the act or process of exploiting the natural resources of a region. While discussing the levels of regional development we, generally, come across two words - inter-regional diversity and inter-regional disparity.[1] Differences in initial resource endowments, largely of a natural or physiographic character, leading to territorial specialisation and division of labour through exploitation of the resource advantages - comparative as well as absolute - constitute the basis and substance of inter-regional diversity, which is a concomitant of development. Inter-regional disparity, on the other hand, denotes the failure of a region to exploit the development potential of its initial resource endowments, its latent comparative and absolute resource advantages, relative to another comparable region, and is, therefore, comprised of factors which are not natural or physiographic, but human, institutional and historical - socio-political and/or economic-technological. Consequently, the former is neither the basis, nor the cause, of the latter. Essentially, inter-regional disparity is a consequence of the relative failure of a region to convert the initial resource endowments into economic resources, i.e., capital resources and

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1 Moonis Raza and Boudhayan Chattopadhyay (1975), "Regional Development: Analytical Framework and Indicators", Indian Journal of Regional Science, vol. 7, p. 11.

producing further resource.

Thus, the existence of inter-regional disparity in a country or state is a natural phenomenon. Generally, a region, where the pace of development is quicker, emerges as developed region. On the contrary, a region, where the pace of development is slower, emerges as an underdeveloped or backward region. Levels of development is a comparative term. Generally, a region or spatial unit (district) is considered less developed if per capita value of production of goods and services is less than the national or state average and vice versa. In this way, while discussing levels of regional development we examine the relative positions of regions in terms of their economic attainments.

The present chapter seeks to measure spatial variations in levels of development of Bihar at two time-points, 1961 and 1971, with the objective of deriving broad development approaches for each region. While spatial variations of levels of development of sectoral activities (e.g., agriculture, occupational patterns and socio-economic characteristics) at certain point of time give a broad idea about regional development, temporal variations of development levels of each spatial unit (district) indicate whether the spatial unit has shown dynamism or remained static, or even deteriorated with time.

4.1 Levels of Development in Agriculture

In agricultural group on the whole there are 12 variables.[2]

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2 See Data Base and Methodology.

While working out the composite index of agricultural development two variables - normal annual rainfall and percentage of area under forest - have not been taken into consideration, because they are not the indicators of agricultural development. Thus the composite index of agricultural development has been worked out only on the basis of rest 10 variables.[3]

Figure No. 31 clearly depicts that on an average the districts of South Bihar Plain are more developed in the field of agriculture in the state. They are followed by the districts of North Bihar Plain. While the districts of Chhotanagpur Plateau are the least developed in this field. This phenomenon is understandable, because the districts of Chhotanagpur have rugged terrain, less fertile soil, less irrigation facilities and more forest cover.

The districts of Patna, Shahabad, Saran and Champaran form one cluster where the agriculture is comparatively more developed. Muzaffarpur, Darbhanga, Gaya and Bhagalpur form another group of districts where agriculture is comparatively developed but not up to the extent of former group. Monghyr, Purnea and Saharsa form another cluster of districts where agriculture is moderately developed. Santhal Parganas, Palamau, Hazaribagh and Singhbhum form fourth group of districts where agriculture is comparatively less developed. And the districts of Ranchi and Dhanbad form last group where agriculture is the

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3 Ibid.

least developed.

It is interesting to observe that in both the years - 1960-61 and 1970-71 - the district of Patna has retained its first position in levels of agricultural development, while the district of Ranchi has retained its last position in this respect. Thus we may say that in the district of Ranchi the agricultural development has almost remained stagnant during this decade, while in the district of Patna the agricultural development has kept pace with other districts of the state, and thus it is retaining its position.

In the districts of Saran, Champaran, Muzaffarpur, Darbhanga, Purnea and Saharsa of North Bihar Plain and Palamau of Chhotanagpur Plateau the pace of agricultural development has been comparatively faster, as a result these districts have improved their positions during this decade.[4] In the districts of Saran, Champaran and Muzaffarpur the pace of agricultural development has been very fast, as a result these districts which were ranking 7th, 9th and 10th in 1960-61, are now (in 1970-71) ranking 3rd, 2nd and 5th in the state respectively. The district of Saran has improved its position during this decade on account of an increase in the percentages of cultivated area, net area sown, irrigated area and per hectare yields of rice and wheat. The district of Champaran has improved its position on account of increase in the percentages of cultivated area, area under wheat,

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4 See Table No. 32.

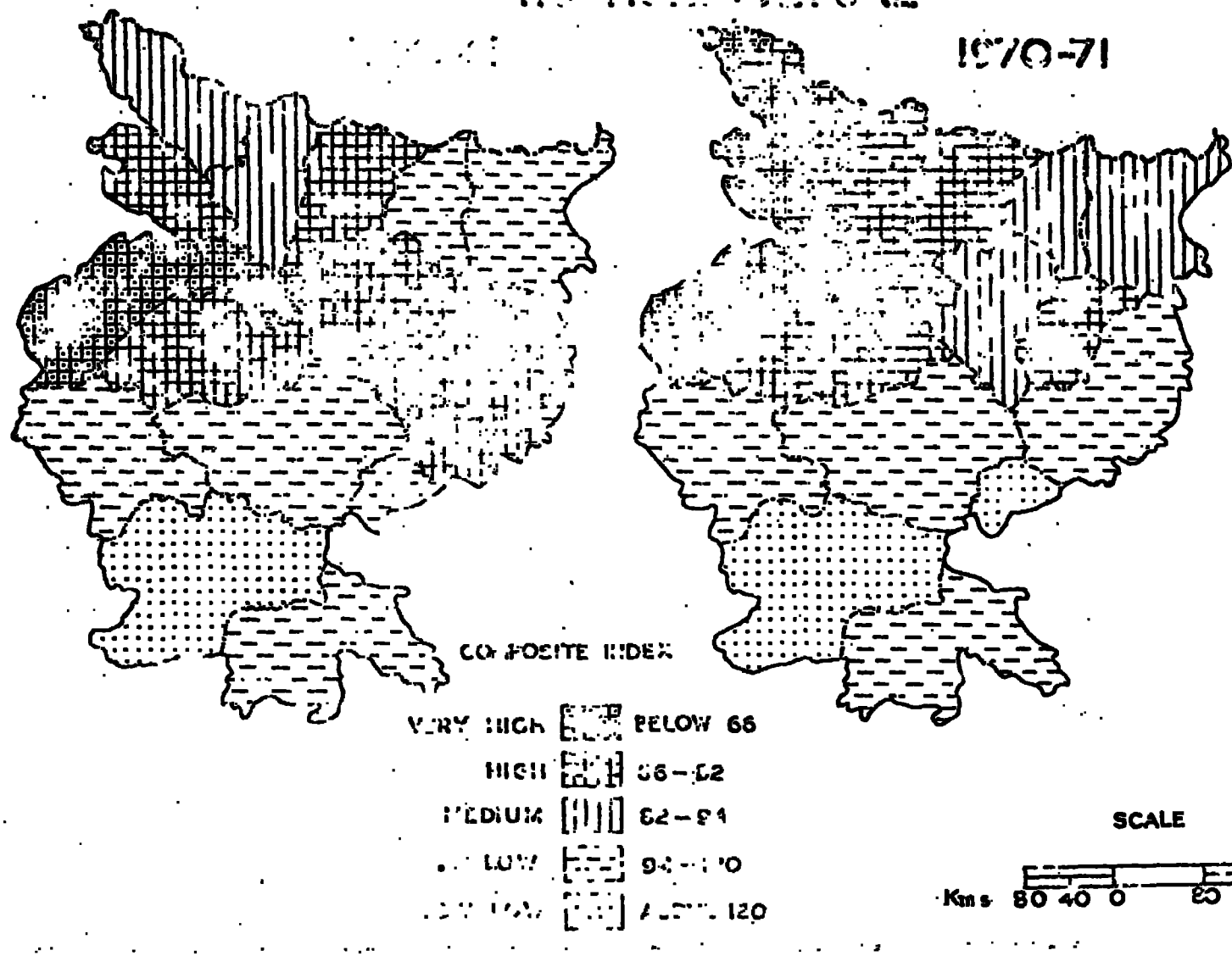
1970-71
COMPOSITE INDEX
VERY HIGH
BELOW 66
HIGH
66 – 82
MEDIUM
82 – 94
LOW
94 – 110
VERY LOW
ABOVE 120
SCALE
Kms 80 40 0 80 150 Kms

Figure No. 31

Table - 32

Table showing the levels of agricultural development during 1960-61 and 1970-71.

Districts	Rank of the districts	
	1960-61	1970-71
1. Patna	1	1
2. Gaya	3	6
3. Shahabad	2	4
4. Saran	7	3
5. Champaran	9	2
6. Muzaffarpur	10	5
7. Darbhanga	8	7
8. Monghyr	5	9
9. Bhagalpur	4	8
10. Saharsa	15	11
11. Purnea	11	10
12. Santhal Parganas	6	12
13. Palamau	16	13
14. Hazaribagh	13	14
15. Ranchi	17	17
16. Dhanbad	12	16
17. Singhbhum	14	15

area sown more than once, irrigated area and also per hectare yields of rice and wheat. While the district of Muzaffarpur has improved its position on account of increase in the percentage of area sown more than once and also per hectare yields of rice, wheat and maize. On account of increase in the percentages of cultivated area, area under wheat and irrigated area and also per hectare yields of rice and wheat the district of Darbhanga which was ranking 8th in 1960-61, is ranking 7th in 1970-71 in the state. While the district of Saharsa has improved its position from 15th in 1960-61 to 11th in 1970-71, on account of increase in the percentages of cultivated area, net area sown, area under rice and wheat, area sown more than once, irrigated area and also per hectare yields of rice and wheat. The district of Purnea has improved its position from 11th in 1960-61 to 10th in 1970-71 on account of increase in the percentages of cultivated area, net area sown, irrigated area and also per hectare yield of wheat. Palamau is the only district of Chhotanagpur Plateau, which has improved its position from 16th in 1960-61 to 13th in 1970-71, on account of its improved positions in respect of the percentages of area sown more than once, area under rice and maize and also in per hectare yields of rice and maize. Thus we find that in each and every district of North Bihar Plain irrigation has played an important role in the agricultural development.

On the other hand, the districts of Shahabad, Gaya, Bhagalpur, Monghyr, Santhal Parganas, Dhanbad, Hazaribagh and Singhbhum

have not kept pace with other districts of the state in the development of different fields of agriculture, as a result they have lost their positions[5] in levels of agricultural development. For example, the districts of Shahabad, Gaya, Bhagalpur and Monghyr of South Bihar Plain, which were ranking 2nd, 3rd and 5th in respect of levels of agricultural development in 1960-61, are ranking 4th, 6th, 8th and 9th in 1970-71 respectively in the state. Similarly, the districts of Santhal Parganas, Dhanbad, Hazaribagh and Singhbhum of Chhotanagpur Plateau, which were ranking 6th, 12th, 13th and 14th in respect of levels of agricultural development in 1960-61, are ranking 12th, 16th, 14th and 15th in 1970-71 respectively in the state.

4.2 Levels of Development in Occupational Patterns

In this group on the whole there are 12 variables. The levels of development in occupational patterns has been worked out on the basis of the percentage of total workers to total population, and the percentages of workers engaged in primary, secondary and tertiary sectors and the eight categories[6] of workers to total workers. While working out the levels of development in occupation patterns the workers engaged in mining,

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5 Ibid.

6 (i) Cultivators, (ii) Agricultural Labourers, (iii) Household Industry, (iv) Manufacturing other than household Industry, (v) Construction, (vi) Trade and Commerce, (vii) Transport, Storage and Communications and (viii) Other Services.

quarrying, livestock, forestry, fishing, hunting and plantation, orchards and allied activities have not been taken into consideration, because in 1961 they were regarded as one category of workers while in 1971 the workers engaged in mining and quarrying have been regarded as a separate category of workers.

Figure No. 32 clearly depicts that on an average the districts of South Bihar Plain are more developed in occupational patterns in the state. They are followed by the districts of Chhotanagpur Plateau. While the districts of North Bihar Plain are the least developed in this respect. This phenomenon is also understandable, because the districts of North Bihar Plain are mainly agricultural districts with low degree of urbanization, industrialization and literacy.

Dhanbad, Patna and Singhbhum form one group of districts (see Figure No. 32) which are comparatively more developed in respect of occupational patterns. The districts of Ranchi, Shahabad, Monghyr, Hazaribagh and Bhagalpur form another group of districts which are also developed in this respect but not up to the extent of former group. The districts of Gaya and Santhal Parganas form third group of districts which are moderately developed in respect of occupational patterns. Saran, Darbhanga, Purnea, Muzaffarpur and Champaran form fourth group of districts which are comparatively less developed in this respect. While Palamau and Saharsa form the fifth group of districts which are the least developed in respect of occupational patterns.

It is interesting to observe that in both the years - 1961 and 1971 - the districts of Singhbhum, Shahabad, Champaran and Palamau have retained their 3rd, 5th, 14th and 15th positions[7] respectively in levels of development of occupational patterns. It means that in the district of Singhbhum and Shahabad the development of occupational patterns has kept pace with other districts of the state, while in the districts of Champaran and Palamau it has been at a very slow rate or almost remained stagnant during this decade.

Dhanbad, Hazaribagh, Ranchi and Santhal Parganas are the only districts in the state where the pace of development in occupational patterns has been comparatively faster, as a result these districts have improved their positions[8] in respect of levels of development in occupational patterns. The district of Dhanbad which was ranking second in respect of levels of development in occupational patterns in 1961, is now (in 1971) ranking first in the state. It has improved its position on account of its improved ranks in respect of total workers, total primary, secondary and tertiary sectors, household industry, construction and trade and commerce. The district of Ranchi which was ranking 11th in respect of levels of development in occupational patterns in 1961, is now (in 1971) ranking 4th in

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7 See Table No. 33.

8 Ibid.

BIHAR-LEVELS OF DEVELOPMENT
IN OCCUPATIONAL PATTERNS

1961

1971

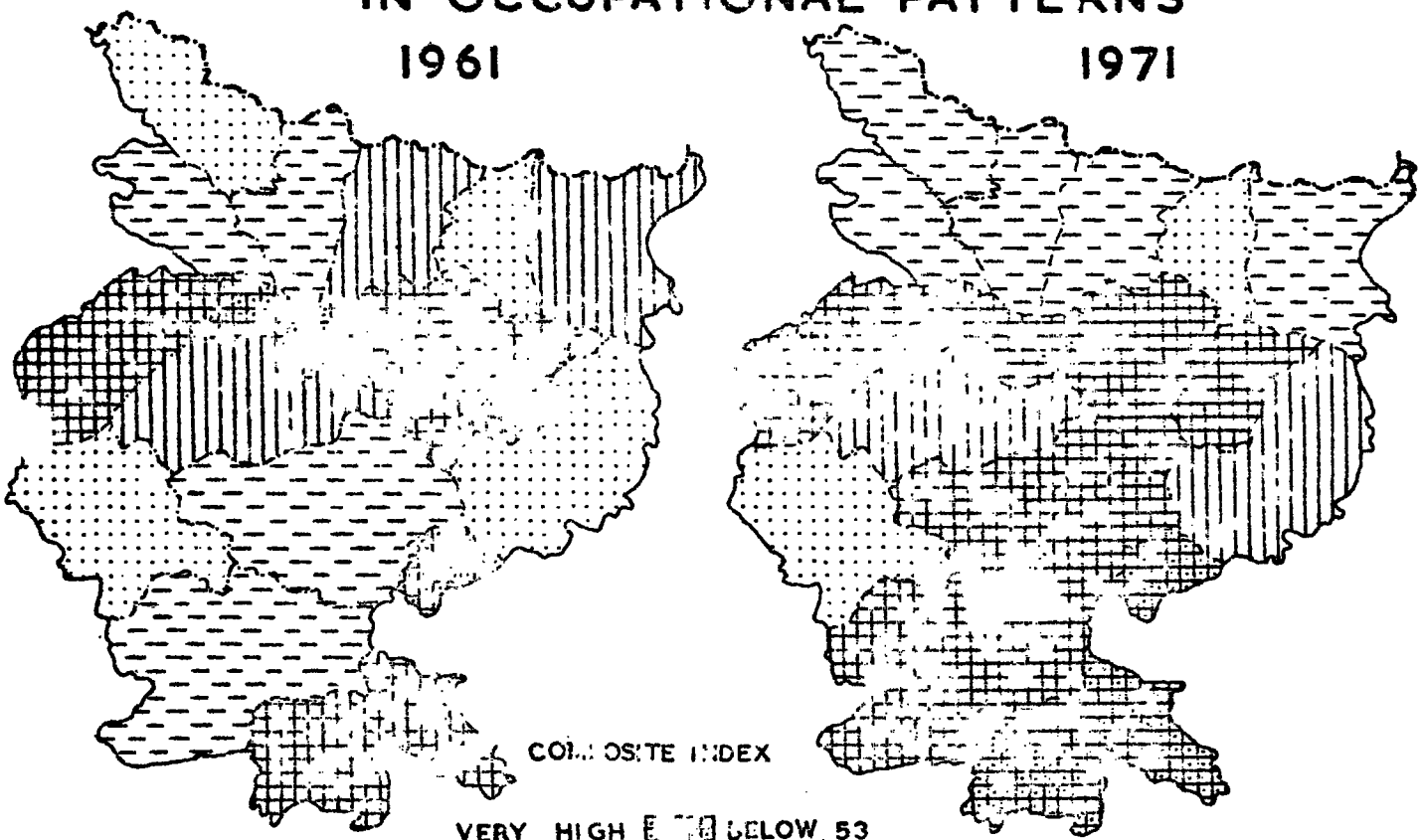

Figure No. 32

Table - 33

Table showing the levels of development in occupational patterns during 1961 and 1971.

Districts	Rank of the districts	
	1961	1971
1. Patna	1	2
2. Gaya	8	9
3. Shahabad	5	5
4. Saran	9	11
5. Champaran	14	14
6. Muzaffarpur	10	13
7. Darbhanga	7	12
8. Monghyr	4	6
9. Bhagalpur	4	8
10. Saharsa	12	16
11. Purnea	6	12
12. Santhal Parganas	13	10
13. Palamau	15	15
14. Hazaribagh	10	7
15. Ranchi	11	4
16. Dhanbad	2	1
17. Singhbhum	3	3

the state. It has improved its position on account of its improved ranks in respect of total primary, secondary and tertiary sectors, household and manufacturing industries, trade and commerce, transport, storage and communications and other services. The district of Hazaribagh which was ranking 10th in respect of levels of development in occupational patterns in 1961, is now (in 1971) ranking 7th in the state. It has improved ranks in respect of total primary, secondary and tertiary sectors, cultivators, agricultural labourers, household industry, construction, trade and commerce, transport, storage and communications and other services. The district of Santhal Parganas which was ranking 13th in respect of levels of development in occupational patterns in 1961, is now (in 1971) ranking 10th in the state. It has improved its position on account of its improved ranks in respect of total primary, secondary and tertiary sectors, household and manufacturing industries, construction, trade and commerce, transport, storage and communications and other services.

On the other hand, the districts of Patna, Monghyr, Bhagalpur and Gaya of South Bihar Plain, which were ranking Ist, 4th, 4th and 8th in respect of levels of development in occupational patterns in 1961, are now (in 1971) ranking 2nd, 6th, 8th and 9th respectively in the state. They have lost their positions mainly because they could not maintain their ranks in the different categories of workers during this decade.

Similarly, the districts of Purnea, Darbhanga, Saran, Muzaffarpur and Saharsa of North Bihar Plain, which were ranking 6th, 7th, 9th, 10th and 12th in respect of levels of development in occupational patterns in 1961, are now (in 1971) ranking 12th, 12th, 11th, 13th and 16th respectively in the state. They have also lost their positions mainly because they could not maintain their ranks in the different categories of workers during this decade.

Thus, we have observed that most of the districts of Chhotanagpur Plateau have forged ahead in respect of levels of development in occupational patterns. It is mainly due to the fact that in this region varying degree of industrialization and urbanization has taken place.

4.3 Levels of Development in Socio-Economic Characteristics

In this group on the whole there are 5 variables.[9] While working out the composite index of socio-economic development the density of population per square kilometre has not been taken into consideration, because it is not a clear cut indicator of development. Thus the socio-economic development level has been worked out on the basis of rest four variables - Scheduled Castes and Scheduled Tribes, literacy, urbanization and road mileage density per thousand square miles.

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9 See Data Base and Methodology.

Figure No. 33 clearly depicts that on an average the districts of South Bihar Plain are more developed in respect of socio-economic characteristics in the state. They are followed by the districts of North Bihar Plain. The districts of Chhotanagpur Plateau are comparatively less developed in respect of socio-economic characteristics.

Patna, Dhanbad and Bhagalpur form one group of districts (see Figure No. 33) which are comparatively socio-economically more developed in the state. Saran, Monghyr and Shahabad form another group of districts which are also socio-economically developed, but not up to the extent of former group. Muzaffarpur, Darbhanga, Singhbhum and Gaya form third group of districts which are moderately developed in respect of socio-economic characteristics. Champaran, Purnea, Ranchi, Hazaribagh and Saharsa form fourth group of districts which are socio-economically less developed. While Santhal Parganas and Palamau form fifth group of districts which are socio-economically least developed.

It is interesting to observe that in both the years - 1961 and 1971 - the districts of Patna, Dhanbad and Bhagalpur have maintained their first, second and third positions[10] respectively in respect of socio-economic development in the state. Shahabad, Darbhanga, Purnea, Ranchi and Saharsa are the other districts of state, which have maintained their 6th, 7th, 10th, 10th and 12th

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10 See Table No. 34.

BIHAR – LEVELS OF DEVELOPMENT IN SOCIO-ECONOMIC CHARACTERISTICS

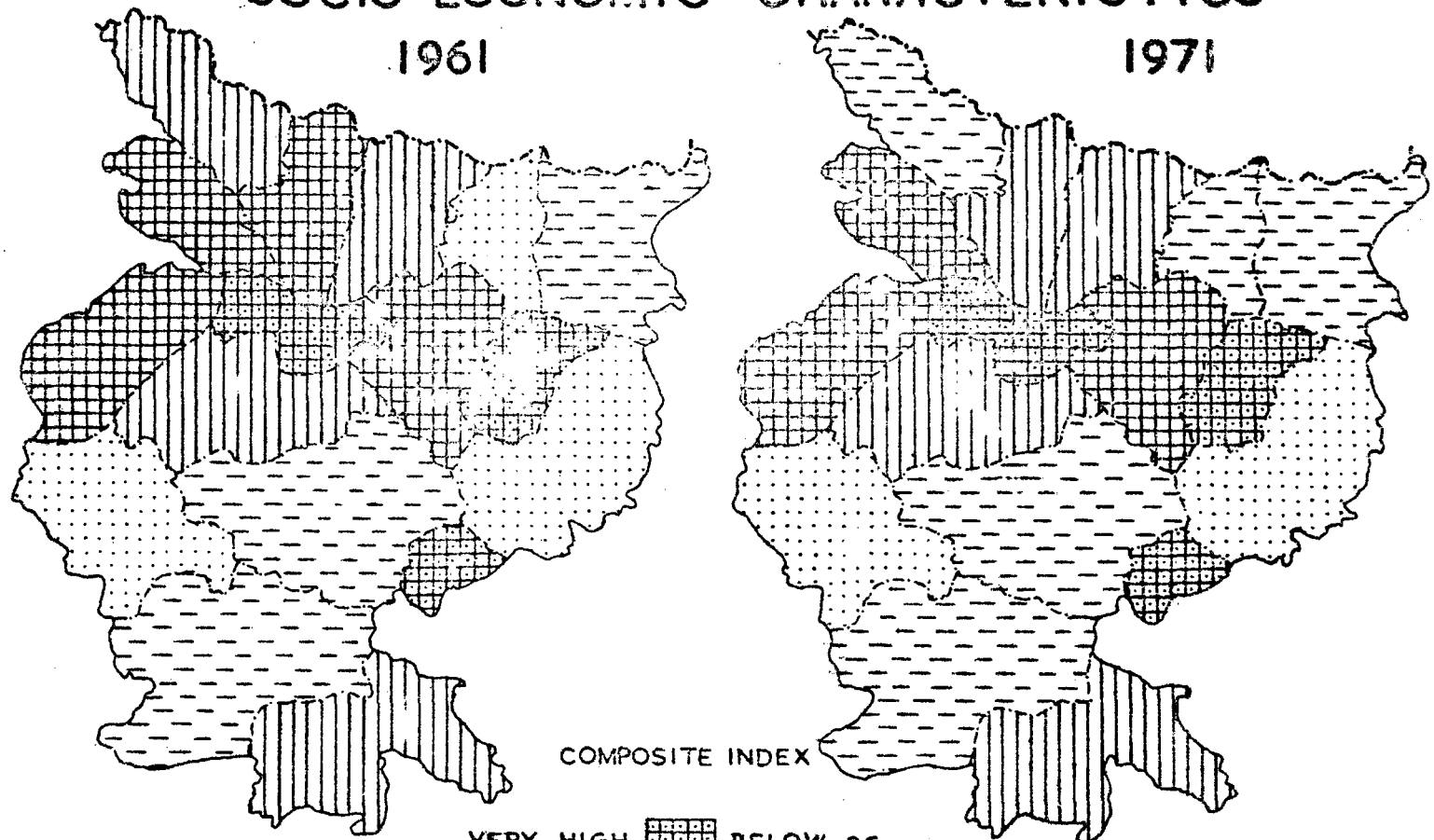

Figure No. 33

Table - 34

Table showing the levels of development in socio-economic characteristics during 1961 and 1971.

Districts	Rank of the districts	
	1961	1971
1. Patna	1	1
2. Gaya	7	9
3. Shahabad	6	6
4. Saran	5	4
5. Champaran	8	10
6. Muzaffarpur	6	7
7. Darbhanga	7	7
8. Monghyr	4	5
9. Bhagalpur	3	3
10. Saharsa	12	12
11. Purnea	10	10
12. Santhal Parganas	11	13
13. Palamau	13	14
14. Hazaribagh	10	11
15. Ranchi	10	10
16. Dhanbad	2	2
17. Singhbhum	9	8

positions respectively in both the years in respect of socio-economic development. Thus we may say in these districts the socio-economic development has forged ahead or kept pace with other districts of the state.

Saran and Singhbhum are the only districts in the state, which have improved their position in respect of socio-economic development levels from 5th and 9th in 1961 to 4th and 8th in 1971 respectively. The district of Saran has pushed back Monghyr by one rank (from fourth to fifth). It is interesting to note that the district of Saran has improved its position not on account of its improved ranks in different fields of socio-economic characteristics but the loss of ranks of Monghyr district in respect of urbanization and road mileage density (from 4th and 7th in 1961 to 6th and 9th in 1971 respectively). The district of Singhbhum has pushed back Gaya and Champaran districts by one rank each.[11] It has improved its position on account of its improved rank in respect of road mileage density and a corresponding loss of their ranks in respect of urbanization and road mileage density. Thus we may say that in the districts of Saran and Singhbhum also the socio-economic development has forged ahead or kept pace with other districts of the state.

On the other hand, the districts of Monghyr, Muzaffarpur, Gaya, Champaran, Hazaribagh, Santhal Parganas and Palamau which were ranking 4th, 6th, 7th, 8th, 10th, 11th and 13th in respect

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11 Ibid.

socio-economic development in 1961, are ranking 5th, 7th, 9th 10th, 11th, 13th and 14th respectively[12] in 1971 in the state. These districts have lost their positions because they could not maintain their ranks in different fields of socio-economic characteristics during this decade. Thus, we may say that these are the districts of the state which have lagged behind in socio-economic development during the decade 1961-71.

4.4 Overall Levels of Development

The overall levels of development has been worked out at two stages. At first stage the whole set of variables have been divided into three major groups: (i) agriculture; (ii) occupational patterns; and (iii) socio-economic characteristics - and composite index of levels of development has been worked out for each group separately. At second stage these three groups have been re-ranked and a composite index of overall levels of development has been worked out by adding their ranks. Thus, while working out the overall levels of development all 26 variables[13] (except normal annual rainfall, area under forest and density of population) have been taken into consideration.

Figure No. 34 clearly depicts that on an average the districts of South Bihar Plain are comparatively more developed in respect of overall development too in the state. They are

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12 Ibid.

13 See Data Base and Methodology.

followed by the districts of North Bihar Plain. The districts of Chhotanagpur Plateau are comparatively less developed in this respect, Dhanbad is the only district in which mining and industrialization have really made visible impact on its overall development. In the district of Singhbhum also we find some impact of industrialization on its overall development. The districts of Ranchi and Hazaribagh have also undergone varying degree of industrial development, but its effect on overall development is hardly perceptible.

Patna is comparatively more developed in the state. The districts of Shahabad, Saran, Dhanbad, Bhagalpur and Monghyr form one group (see Figure No. 34) which are also developed in this respect but not up to the extent of Patna. The districts of Gaya, Muzaffarpur, Singhbhum, Darbhanga and Champaran form another group which are moderately developed in this respect. The districts of Ranchi, Hazaribagh, Purnea and Santhal Parganas form one cluster which are comparatively less developed in this respect. While districts of Saharsa and Palamau form one group which are the least developed in this respect in the state.

It is interesting to observe that in both the years - 1961 and 1971 - the district of Patna has maintained its first position in respect of overall development in the state. It is the only district in the state where there has been a balanced development in the fields of agriculture, occupational patterns and socio-economic characteristics. It is evident from the fact

that it ranks first in respect of agricultural and socio-economic developments, while second in respect of occupational patterns in the state. Dhanbad and Singhbhum are the other districts of the state which have maintained their 4th and 8th positions respectively in both the years. Although both of these districts are lagging behind in agricultural development, they are comparatively more developed in respect of occupational patterns and socio-economic characteristics.

It is interesting to observe that in respect of overall development Saran, Champaran, Muzaffarpur and Saharsa of North Bihar Plain, Shahabad of South Bihar Plain and Hazaribagh, Ranchi and Palamau of Chhotanagpur Plateau are the only districts of Bihar which have improved their positions[14] from 6th, 11th, 8th, 14th, 3rd, 12th, 13th and 15th in 1961 to 3rd, 8th, 7th, 13th, 2nd, 10th, 9th and 14th respectively in 1971. The district of Saran has improved its position on account of its improved ranks in the fields of agriculture (from 7th to 3rd) and socio-economic characteristics (from 5th to 4th). The district of Champaran has maintained its 14th rank in respect of occupational patterns but lost its rank (from 8th to 10th) in respect of socio-economic characteristics. It has improved its position mainly on account of its improved rank in respect of agricultural development (from 9th to 2nd). The districts of Muzaffarpur and Saharsa have also improved their positions on account of their improved

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14 See Table No. 35.

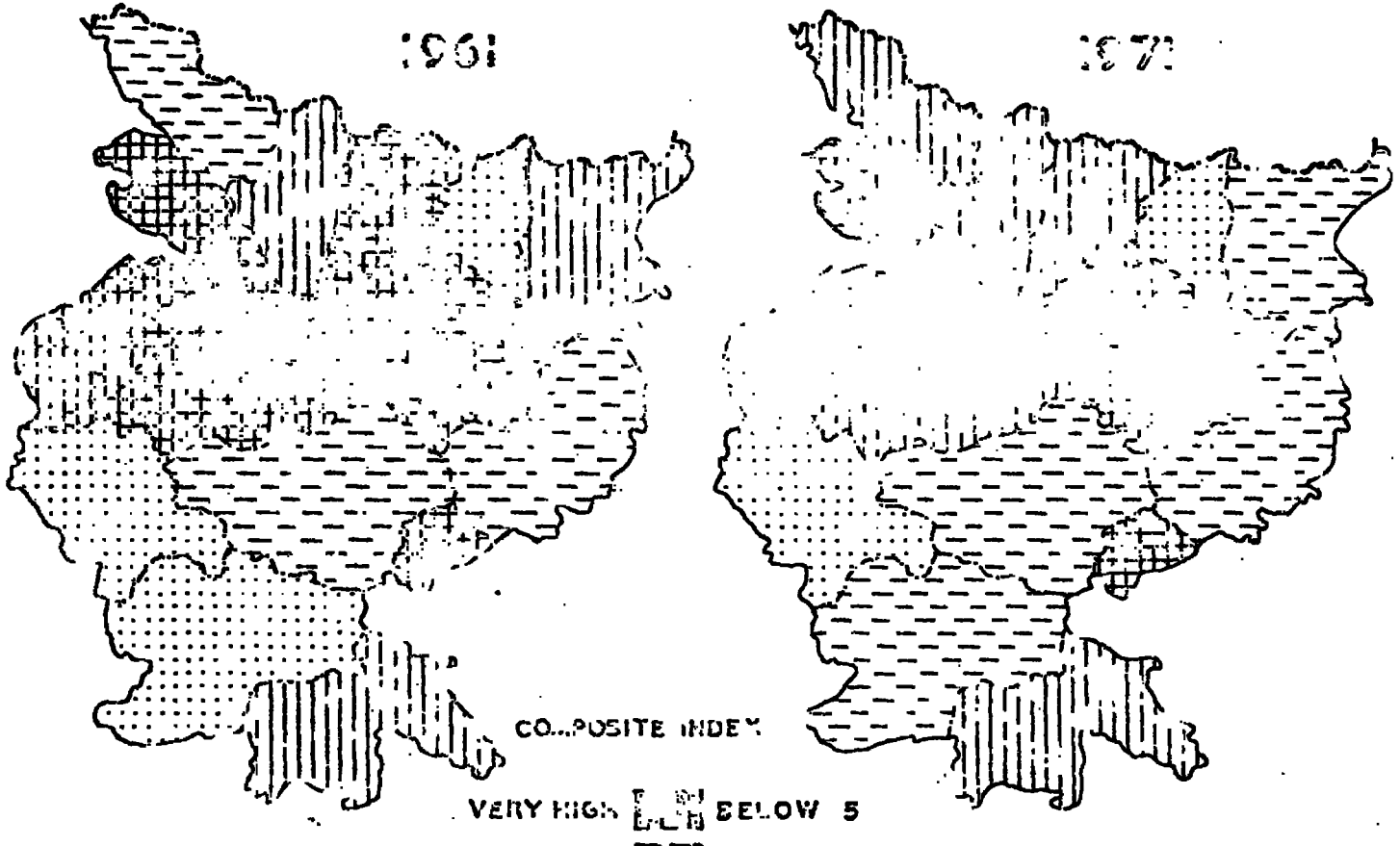
1961
1971
COMPOSITE INDEX
VERY HIGH
BELOW 5
HIGH
5 23
MEDIUM
23 28
LOW
28 33
VERY LOW
ABOVE 33
SCALE
Kms. 30 0 0 30 130 Kms.

Figure No. 34

Table - 35

Table showing overall levels of development during 1961 and 1971.

Districts	Rank of the districts	
	1961	1971
1. Patna	1	1
2. Gaya	5	6
3. Shahabad	3	2
4. Saran	6	3
5. Champaran	11	8
6. Muzaffarpur	8	7
7. Darbhanga	7	8
8. Monghyr	3	5
9. Bhagalpur	2	4
10. Saharsa	14	13
11. Purnea	9	11
12. Santhal Parganas	10	12
13. Palamau	15	14
14. Hazaribagh	12	10
15. Ranchi	13	9
16. Dhanbad	4	4
17. Singhbhum	8	8

ranks in respect of agricultural development (from 10th and 15th in 1961 to 5th and 11th in 1971 respectively). It is interesting to note that the district of Shahabad has improved its position not on account of its improved ranks in any of the three fields of economy but only on account of the loss of position of Bhagalpur district (from 2nd in 1961 to 4th in 1971). The districts of Hazaribagh and Ranchi have improved their positions on account of their improved ranks in field of occupational patterns (from 10th and 11th in 1961 to 7th and 4th in 1971). While the district of Palamau has improved its position in respect of agricultural development (from 16th in 1961 to 13th in 1971). Thus we may say that these are the districts which have forged ahead or kept pace with other districts of the state in respect of overall development.

On the other hand Bhagalpur, Monghyr and Gaya of South Bihar Plain, Darbhanga and Purnea of North Bihar Plain and Santhal Parganas of Chhotanagpur Plateau are the only districts of the state which have lost their positions[15] in respect of overall development from 2nd, 3rd, 5th, 7th, 9th and 10th in 1961 to 4th, 5th, 6th, 8th, 11th and 12th respectively in 1971. The district of Bhagalpur has lost its position on account of its lost ranks in respect of occupational patterns and agricultural development (from 4th, 4th in 1961 to 8th, 8th, respectively in 1971). While the district of Gaya has lost its position

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15 Ibid.

on account of its lost ranks in all the three fields of economy-agriculture (from 3rd in 1961 to 6th in 1971), occupational patterns (from 8th in 1961 to 9th in 1971) and socio-economic characteristics (from 7th in 1961 to 9th in 1971). The districts of Darbhanga and Purnea have lost their positions on account of their lost ranks in respect of only occupational patterns (from 7th and 6th in 1961 to 12th and 12th respectively in 1971). While the district of Santhal Parganas has lost its position on account of its lost ranks in respect of agricultural development (from 6th in 1961 to 12th in 1971) and socio-economic characteristics (from 11th in 1961 to 13th in 1971). Thus, we may say that these are the only districts of Bihar which have lagged behind in respect of overall development.

Thus from the above discussion it is quite clear that in Bihar both spatial and temporal variations in levels of development have taken place, as a result some of the districts have improved their positions, while others have lost. One thing is remarkable that most of the districts of North Bihar Plain have improved their positions in respect of overall development, on account of a faster agricultural development. While some of the districts of Chhotanagpur have improved their positions in respect of overall development, on account of a faster development in respect of occupational patterns.

Chapter V

SUMMARY AND CONCLUSIONS

Chapter V

SUMMARY AND CONCLUSIONS

After a detail discussion of the salient features of agricultural economy of Bihar, occupational patterns, socio-economic characteristics, process of development and patterns of association, and spatial and temporal variations of levels of development in the previous chapters we come to the conclusion that the hypothesis "spatial inequalities in development are often accentuated by inequalities in resources potential and imbalances in the regional structure of development" appears to hold some validity in case of Bihar. For instance, on account of rich natural endowments and sound regional structure of development the districts of South Bihar Plain are comparatively more developed in the fields of agriculture and socio-economic characteristics in the state. They are followed by the districts of North Bihar Plain and Chhotanagpur Plateau. In case of occupational patterns also the districts of South Bihar Plain are comparatively more developed in the state. They are followed by the districts of Chhotanagpur Plateau and North Bihar Plain. This phenomenon is understandable, because the districts of North Bihar Plain are mainly agricultural with low degree of urbanization, industrialization and literacy.

Thus it has been found that on an average the districts of South Bihar Plain are comparatively more developed in respect of overall development too in the state. They are followed by the districts of North Bihar Plain. The districts of Chhotanagpur

Plateau are comparatively least developed in this respect, Dhanbad being the sole exception. It is the only district of Chhotanagpur Plateau in which mining and industrialization have really made visible impact on its overall development. In the district of Singhbhum also we find some impact of industrialization on its overall development. The districts of Ranchi and Hazaribagh have also undergone varying degrees of industrial development but its effect on their overall development is hardly perceptible.

The district of Patna tops the list in respect of overall levels of development not only among the districts of South Bihar Plain but also the state. It is mainly due to the fact that in spite of rich natural endowments it has a sound regional structure of development on account of its being the seat of administration in both the ancient India and the modern Bihar. It has been found that the district of Patna is acting as a core area for the levels of regional development. Although the streams of development are spreading in all directions from here, it is mainly parallel to the streams of River Ganges (see Figure No. 34). It is evident from the fact that the districts of Saran, Shahabad, Bhagalpur and Monghyr rank just next to Patna in respect of overall development.

It is observed that Patna is the only district in the state where there has been a balanced/integrated development in the fields of agriculture, occupational patterns and socio-

economic characteristics. It is evident from the fact that in both the periods- 1961 and 1971 - it ranks first in respect of agricultural and socio-economic developments, while second in respect of occupational patterns in the state. Dhanbad and Singhbhum are the other districts of the state, which have maintained their 4th and 8th positions respectively in both the periods. Although both of these districts are lagging behind in agricultural development, they are comparatively more developed in respect of occupational patterns and socio-economic characteristics.

It has been found that the districts of Saran, Champaran, Muzaffarpur and Saharsa of North Bihar Plain, Shahabad of South Bihar Plain and Hazaribagh, Ranchi and Palamau of Chhotanagpur Plateau have improved their positions in respect of overall development on account of their improved ranks in any of the three fields of economy (agriculture, occupational patterns and socio-economic characteristics). On the other hand the districts of Bhagalpur, Monghyr and Gaya of South Bihar Plain, Darbhanga and Purnea of North Bihar Plain and Santhal Parganas of Chhotanagpur Plateau have lost their positions in respect of overall development on account of the loss of their ranks in any of the three fields of economy. In other words, these are the only districts of Bihar which have lagged behind in respect of overall development.

It has been observed that the nature of terrain, forest-

cover, soil, net area sown, area sown more than once and road mileage density have a decisive effect on the distributional pattern of the density of population in the state of Bihar.

The analysis of co-efficient of correlation of literacy with urbanization, secondary and tertiary sectors has revealed that with an increase in the percentage of literacy there may be more participation of workers in secondary and tertiary activities and greater degree of urbanization. It has also revealed that the increase in the proportion of workers in tertiary sector will be comparatively higher than the secondary sector.

It has been observed that although there is some relationship between the proportion of Scheduled Castes and Scheduled Tribes and the proportion of total workers, the fact remains that several other factors also operate in order to determine the proportion of total workers in the state.

An analysis of co-efficient of correlation of Scheduled Castes and Scheduled Tribes with cultivators and urbanization reveals that most of the Scheduled Castes and Scheduled Tribes participating in economic activities are as cultivators and rural people, which may partly explain low literacy among them and their social backwardness.

It has been also observed that although there is some relationship between urbanization and road mileage density, the fact remains that there are some other factors also which determine the patterns of road mileage density in the state.

It has been found that with an increase in degree of urbanization there is likely to be a decrease in the proportion of workers engaged in primary sectors, but on the contrary there is likely to be an increase in the proportion of workers engaged in secondary and tertiary sectors. This phenomenon is understandable, because in urban areas generally secondary and tertiary activities are carried on.

On the basis of co-efficient of correlation analysis of the road mileage density with secondary and tertiary sectors, literacy, cultivable land, acreages and yields of rice, wheat and maize one may conclude that with an increase in road mileage density there may be an increase in the proportion of workers engaged in secondary and tertiary sectors, literacy and overall growth of agriculture in the state.

In case of occupational structure it has been found that in the state of Bihar with an increase in the proportion of workers in secondary and tertiary sectors, there will be a decrease in the proportion of workers in primary sector. On the other hand with an increase in the proportion of workers in secondary sector, there will also be an increase in the proportion of workers in tertiary sector.

In Bihar the primary sector, with 83.22 per cent of total workers, is the most predominant. Comprising mainly workers in agriculture, it dominates the scene everywhere. It is followed by the tertiary and secondary sectors with 9.66 per cent and 7.11 per cent of the total workers respectively.

An analysis of co-efficient of correlation of primary sector with household industry has revealed that there is ample scope for the development of household industries in areas where primary activities are predominant in the state.

It is believed that irrigation is one of the most important factor which supports the agricultural development. An analysis of co-efficient of correlation of irrigation with net area sown, area sown more than once, yield and acreage of wheat has revealed that with an increase in the proportion of gross irrigated area, there is some possibility of an increase in the proportion of net area sown, area sown more than once, yield and acreage of wheat in most of the districts of the state.

It has been found that there is a decisive effect of rainfall on acreage of rice in the state, but there are some other factors which operate in order to determine the proportion of area under wheat and maize and also the yields of rice, wheat and maize in the state.

It has been observed that the cropping pattern which has emerged in respect of rice and maize in the state is not an ideal one, as a high proportion of area under these crops is accompanied by a low per hectare yield. On the contrary the cropping pattern which has emerged in respect of wheat in the state is the most suitable one, as a high proportion of area under this crop is accompanied by a high per hectare yield.

It has also been found that the nature of terrain has played an important role in determining the distributional

pattern of the proportion of net area sown and area sown more than once in the state.

Strategy

The foregoing analysis has indicated the levels of development of different regions of the state of Bihar and highlighted the special problems obtaining therein. Now the question arises what strategy should be adopted for accelerated development of less developed regions so that they may catch up with the relatively developed regions? In the succeeding paragraphs an attempt has been made to broadly indicate the strategy to reduce the regional imbalances.

The programme for the districts of Chhotanagpur Plateau should accord highest priority to the construction of roads, because in all the districts of this region the road mileage density is far below the state average, Dhanbad being the sole exception. In this region communication is a factor without which no development strategy can internalize economies of scale advantage. Adequate transport facilities will assure higher income from farm products, more exploitation of forest and mineral resources and thus lead to up-coming of forest-based and mineral-based industries in this region.

Other problems of Chhotanagpur Plateau are the existence of vast areas under culturable waste, poor soil fertility and lack of irrigation facilities. In almost all the districts of

this region the percentage of net area sown, area sown more than once and the area irrigated is below the state average. The value of agricultural output is also lowest in this region. Therefore, attempt should be made to increase per hectare yield by using high yielding varieties of seeds, modern agricultural implements and more chemical fertilizer. The attempt should also be made to provide more irrigation facilities, because the irrigation facilities lead to more intensive use of land, help in bringing more area under cultivation and provide greater opportunities to the farmers to raise their output, marketable surplus and level of income. Over and above, these benefits, irrigation facilities offer wide scope for increasing farm production, because of the high yield responsive combination of water, seed and fertilizer. This aspect of irrigation gives it strategic place in any programme of agricultural development. Drought being a regular feature of the region an integrated area development plan with irrigation and agricultural programmes with draught relief programmes be implemented.

In the districts of Palamau, Santhal Parganas and Hazaribagh a high percentage of Scheduled Castes and Scheduled Tribes accompanied by low percentage of literacy shows their social backwardness. Therefore, in these districts attention should be given in this direction also.

In the districts of North Bihar Plain pressure on land is too heavy. This has to be reduced by establishing agro-based

industries, as there are large scope for developing such industries. The per hectare yield of rice, wheat and maize is below the state average in the districts of Muzaffarpur, Saharsa, Purnea; Darbhanga, Muzaffarpur; and Saran, Champaran, Darbhanga and Saharsa respectively. Therefore, attempt should be made to increase per hectare yield of these crops in respective districts by extensive adoption of improved agricultural practices and enhanced use of inputs. In the districts of North Bihar Plain the percentage of gross irrigated area is far below the state average. Thus, assured irrigation facilities are still inadequate in this region and will have to be provided on a large scale.

Floods are recurring features in the districts of North Bihar Plain resulting in huge losses to crops, property and public utilities. It is quite natural that the peasant in these areas will not invest more to modernize agriculture, in the face of a perpetual threat of floods. The future programme for agricultural development would be meaningless unless a comprehensive attempt is made for flood control. The flood prevention and control programmes need to be co-ordinated with agriculture, soil and water conservation and irrigation programmes. This region is interspersed with large number of rivers, which make communication very difficult. Large scale construction of roads and bridges are needed (especially over River Ganges which divides the whole Bihar into two parts - North and South) to

increase communication facilities, which may open up the hinterlands and quicken the implementation of development programmes of the area. The water of these rivers running to waste can be used for hydro-electric generation and irrigation purposes. The districts of North Bihar Plain are also much behind the state average in educational field. Literacy percentage is the lowest in these districts. Therefore, various efforts are also needed in this direction.

The problems facing the districts of South Bihar Plain are, to some extent, similar to those of North Bihar Plain. For instance, in the districts of South Bihar Plain pressure on land is also too heavy. The per hectare yield of rice, wheat and maize is also below the state average in the districts of Patna, Bhagalpur, Monghyr; Monghyr, Gaya; and Shahabad respectively. They are also interspersed with many rivers and suffer from frequent occurence of floods. Thus, in the districts of South Bihar Plain also the attempt should be made to overcome these problems by various measures suggested in case of North Bihar Plain. Monghyr is the only district of South Bihar Plain where percentage of gross irrigated area is below the state average. Therefore, efforts should be made to provide more irrigation facilities in this district. Gaya and Shahabad are the only districts of this region where road mileage density per 1000 square miles is below the state average. In these districts more attention should be given towards the construction of roads.

Thus we come to the conclusion that for an overall accelerated development of Bihar more and more emphasis should be given on providing assured irrigation facilities, increasing per hectare yield, developing agro-based, forest-based and mineral-based industries, constructing roads and bridges, and literacy.

However, it must be mentioned here that several sub-strategies have to be worked out for each block or tahsil of Bihar, taking into account of regional differences, resource potentialities, availability of infrastructural facilities and level of development. Since the scope of this study is limited to that of outlining the spatial and temporal variations in levels of development at district level, detailed block-wise or tahsil-wise analysis has not been made. Research efforts in the direction will be worth undertaking.

APPENDICES

Appendix I

Percentage of area under three major crops during 1960-61 and 1970-71.

	1960-61			1970-71		
	Rice	Wheat	Maize	Rice	Wheat	Maize
Patna	39.56	6.52	3.66	38.22	12.79	7.97
Gaya	45.99	9.34	1.40	53.06	13.75	2.46
Shahabad	41.72	11.42	1.26	44.32	25.21	1.85
Saran	30.61	11.55	16.59	30.19	18.20	19.30
Champaran	50.66	6.11	4.55	49.87	17.39	4.88
Muzaffarpur	39.83	5.39	10.73	40.58	11.59	12.55
Darbhanga	50.83	4.87	8.17	46.96	11.45	11.76
Monghyr	29.57	11.36	16.46	20.61	21.29	26.91
Bhagalpur	38.79	4.96	16.63	39.79	9.70	17.33
Saharsa	32.51	4.87	14.58	40.93	12.77	12.36
Purnea	51.92	3.64	6.84	53.26	9.21	4.35
Santhal Parganas	62.94	0.61	7.99	69.26	1.28	8.73
Palamau	29.36	2.96	9.85	29.99	4.32	14.67
Hazaribagh	60.10	1.03	8.11	55.67	1.48	12.67
Ranchi	60.70	0.24	1.21	61.61	0.51	1.79
Dhanbad	82.17	0.07	4.92	78.20	0.29	7.92
Singhbhum	82.14	0.29	3.21	83.62	0.40	2.86
BIHAR	47.14	5.86	7.24	47.83	11.93	8.98

Appendix II

Percentage of workers under various categories to total workers during 1961.

Districts	% of total workers to total population	(1) Cultivator	(2) Agricultural labourers	(3) Agricultural labourers and cultivators	(4) Mining, Quarrying, Livestock, Forestry, Fishing, etc.
Patna	37.59	40.66	26.72	67.38	1.29
Gaya	40.98	51.72	29.05	80.77	1.47
Shahabad	37.11	48.45	23.52	71.97	2.47
Saran	34.79	62.60	19.14	81.74	0.53
Champaran	41.29	48.74	36.79	85.53	1.55
Muzaffarpur	33.52	50.18	30.30	80.48	0.77
Darbhanga	35.61	41.67	34.54	76.21	2.21
Monghyr	38.80	45.04	27.74	72.78	1.64
Bhagalpur	41.71	42.90	28.18	71.08	3.17
Saharsa	45.58	52.67	29.15	81.82	4.30
Purnea	39.50	46.27	29.47	75.74	3.62
Santhal Parganas	52.45	73.64	8.86	82.50	3.69
Palamau	47.76	59.32	24.35	83.67	3.55
Hazaribagh	48.41	67.68	9.48	77.16	7.82
Ranchi	56.34	78.60	5.60	84.20	2.18
Dhanbad	48.79	40.26	4.38	44.64	29.60
Singhbhum	51.71	58.32	12.29	70.61	3.37
BIHAR	41.40	53.87	22.97	76.84	3.39

(Contd.)

Appendix II

Percentage of workers under various categories to total workers during 1961.

Districts	(5) Total primary sector	(6) Total secondary sector	(7) Household Industry	(8) Manufacturing other than household industry	(9) Construction
Patna	68.69	10.38	5.46	3.71	1.19
Gaya	82.25	6.87	4.75	1.54	0.57
Shahabad	74.45	9.08	5.92	2.52	0.63
Saran	82.29	8.54	6.98	1.20	0.36
Champaran	87.09	5.79	4.07	1.34	0.37
Muzaffarpur	81.25	8.46	7.13	0.90	0.42
Darbhanga	78.42	11.11	9.64	1.16	0.29
Monghyr	74.43	10.29	7.15	2.62	0.51
Bhagalpur	74.26	10.13	6.91	2.72	0.49
Saharsa	86.14	5.10	3.90	0.83	0.35
Purnea	79.36	7.23	4.81	1.73	0.68
Santhal Parganas	86.20	4.83	3.81	0.84	0.17
Palamau	87.22	3.74	2.58	0.87	0.28
Hazaribagh	85.00	7.01	3.87	2.60	0.52
Ranchi	86.39	6.12	3.95	1.53	0.63
Dhanbad	74.25	9.47	2.48	5.97	1.00
Singhbhum	73.99	13.54	3.92	8.28	1.33
BIHAR	8.23	8.27	5.49	2.21	0.56

(Contd.)

Appendix II

Percentage of workers under various categories to total workers during 1961.

Districts	(1) Trade and Commerce	(11) Transport storage and communications	(12) Other Services	(13) Total tertiary sector
Patna	4.92	2.61	13.39	20.92
Gaya	2.82	1.10	6.94	10.87
Shahabad	3.86	1.20	11.39	16.45
Saran	2.55	0.92	5.66	9.15
Champaran	1.98	0.54	4.56	7.09
Muzaffarpur	2.64	0.81	6.81	10.27
Darbhanga	2.91	0.86	6.68	10.45
Monghyr	3.43	2.04	9.79	15.27
Bhagalpur	3.29	1.32	10.96	15.58
Saharsa	2.31	0.42	6.01	8.75
Purnea	3.54	1.22	8.61	13.39
Santhal Parganas	1.79	0.82	5.29	7.92
Palamau	1.55	0.77	6.08	8.41
Hazaribagh	1.56	0.87	5.55	7.99
Ranchi	1.32	0.64	5.51	7.49
Dhanbad	3.44	3.17	9.65	16.27
Singhbhum	2.18	1.99	8.26	12.45
BIHAR	2.71	1.19	7.57	11.48

Appendix III

Percentage of workers under various categories to total workers during 1971.

Districts	% of total workers to total population	(1) Cultivators	(2) Agricultural labourers	(3) Agricultural labourers and cultivators	(4) Livestock, Forestry, Fishing, Hunting and Plantations, orchards and allied activities	(5) Total Primary Sector
Patna	30.35	35.77	37.53	73.30	0.64	73.95
Gaya	30.69	45.02	39.32	84.34	0.65	85.01
Shahabad	29.29	40.55	40.55	81.10	0.86	81.97
Saran	26.62	54.08	33.36	87.44	0.35	87.79
Champaran	33.88	35.52	54.37	89.89	0.58	90.49
Muzaffarpur	29.43	40.88	46.56	87.44	0.56	88.00
Darbhanga	29.70	37.94	49.45	87.39	0.70	88.10
Monghyr	30.82	37.16	45.33	82.49	0.75	83.25
Bhagalpur	32.01	35.97	46.26	82.23	1.19	83.43
Saharsa	35.30	42.16	48.31	90.47	1.56	92.04
Purnea	33.23	42.59	43.66	86.25	2.59	88.85
Santhal Parganas	32.69	60.46	25.33	85.79	1.63	87.42
Palamau	32.18	48.34	40.28	88.62	1.03	89.66
Hazaribagh	29.71	53.40	22.51	75.91	1.00	76.92
Ranchi	31.83	61.25	18.65	79.90	0.72	80.62
Dhanbad	33.72	23.23	11.91	35.14	0.60	35.75
Singhbhum	33.19	40.91	27.81	68.72	1.11	69.83
BIHAR	31.03	43.34	38.91	82.25	0.96	83.22

(Contd.)

	(6) Total Secondary Sector	(7) Household Industry	(8) Manufacturing other than household industry	(9) Construction	(10) Mining & Quarrying
Patna	7.78	3.70	3.15	0.92	-
Gaya	5.40	3.28	1.38	0.51	0.21
Shahabad	6.32	3.03	2.59	0.51	0.17
Saran	4.38	1.75	2.28	0.35	-
Champaran	3.41	1.58	1.50	0.33	-
Muzaffarpur	3.71	2.03	1.33	0.35	-
Darbhanga	3.85	2.18	1.41	0.25	-
Monghyr	6.83	3.25	3.16	0.33	0.08
Bhagalpur	6.11	3.88	1.94	0.29	-
Saharsa	2.28	1.32	0.60	0.36	-
Purnea	3.35	1.75	1.22	0.38	-
Santhal Parganas	5.08	3.07	1.53	0.28	0.19
Palamau	3.71	1.85	1.23	0.20	0.41
Hazaribagh	13.48	2.11	1.89	1.00	8.47
Ranchi	7.94	2.88	4.09	0.36	0.60
Dhanbad	43.83	1.81	8.88	3.63	29.49
Singhbhum	17.55	2.47	11.86	0.86	2.34
BIHAR	7.11	2.47	2.60	0.56	1.47

(Contd.)

	(11)	(12)	(13)	(14)
	Trade and Commerce	Transport Storage & Communication	Other Services	Total Tertiary Sector
Patna	6.02	2.70	9.45	18.25
Gaya	3.65	1.31	4.67	9.64
Shahabad	4.24	1.38	6.06	11.69
Saran	2.63	1.05	4.21	7.90
Champaran	2.16	0.58	3.25	6.00
Muzaffarpur	2.87	0.84	4.34	8.06
Darbhanga	2.63	1.15	4.18	7.97
Monghyr	3.50	1.83	4.41	9.75
Bhagalpur	3.43	1.34	5.22	10.00
Saharsa	2.04	0.36	3.25	5.66
Purnea	3.28	1.14	3.35	7.78
Santhal Parganas	2.39	1.34	3.74	7.48
Palamau	2.06	1.03	3.51	6.61
Hazaribagh	2.89	1.67	5.23	9.81
Ranchi	2.88	1.56	6.97	11.43
Dhanbad	6.66	6.06	7.27	20.00
Singhbhum	3.46	3.09	5.80	12.36
BIHAR	3.25	1.51	4.89	9.66

Appendix IV

Correlation Matrix - 1970-71.

Sl. No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	1.00	0.20	-0.40	-0.61	0.49	-0.51	-0.34	-0.44	-0.20	-0.09	-0.65	0.29
2.		1.00	-0.72	-0.13	0.15	-0.44	-0.05	0.10	-0.57	0.19	-0.11	0.12
3.			1.00	0.11	-0.45	0.75	0.01	0.08	0.73	-0.35	0.39	0.24
4.				1.00	0.14	0.14	0.11	0.50	-0.03	0.15	0.21	- 0.39
5.					1.00	-0.69	-0.67	0.08	-0.38	0.16	-0.36	-0.12
6.						1.00	0.25	0.16	0.56	-0.31	0.61	0.25
7.							1.00	-0.31	0.10	0.12	-0.17	-0.45
8.								1.00	-0.25	0.13	0.46	-0.01
9.									1.00	-0.42	0.32	0.26
10.										1.00	-0.07	-0.45
11.											1.00	0.32
12.												1.00

1. Normal annual rainfall.
2. Percentage of area underrforest.
3. Cultivated area as percentage of cultivable land.
4. Percentage of area under food crops.
5. Percentage of area under rice.
6. Percentage of area under wheat.
7. Percentage of area under maize.
8. Per hectare yield of rice.
9. Per hectare yield of wheat.
10. Per hectare yield of maize.
11. Percentage of gross area irrigated.
12. Per capita cultivated land.

Appendix IV

Correlation Matrix - 1970-71

Sl. No.	13.	14.	15.	16.	17	18.	19.	20.	21.	22.	23.	24.
1.	0.68	0.05	0.24	-0.28	0.06	-0.18	0.12	-0.04	-0.32	-0.08	0.12	-0.06
2.	0.06	-0.09	0.43	-0.43	0.13	-0.41	-0.02	-0.52	-0.03	-0.57	0.28	0.12
3.	-0.32	0.38	-0.68	0.69	-0.46	0.49	0.29	0.40	-0.11	0.49	-0.57	0.22
4.	-0.37	-0.35	0.12	-0.08	0.31	-0.21	0.10	-0.30	0.40	-0.33	0.26	-0.03
5.	0.43	-0.56	0.54	-0.56	0.60	-0.56	0.01	-0.15	0.37	-0.35	0.58	-0.33
6.	-0.40	0.42	-0.66	0.68	-0.47	0.47	0.18	0.30	-0.22	0.61	-0.53	0.11
7.	-0.29	0.17	-0.22	0.24	-0.14	0.16	-0.09	-0.19	-0.23	0.06	-0.03	-0.01
8.	-0.43	-0.07	0.03	0.01	0.04	-0.04	0.10	-0.17	0.12	-0.17	0.00	0.12
9.	0.05	0.33	-0.54	0.53	-0.40	0.45	0.14	0.43	-0.10	0.45	-0.43	0.12
10.	-0.12	-0.23	0.06	-0.06	0.23	-0.21	0.02	-0.33	0.18	-0.04	0.45	-0.41
11.	-0.29	0.16	-0.37	0.38	-0.27	0.41	-0.05	0.20	0.16	0.37	-0.31	0.04
12.	0.15	0.58	-0.09	0.09	-0.61	0.46	0.33	-0.03	-0.40	0.06	-0.59	0.55
13.	1.00	-0.17	-0.08	0.05	0.23	-0.06	-0.13	0.23	-0.02	0.07	0.14	-0.19
14.		1.00	-0.39	0.39	-0.98	0.78	0.15	0.13	-0.87	0.27	-0.84	0.64
15.			1.00	-1.00	0.41	-0.55	-0.05	-0.37	0.27	-0.67	0.44	0.03
16.				1.00	-0.42	0.55	0.07	0.36	-0.27	0.65	-0.46	-0.00
17.					1.00	-0.81	-0.19	-0.14	0.76	-0.26	0.85	-0.66
18.						1.00	-0.08	0.21	-0.57	0.50	-0.73	0.37
19.							1.00	-0.32	-0.01	-0.27	0.04	0.15
20.								1.00	- 0.05	0.57	-0.45	0.05
21.									1.00	-0.24	0.66	-0.48
22.										1.00	-0.33	-0.36
23.											1.00	-0.76
24.												1.00

13. Percentage of total workers.
14. Percentage of primary sector workers.
15. Percentage of cultivators.
16. Percentage of agricultural labourers.
17. Percentage of secondary sector workers.
18. Percentage of workers in household industry.
19. Percentage of workers in manufacturing other than household industry.
20. Percentage of workers in construction.
21. Percentage of tertiary sector workers.
22. Percentage of workers in trade and commerce.
23. Percentage of workers in transport, storage and communication.
24. Percentage of workers in other services.

Appendix IV

Correlation Matrix - 1970-71

Sl.No.	25	26	27	28	29
1.	-0.57	0.49	-0.41	-0.01	-0.35
2.	-0.82	0.62	-0.07	0.10	-0.55
3.	0.72	-0.67	0.05	-0.36	0.20
4.	0.31	-0.07	0.47	0.33	0.37
5.	-0.35	0.53	0.29	0.57	0.09
6.	0.50	-0.69	-0.01	-0.44	0.03
7.	0.26	-0.38	-0.28	-0.20	0.13
8.	0.17	0.04	0.25	0.01	0.12
9.	0.43	-0.55	-0.06	-0.26	0.14
10.	-0.03	0.08	0.07	0.27	0.04
11.	0.19	-0.33	0.37	-0.15	-0.02
12.	-0.41	0.29	-0.18	-0.52	-0.64
13.	-0.40	0.29	-0.13	-0.25	-0.03
14.	-0.06	-0.16	-0.72	-0.97	-0.66
15.	-0.48	0.69	0.18	0.34	-0.09
16.	0.49	-0.69	-0.17	-0.35	0.09
17.	-0.01	0.18	0.59	0.93	0.63
18.	0.21	-0.30	-0.43	-0.77	-0.25
19.	-0.01	0.28	0.22	0.90	-0.22
20.	0.44	-0.52	-0.11	0.65	0.23
21.	0.21	0.10	0.92	0.90	0.62
22.	0.43	-0.73	-0.23	-0.32	0.17
23.	-0.16	0.35	0.51	0.83	0.39
24.	-0.14	0.17	-0.34	-0.60	-0.50
25.	1.00	-0.74	0.20	0.02	0.71
26.		1.00	0.11	0.23	-0.40
27.			1.00	0.76	0.48
28.				1.00	0.59
29.					1.00

25. Density of population.
26. Percentage of Scheduled Castes and Scheduled Tribes.
27. Percentage of literates.
28. Percentage of urban population.
29. Road-mileage density.

Appendix V

Correlation Matrix - 1960-61

Sl.No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	1.00	0.18	-0.64	-0.62	0.45	-0.60	-0.14	-0.29	-0.40	-0.32	-0.70	0.12
2.		1.00	-0.67	0.06	0.39	-0.49	-0.32	0.32	0.18	-0.34	0.04	0.30
3.			1.00	0.32	-0.57	0.80	0.08	-0.10	0.01	0.41	0.51	0.05
4.				1.00	0.21	0.22	-0.16	0.46	0.45	0.25	0.32	-0.23
5.					1.00	-0.72	-0.57	0.39	0.01	-0.13	-0.35	-0.22
6.						1.00	0.27	-0.30	0.24	0.28	0.53	0.12
7.							1.00	-0.25	-0.15	0.03	-0.24	-0.41
8.								1.00	0.38	0.24	0.36	-0.02
9.									1.00	0.32	0.43	0.11
10.										1.00	0.32	0.12
11.											1.00	0.39
12.												1.00

1. Normal annual rainfall.
2. Percentage of area under forest.
3. Cultivated area as percentage of cultivable land.
4. Percentage of area under food crops.
5. Percentage of area under rice.
6. Percentage of area under wheat.
7. Percentage of area under maize.
8. Per hectare yield of rice.
9. Per hectare yield of wheat.
10. Per hectare yield of maize.
11. Percentage of gross area irrigated.
12. Per capita cultivated land.

Appendix V

Correlation Matrix - 1960-61

Sl.No.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
1.	0.55	0.48	0.22	-0.30	-0.35	-0.12	-0.10	0.17	-0.48	-0.12	-0.03	0.15
2.	0.69	0.23	0.59	-0.60	-0.14	-0.46	0.46	0.29	-0.27	-0.82	0.27	0.54
3.	-0.83	-0.33	-0.55	0.79	0.26	0.45	-0.45	-0.32	0.35	0.66	-0.39	-0.28
4.	-0.10	-0.36	0.09	-0.16	0.48	-0.19	0.24	-0.18	0.22	-0.08	0.43	-0.31
5.	0.61	-0.10	0.28	-0.65	0.26	-0.69	0.71	0.40	-0.03	-0.41	0.61	-0.17
6.	-0.78	-0.24	-0.36	0.61	0.15	0.44	-0.43	-0.34	0.28	0.56	-0.29	-0.28
7.	-0.30	0.06	-0.17	0.24	-0.01	0.44	-0.39	-0.61	-0.09	0.21	-0.19	-0.02
8.	0.27	-0.49	-0.01	-0.26	0.28	-0.54	0.57	0.24	0.52	-0.51	0.51	0.02
9.	-0.02	-0.47	0.16	-0.14	0.32	-0.20	0.21	0.11	0.47	-0.30	0.51	-0.19
10.	-0.35	-0.32	-0.20	0.34	0.25	0.36	-0.32	-0.48	0.30	0.34	-0.20	-0.15
11.	-0.25	-0.33	-0.13	0.28	0.02	-0.01	-0.02	0.14	0.46	0.02	-0.08	0.05
12.	0.20	0.29	0.38	0.04	-0.43	0.25	-0.30	0.13	-0.17	-0.20	-0.50	0.65
13.	1.00	0.35	0.64	-0.79	-0.30	-0.47	0.46	0.40	-0.35	-0.74	0.28	0.45
14.		1.00	0.41	-0.22	-0.85	0.47	-0.48	-0.25	-0.95	0.09	-0.51	0.39
15.			1.00	-0.73	-0.24	-0.06	0.05	0.08	-0.48	-0.54	0.02	0.49
16.				1.00	-0.14	0.50	-0.51	-0.32	0.24	-0.65	-0.49	-0.17
17.					1.00	-0.41	0.45	0.05	0.63	-0.07	0.50	-0.39
18.						1.00	-0.99	-0.75	-0.44	0.60	-0.80	0.16
19.							1.00	0.67	0.43	-0.60	0.83	-0.19
20.								1.00	0.36	-0.44	0.43	0.03
21.									1.00	-0.07	0.43	-0.33
22.										1.00	-0.44	-0.56
23.											1.00	-0.51
24.												1.00

13. Percentage of total workers.
14. Percentage of primary sector workers.
15. Percentage of cultivators.
16. Percentage of agricultural labourers.
17. Percentage of secondary sector workers.
18. Percentage of workers in household industry.
19. Percentage of workers in manufacturing other than household industry.
20. Percentage of workers in construction.
21. Percentage of tertiary sector workers.
22. Percentage of workers in trade and commerce.
23. Percentage of workers in transport, storage and communication.
24. Percentage of workers in other services.

Appendix V.

Correlation Matrix - 1960-61

Sl.No.	25	26	27	28	29
1.	-0.51	0.44	-0.47	-0.12	-0.66
2.	-0.84	0.69	-0.10	0.19	-0.65
3.	0.69	-0.71	0.18	-0.23	0.64
4.	0.29	-0.02	0.45	0.37	0.42
5.	-0.30	0.50	0.26	0.58	-0.28
6.	0.49	-0.66	0.08	-0.32	0.41
7.	0.26	-0.42	-0.33	-0.31	0.10
8.	-0.15	0.19	0.54	0.63	0.13
9.	-0.03	0.15	0.47	0.36	0.12
10.	0.30	-0.30	0.12	-0.16	0.15
11.	0.03	-0.20	0.38	0.07	0.25
12.	-0.54	0.40	-0.18	-0.38	-0.41
13.	-0.79	0.87	-0.08	0.29	-0.62
14.	-0.42	0.30	-0.86	-0.70	-0.42
15.	-0.59	0.73	-0.15	-0.07	-0.43
16.	0.51	-0.70	-0.10	-0.36	0.32
17.	0.40	-0.22	0.68	0.60	0.25
18.	0.27	-0.34	-0.62	-0.90	0.10
19.	-0.26	0.32	0.61	0.90	-0.11
20.	-0.26	0.37	0.55	0.65	-0.01
21.	0.38	-0.33	0.85	0.65	0.48
22.	0.71	-0.76	-0.25	-0.50	0.46
23.	0.00	0.24	0.61	0.86	0.70
24.	-0.68	0.50	-0.33	-0.31	-0.53
25.	1.00	-0.72	0.33	0.03	0.36
26.		1.00	0.00	-0.23	-0.58
27.			1.00	0.83	0.48
28.				1.00	0.20
29.					1.00

25. Density of population.
26. Percentage of Scheduled Castes and Scheduled Tribes.
27. Percentage of literates.
28. Percentage of urban population.
29. Road-mileage density.

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