

## CHAPTER 3

### REGIONAL DISPARITIES IN AGRICULTURAL DEVELOPMENT

#### 3.1 Introduction

Agriculture is a very important sector and backbone of the Indian economy and despite concerted industrialization in the last six decades, agriculture still occupies a place of pride. It contributes a sizable percentage to the domestic product as also to exports. More than two-thirds of the work-force is engaged in agriculture and large many depend upon it being engaged in trade in agricultural products, agro-based industries etc. Being the largest industry in the country, agriculture provides employment to around 60 per cent of the total work-force in the country. The significance of agriculture in the national economy can best explained by considering the role of agriculture under different heads as follows.

##### 3.1.1 Share of Agriculture in the National Income

According to the Economic Survey 2003-04, between 1950-51 to 1960-61, the share of agriculture in GDP has been in the range of 55 to 52 per cent, though it was declining, but as the process of industrialization and economic growth gathered momentum, the share of agriculture indicated a sharp decline and reached a level of 22 per cent in 2003-04 and 20 per cent in 2006-07.

Comparison can be made between the positions of agriculture in India with that in the other countries as regards the share of agriculture in national income. In the United Kingdom and United States, only 2 to 3 per cent of the working population is engaged in agriculture; in France, the proportion is about 7 per cent; and in Australia, this is about 6 per cent.

It is only in backward and less developed countries that the working population engaged in agriculture is quite high. For instance, it is 35 per cent in Egypt, 59 per cent in Bangladesh, 50 per cent in Indonesia and 68 per cent in China. The more developed a country, the smaller is the share of agriculture in national output. India, having not yet reached the stage of an advanced economy, has an agricultural sector which is still the dominated one in the country.

##### 3.1.2 Indian Agriculture and Pattern of Employment in the Country

Agriculture dominates the economy to such an extent that a very high proportion of working population in India is engaged in agriculture. Agriculture

provided employment to 98 million people in 1951; the number of people working on land (cultivators and agricultural labourers) increased to 235 million in 2001. In terms of percentage, however, people working on land came down from 70 to 59 during the five decades between 1951 and 2001.

The Tenth Plan (2002-07) estimates that the agricultural sector still provides employment to 57 per cent of India's work force and is the single largest private sector occupation. It is, however, really disturbing that the proportion of agricultural labourers has increased from 20 to 27 per cent between 1951 and 2001 but that of cultivators registered a decline from 50 per cent to 32 per cent. This shows clearly the growing pauperization of the rural peasantry.

### **3.1.3 Importance of Agriculture for Industrial Development**

Indian agriculture has been the source of supply of raw materials to our leading industries. Cotton and jute textile industries, sugar, flour mills, vanaspati and plantations, all these depend on agriculture directly. There are many other industries which depend on agriculture in a direct manner. Many of our small-scale and cottage industries like handloom weaving, oil crushing, rice husking etc., depend upon agriculture for their raw materials, together they account for 50 per cent income generated in the manufacturing sector in India.

But then, in recent years, the significance of agriculture to industries is going down as many new industries have come up which are not dependent on agriculture. Under the Five Year Plans, iron and steel industry, chemicals, machine tools and other engineering industries, automobiles, information technology etc., have come up in big way.

However, in recent years, the importance of food processing industries is being increasingly recognized both for generation of income and for generation of employment.

### **3.1.4 Role of Agriculture in the Field of International Trade**

Importance of Indian agriculture also arises from the role it plays in India's trade. Agricultural products—tea, sugar, oilseeds, tobacco, spices, etc. constituted the main items of exports of India. Broadly speaking, the proportion of agricultural goods which were exported came to 50 per cent of our exports, and manufactures with agricultural content (such goods as manufactured jute, cloth and sugar) contribute another 20 per cent or so; and the total comes to 70 per cent of India's exports in 1950-51. But with diversification of exports, especially

after the introduction of agricultural exports which were 18.5% in 1990-91 rose to 20.3% in 1996-97 and thereafter indicated a continuous decline and were of the order of only 10.8% in 2005-06.

### **3.1.5 Role of Agriculture Sector in Economic Planning**

Importance of agriculture in the national economy is indicated by many facts. For example, agriculture is the main support for India's transport systems, secure bulk of their business from the movement of agricultural good. Internal trade is mostly in agricultural products.

Further, good crops implying large purchasing power with the farmers lead to greater demand for manufactures and, therefore, better prices. In other words, prosperity of the farmers is also the prosperity of industries. Likewise, bad crops lead to a depression in business. Generally, it is the failure in the agricultural front that has led to failure of economic planning in particular periods.

Agricultural growth has direct impact on poverty eradication. It is also an important factor in containing inflation, raising agricultural wages and for employment generation.

Besides, the allied sectors like horticulture, animal husbandry, dairy and fisheries have an important role in improving the overall economic conditions and health and nutrition of the rural masses. To maintain the ecological balance, there is need for sustainable and balanced development of both agriculture and the allied sector. The Tenth Plan—in fact, every one of the Five Year Plans—brought out the crucial role of the agricultural sector in enabling the widest dispersal of economic benefits and emphasized that “agricultural development is central to economic development of the country”.

### **3.2 Importance of the Agriculture Sector in West Bengal Economy**

Total employment in the state increased at compound annual rate of 3.34%. Employment in rural areas increased at a compound annual rate of 3.33% and in urban areas by 3.55%.

In the agriculture sector (agriculture includes animal husbandry, fishery, forestry and allied activities), the growth in employment in the rural areas was an impressive 3.05% per annum. Although agriculture in the urban areas is not significant, growth of employment in the sector was 2.13% per annum. The annual growth rate of total employment (rural + urban) in the agriculture sector was 3.03% (Economic Review, 2006-2007, p.205)

### **3.2.1 Present Agrarian Scenario in West Bengal**

West Bengal has projected population of 8.92 crore on 01.01.2005 of which 6.33 crore (71%) reside in rural areas. The availability of land per person in West Bengal has been abysmally low and declining very fast over the years. The gross cropped area per rural person in West Bengal in 2002-2003 has been only 0.39 acre as against 0.62 acre in all-India. Further, according to the NSSO 59<sup>th</sup> Round landholdings survey, the average size of operational holdings in West Bengal in 2002-03 has been only 1.10 acres as against 2.63 acres in all-India. All these figures clearly indicate that rural West Bengal has to withstand a very high pressure of population.

### **3.2.2 Recent Performance of Agriculture in West Bengal**

A great deal of discussion has taken place in recent years on the issue of production performance of agriculture in West Bengal. In a pioneering study, Boyce (1987) observed that the exponential growth rate of total agricultural output in West Bengal was 1.74 per cent per annum during the period 1949 to 1980 which was lower than population growth rate. However, since early 1980s, the situation changed dramatically so much so that the rate of growth of agricultural output far exceeded the growth rate of population in West Bengal. As reported by the CMIE (1993), the rate of growth of agricultural production in the states of eastern India increased rapidly during 1980s and the fastest growth has been recorded in West Bengal, particularly with regard to the foodgrains production (growing by 6.5 per cent per annum during 1981-82 to 1991-92, while the all-India average was only 2.7 per cent per annum). Saha and Swaminathan (1994) further reported that for the period 1981-82 to 1990-91, the exponential growth rate of all-crop production for West Bengal was 6.4 per cent per annum. Sanyal, Biswas and Bardhan (1998) maintained that the period of stagnation in West Bengal agriculture has come to an end under the Left Front Government rule. They observed that annual exponential growth rate of all crops production in West Bengal during 1977-78 to 1995-96 was 4.1 per cent, which exceeded the growth rate of production.

To understand the current scenarios, let us have a look at the performance of agriculture in West Bengal vis-à-vis all-India covering a wider period, from 1980-81 to 2004-05. The following three points are worth mentioning in this context.

1. During 1980-81 to 1992-93, the annual growth rate of foodgrains production in West Bengal was 4.99 per cent, which was far greater than the growth rate observed for all-India (2.88 per cent). During the same period, the annual growth rate of rice production was as high as 5.53 per cent in West Bengal as against 3.58 per cent for all-India. Even for commercial crops such as Jute and Potatoes, West Bengal recorded high growth rate of production during this period.
2. Both in West Bengal and all-India, the growth rate of foodgrains production decelerated significantly during 1993-94 to 1999-2000. During this period, annual growth rates of foodgrains production in West Bengal and all-India have been 2.45 and 2.06 per cent respectively. It is important to note that not only the annual growth rate of foodgrains production in West Bengal has been higher than the same for all-India in the early years of economic reforms, but also the growth rate of foodgrains production exceeded the growth rate of population during this period.
3. The situation changed drastically after 1999-2000 as far as agricultural performance in all-India is concerned. During 1999-2000 to 2004-2005 (more matured phase of economic reforms), the growth rate of foodgrains production at the all-India level became negative (-0.23 per cent per annum) while population grew at the rate of 1.96 per cent per annum. This is where the country got trapped in an 'agrarian crisis'. On the other hand, in West Bengal, foodgrains production grew at the rate of 2.06 per cent per annum even during this phase of agrarian crisis which was again higher than population growth rate. The overall picture obtaining in West Bengal during 1999-2000 to 2004-05 appear to be quite satisfactory, particularly with regards to growth rate of foodgrains production, when agriculture in many states as well as all-India suffered a set back.

Nevertheless, one might ask to what extent good agricultural performance in West Bengal could be sustained in future. It is also important to identify the areas for important so that the current growth momentum could be sustained and bettered. To this end, let us concentrate on a few indicators relating to the pattern of adoption of agricultural technology in West Bengal. The important points are as follows.

1. There is indeed scope for raising cropping intensity in West Bengal through increase in irrigation. In 2002-03, about 52% of gross cropped areas were irrigated and the cropping intensity stood at 1.78, which was lower than Punjab, the highest performing state in this respect.
2. There also exists a yield-gap for rice / foodgrains, which becomes apparent through a comparison with the best performing state, namely Punjab. The yield of foodgrains in West Bengal is about 2374 kgs / ha. this is 61% less than the same in Punjab. Similarly, the yield of rice (2463 kgs / ha.) fell short by 43% compared with Punjab. It seems that with appropriate interventions, the state could enhance the yield levels for rice / foodgrains further. However, it also needs to be emphasized that as 85% of Aman rice area and 100% of Boro rice area are already under HYVs, for yield enhancement, it would perhaps be necessary to develop new and improved seed varieties of rice which would be suitable to the local agro-climatic conditions.
3. To enhance the pace of agricultural diversification in West Bengal, it would be necessary to improve, among others, the storage and marketing infrastructures. Another very important intervention needed is that of expanding the flow of institutional credit. Accordingly, West Bengal lagged far behind all-India as well as the highest performing state with regard to institutional banking support provided to agriculture. Even in the matter of co-operative credit, West Bengal stands way behind Maharashtra where credit flow per hectare from co-operatives has been the highest in India (Bhaumik, 2007).

It clearly emerges that agriculture still has something to contribute in the process of future economic development in West Bengal, particularly in terms of employment generation and poverty reduction in rural areas. Therefore, following the objective set for the Eleventh Five Year Plan, the state should devise its region-specific policies to accelerate the pace of agricultural development. As more than 60 per cent of rural workers are still dependent on agriculture and it continued to absorb a good majority of incremental workers even during recent years of economic reforms, its importance in the economy of West Bengal could not be dismissed at least in the short to medium term.

As is evident from above the agricultural sector is a prime sector of the economy of West Bengal where expansion of industrial sector is limited due to many constraints. The study of the relationship between value of agricultural produce per hectare of net area sown and agricultural values are relevant and significant to find out the roots to pace of agricultural development. There is the coexistence of developed and developing districts in West Bengal. The changing pattern of association of agricultural development indicators for the decadal year of 1980-81, 1990-91 and 2000-2001 has been analyzed in this chapter. Some ten (10) variables have been identified at district level in West Bengal to analyze the level of agricultural development. The Principal Component Analysis (PCA) and Factor Analysis (FA) (Rotated Factor Matrix / Kaiser Varimax Method) techniques have been used for the analysis.

The relative importance of the agriculture sector in the economy of different districts of West Bengal can be understood from the Table 3.1 below. We have presented the percentage share of agriculture in DDP over the period 1980-81, 1990-91 and 2000-2001 is calculated district-wise and presented in Table 3.1.

<b>Table 3.1: Share of Agriculture Sector (percentage) in DDP</b>			
<i>Districts</i>	1980-1981	1990-1991	2000-2001
Burdwan	31.36	27.61	20.68
Birbhum	53.78	42.28	35.10
Bankura	55.14	42.97	36.15
Midnapore	47.14	30.70	30.79
Howrah	8.06	8.96	10.61
Hooghly	30.04	29.00	22.90
24 Parganas (N)	15.73	19.64	16.87
24 Parganas (S)	17.78	23.96	18.61
Nadia	40.35	41.04	35.59
Murshidabad	46.86	37.39	32.36
Malda	49.34	41.32	41.60
Uttar Dinajpur	63.06	26.63	41.29
Dakshin Dinajpur	63.05	18.51	44.20
Jalpaiguri	36.52	40.49	33.96
Darjeeling	9.98	32.66	29.71
Cooch Behar	54.20	44.41	44.27
Purulia	38.70	28.28	24.90
Kolkata	0.00	0.34	0.32
West Bengal	27.84	27.18	24.182

Source: Statistical Abstract, the Bureau of Applied Economics and Statistics, GoWB (various years)

Kolkata's position in respect of other districts is more or less the lowest because of its metropolitan character. The contribution of agriculture to DDP was the maximum in Uttar Dinajpur district in the year 1980-81; where as its contribution to DDP of Cooch Behar district (44.41 and 44.27) was more consistent than the other districts in the year 1990-91 and 2000-01. Dakshin Dinajpur consistently occupies the second position in the year 1980-81 and 2000-01 and in the lower echelon the position of the Howrah district remains unchanged among the benchmark years. In West Bengal, percentage share of agriculture in DDP is 27.84, 27.18, and 24.18 in the three points of time.

### **3.3 Indicators of Agriculture Development**

As a matter of fact, determination of the validity of the indicators is one of the crucial problems in social science research because of its selection being quite difficult. In spite of knowing very well the importance of this major problem, efforts have been made to provide rationale for selecting the indicators and giving empirical content to various concepts used to measure and analyze the level of development of different districts.

We have used the following indicators (*see in Appendix to chapter-3*) of agricultural development in order to make a comparative study of agricultural development in the 18 districts of West Bengal.

- A-1: Gross value of agricultural produce per hectare of net area sown;
- A-2: Gross value of agricultural produce per capita of rural population;
- A-3: Gross value of agricultural produce per agricultural worker;
- A-4: Percentage of area under commercial crops to gross cropped area;
- A-5: Percentage of net area sown to total geographical area;
- A-6: Cropping intensity;
- A-7: Percentage of agricultural workers to total (main) workers;
- A-8: Credit to agriculture (Rs. Per Capita);
- A-9: Consumption of fertilizer per hectare of gross cropped area;
- A-10: Average size of holding.

#### **3.3.1 Rationale for the Choice of Indicators of Agricultural Development**

The first three indicators A-1, A-2 and A-3 have been selected to exhibit the overall performance of agriculture in terms of agriculture productivity, labour productivity and availability of agricultural produce for consumption of the

population, besides showing the effects of all technological inputs on land. West Bengal has enough potential for horticulture development; as such A-4 has been selected to assess the horticultural development. It reveals the level of diversification within agricultural sector from foodgrain production to commercial crops in terms of percentage of area under commercial crops. Net area under agricultural use has been evaluated with the help of A-5 and the intensity of cropping A-6, is measured through the ratio of gross to net cropped area, which shows the rate of utilization of net area under cultivation in different districts and enlightens on the scope of bringing additional area under multiple cropping. Indicator A-7 has been selected to assess the labour absorption situation in agriculture. Indicator A-8 includes credit to agriculture which obviously lead to increase in the productivity of the farm sector. Modernization and commercialization of agriculture sector have been examined with the help of A-9 and A-10, which indicates consumption of fertilizers for increasing the productivity of land. With the help of this indicator, modernization of agriculture sector can be evaluated at the district level.

### **3.3.2 District-wise Agricultural Development: Indicator-wise Assessment**

#### *Inter-District Disparities in terms of the Indicator of Agricultural Development*

West Bengal agriculture has occupied around 3 per cent of India's productive land. More than 8 percent of India's foods are being generated by the agricultural sector of West Bengal. Small and marginal farmers rule over the West Bengal agriculture and cultivate more than 68 per cent of the total area. The agriculture in West Bengal is one of the most significant means to earn livelihood especially in the rural sectors. This has been enabled by various schemes of the Green Revolution and the land reforms. West Bengal comprises of 8 per cent of India's population and the majority of them are engaged in farming and others agricultural activities (<http://business.mapsofindia.com>).

Therefore, agriculture, being the main occupation of the people of West Bengal, has an important role to play in the economy of the state. In order to study indicator-wise level of agricultural development, districts have been classified into two categories, viz. developed and developing ( or less developed), according to the level of development in relation to state average with reference to different indicators of agricultural development for the years 1980-81, 1990-91 and 2000-01.

The classification of districts according to their respective level of development with respect to different indicators of agricultural development is shown in Tables 3.2, 3.3 and 3.4 for the benchmark years 1980-81, 1990-91 and 2000-01 respectively.

**Table 3.2: Distribution of Districts by Relative Levels of Socio-economic Development in West Bengal 1980- 81**

Sl. No.	Indicators	State Average	Developed Districts	Developing Districts
			<i>Agriculture Sector</i>	
1	Gross value of agricultural produce per hectare of net area sown	4454.46 (Rs.)	Hooghly, Burdwan 24 Parganas (N), Howrah, Darjeeling, Birbhum, Bankura, Nadia, Midnapore, Murshidabad, Dakshin Dinajpur	Cooch Behar, Malda, Purulia, Uttar Dinajpur, 24 Parganas (S), Jalpaiguri, Kolkata
2	Gross value of agricultural produce per capita of rural population	617.34 (Rs.)	Burdwan, Dakshin Dinajpur, Birbhum, Hooghly Bankura, Uttar Dinajpur, 24 Parganas (N), Cooch Behar	Purulia, Nadia, Midnapore, Malda, Jalpaiguri, Murshidabad, Howrah, 24 Parganas (S), Darjeeling, Kolkata
3	Gross value of agricultural produce per agricultural workers	6155.55 (Rs.)	Jalpaiguri, Dakshin Dinajpur, Burdwan, Hooghly, Birbhum, Bankura, Darjeeling, Cooch Behar, Purulia, 24 Parganas (N), Midnapore	Nadia, Uttar Dinajpur, Malda, Murshidabad, Howrah, 24 Parganas (S), Kolkata
4	Percentage of area under commercial crops to gross cropped area	14.971 (in hectare)	Jalpaiguri, Nadia, Darjeeling, Cooch Behar, Uttar Dinajpur, Hooghly, Murshidabad, Dakshin Dinajpur	Malda, Burdwan, Howrah, Bankura, Birbhum, Midnapore, 24 Parganas (N), Purulia, 24 Parganas (S), Kolkata
5	Percentage of Net Area Sown to Total Geographical Area	62.380 (in hectare)	Uttar Dinajpur, Dakshin Dinajpur, Nadia, Murshidabad, Cooch Behar, Malda, Birbhum, Hooghly, 24 Parganas (N), Burdwan, Howrah	Midnapore, Jalpaiguri, Bankura, Purulia, 24 Parganas (S), Darjeeling, Kolkata
6	Cropping Intensity	140.237	Darjeeling, Nadia, Uttar Dinajpur, Murshidabad, Hooghly, Cooch Behar, 24 Parganas (N), Burdwan	Malda, Dakshin Dinajpur, Howrah, Birbhum, Midnapore, Bankura, Jalpaiguri, 24 Parganas (S), Purulia, Kolkata
7	Percentage of Agricultural workers	25.866	Birbhum, Uttar Dinajpur, Bankura, Malda,	Purulia, 24 Parganas (N), Jalpaiguri, Howrah,

	to total ( main ) workers		Murshidabad, Dakshin Dinajpur, Midnapore, Burdwan, 24 Parganas (S), Nadia, Hooghly, Cooch Behar	Darjeeling, Kolkata
8	Credit to Agriculture ( Rs. Per Capita)	25.914	Darjeeling, Jalpaiguri, Hooghly, Nadia	Malda, Murshidabad, Burdwan, Birbhum, Cooch Behar, 24 Parganas (N), 24 Parganas (S), Bankura, Uttar Dinajpur, Midnapore, Dakshin Dinajpur, Purulia, Howrah, Kolkata
9	Consumption of fertilizer per hectare of gross cropped area	35.67 (Kg.)	Howrah, Hooghly, Burdwan, Nadia, Birbhum, 24 Parganas (N)	Murshidabad, Malda, Midnapore, Uttar Dinajpur, 24 Parganas (S), Darjeeling, Purulia, Dakshin Dinajpur, Cooch Behar, Jalpaiguri, Bankura, Kolkata
10	Average size of holdings ( in hectare)	0.947	Darjeeling, Jalpaiguri, Burdwan, Birbhum  Purulia, Bankura, Cooch Behar, Nadia	Murshidabad, Malda, Midnapore, Hooghly, 24 Parganas (N), 24 Parganas (S), Uttar Dinajpur, Howrah Dakshin Dinajpur, Kolkata

It may be observed from the Table 3.2 above that majority of the districts fall in the developed category in the matter of value of agricultural produce per hectare of net area sown. The seven districts, namely, Cooch Behar, Malda, Purulia, Uttar Dinajpur, 24 Parganas (S), Jalpaiguri and Kolkata, however, lagged in this respect during the year 1980-81 due to metropolitan characteristics. After one decade, minor reshuffle took place in the placement of districts. For example, Cooch Behar district emerged as developed district in 1990-91 in this respect. In the matter of another indicator, i.e., value of agricultural produce per capita of rural population, Darjeeling, Jalpaiguri and Nadia districts emerged as reasonably developed, during the period of 1990-91. Again, in the matter of another indicator— gross value of agricultural produce per agricultural workers, majority of the districts fall in the developed category but minor reshuffle took place in the placement of districts, viz., Kolkata and Nadia emerged as developed category. But in the indicator of credit to agriculture, positions of some districts have drastically changed, i.e., emerged from developing to developed districts, viz., Uttar Dinajpur, Dakshin Dinajpur, Midnapore, Birbhum and Burdwan.

As revealed by Table 3.3 and Table 3.4, Darjeeling, Jalpaiguri, Cooch Behar, and Nadia are fairly developed in respect of first three indicators, which represent overall performance of agriculture in the year 1990-91. In the indicator of percentage of area under commercial crops to gross cropped area, Nadia, Murshidabad, Cooch Behar, Uttar Dinajpur, Darjeeling, 24 Parganas (N) and Burdwan districts fall in category of developed districts, which stand for diversification within agriculture from food grain to commercial crops area and also show efficiency of farm management. In the aspect of two indicators, viz., percentage of net area sown to total geographical area and cropping intensity, Uttar Dinajpur, Nadia, Murshidabad, Cooch Behar, 24 Parganas (N), and Burdwan districts are placed above the state average in respect of these indicators, which indicates that the rate of utilization of net area under cultivation in these districts is reasonably high. Eleven districts, viz., Uttar Dinajpur, Birbhum, Dakshin Dinajpur, Purulia, Bankura, Midnapore, Malda, Burdwan, Cooch Behar, Murshidabad and 24 Parganas (S) are placed in the developed category in respect of the indicator percentage of agricultural workers to total (main) workers which indicates that degree of concentration of agricultural activities was rather high in the year 1990-91 and 2000-01, in these districts.

**Table 3.3: Distribution of Districts by Relative Levels of Socio-economic Development in West Bengal 1990-91**

Sl. No.	Indicators	State Average	Developed Districts	Developing Districts
<i>Agriculture Sector</i>				
1	Gross value of agricultural produce per hectare of net area sown	7192.69 (Rs.)	Hooghly, 24 Parganas (N), Nadia, Burdwan, Howrah, Murshidabad, Darjeeling, Cooch Behar	Malda, Jalpaiguri, Bankura, Dakshin Dinajpur, Midnapore, Birbhum, Uttar Dinajpur, 24 Parganas (S), Purulia, Kolkata
2	Gross value of agricultural produce per capita of rural population	782.95 (Rs.)	Darjeeling, Burdwan, Hooghly, Dakshin Dinajpur, Jalpaiguri, Bankura, Nadia, Cooch Behar, Birbhum	24 Parganas (N), Uttar Dinajpur, Murshidabad, Malda, Midnapore, Purulia, Howrah, 24 Parganas (S), Kolkata
3	Gross value of agricultural produce per agricultural workers	9150.00 (Rs.)	Darjeeling, Kolkata, Jalpaiguri, Cooch Behar, Nadia	Hooghly, Bankura, 24 Parganas (N), Midnapore, Dakshin Dinajpur, Murshidabad, Burdwan, Birbhum, Malda, Uttar Dinajpur, Purulia, Howrah, 24 Parganas (S)

4	Percentage of area under commercial crops to gross cropped area	15.152 (In hectare)	Jalpaiguri, Hooghly, Nadia, Murshidabad, Cooch Behar, Uttar Dinajpur, Darjeeling, 24 Parganas (N), Burdwan	Malda, Dakshin Dinajpur, Birbhum, Bankura, Midnapore, Howrah, 24 Parganas (S), Purulia, Kolkata
5	Percentage of Net Area Sown to Total Geographical Area	60.891 (In hectare)	Uttar Dinajpur, Dakshin Dinajpur, Murshidabad, Birbhum, Nadia, Cooch Behar, Hooghly, 24 Parganas (N), Malda, Burdwan,	Midnapore, Howrah, , Bankura, Jalpaiguri, Purulia, Darjeeling, 24 Parganas (S), Kolkata
6	Cropping Intensity	153.540	Darjeeling, Nadia, Uttar Dinajpur, Murshidabad, Hooghly, Cooch Behar, 24 Parganas (N), Burdwan	Malda, Dakshin Dinajpur, Howrah, Birbhum, Midnapore, Bankura, Jalpaiguri, 24 Parganas (S), Purulia, Kolkata
7	Percentage of Agricultural workers to total ( main ) workers	25.406	Birbhum, Uttar Dinajpur, Malda, Bankura, Dakshin Dinajpur, Burdwan, 24 Parganas (S), Murshidabad, Nadia, Hooghly, Cooch Behar, Purulia, Midnapore	24 Parganas (N), Jalpaiguri, Howrah, Darjeeling, Kolkata
8	Credit to Agriculture ( Rs. Per Capita)	83.000	Uttar Dinajpur, Dakshin Dinajpur, Midnapore, Darjeeling, Birbhum, Hooghly, Nadia, Burdwan,	Malda, Bankura, Murshidabad, Jalpaiguri, Cooch Behar, Howrah, Purulia, 24 Parganas (N), 24 Parganas (S), Kolkata
9	Consumption of fertilizer per hectare of gross cropped area	84.56 (Kg)	Howrah, Hooghly, Birbhum, 24 Parganas (N), Malda, Darjeeling,	Nadia, Purulia, Murshidabad, Cooch Behar, Midnapore, Uttar Dinajpur, Bankura, 24 Parganas (S), Jalpaiguri, Burdwan, Dakshin Dinajpur, Kolkata
10	Average size of holdings ( in hectare)	0.893	Darjeeling, Jalpaiguri, Burdwan, Birbhum Bankura, Purulia, Cooch Behar, Nadia	Malda, Murshidabad, Midnapore, Hooghly, 24 Parganas (S), 24Pargana(N), Uttar Dinajpur, Dakshin Dinajpur, Howrah, Kolkata

Table 3.4: Distribution of Districts by Relative Levels of Socio-economic Development in West Bengal 2000-01

Sl. No.	Indicators	State Average	Developed Districts	Developing Districts
<i>Agriculture Sector</i>				
1	Gross value of agricultural produce per	34523.73 (Rs.)	Howrah, Hooghly, Nadia, Malda, 24 Parganas (N), Murshidabad,	Midnapore, Cooch Behar, Bankura, Dakshin Dinajpur, Jalpaiguri, 24 Parganas (S),

	hectare of net area sown		Darjeeling, Burdwan,	Uttar Dinajpur, Birbhum, Purulia, Kolkata
2	Gross value of agricultural produce per capita of rural population	3199.49 (Rs.)	Darjeeling, Dakshin Dinajpur, Nadia, Burdwan, Hooghly, Jalpaiguri, Cooch Behar, Bankura, Malda, Midnapore, Uttar Dinajpur	24 Parganas (N), Murshidabad, Birbhum, Howrah, Purulia, 24 Parganas (S), Kolkata
3	Gross value of agricultural produce per agricultural workers	32100.00 (Rs.)	Darjeeling, Kolkata, Jalpaiguri, Nadia, Howrah	24 Parganas (N), Cooch Behar, Hooghly, Murshidabad, Malda, Dakshin Dinajpur, Midnapore, Burdwan, Bankura, Birbhum, Uttar Dinajpur, 24 Parganas (S), Purulia,
4	Percentage of area under commercial crops to gross cropped area	17.349 (in hectare)	Hooghly, Nadia, Murshidabad, Jalpaiguri, Cooch Behar, Uttar Dinajpur, 24 Parganas (N)	Darjeeling, Malda, Dakshin Dinajpur, Burdwan, Howrah, Birbhum, Midnapore, 24 Parganas (S), Bankura, Purulia, Kolkata
5	Percentage of Net Area Sown to Total Geographical Area	60.906 (in hectare)	Uttar Dinajpur, Dakshin Dinajpur, Cooch Behar, Nadia, Birbhum, Murshidabad, Hooghly, Burdwan, 24 Parganas (N), Midnapore,	Malda, Howrah, Jalpaiguri, Bankura, Purulia, Darjeeling, 24 Parganas (S), Kolkata
6	Cropping Intensity	160.673	Darjeeling, Nadia, 24 Parganas (N), Murshidabad, Cooch Behar, Howrah, Uttar Dinajpur, Hooghly, Jalpaiguri, Burdwan, Midnapore	Dakshin Dinajpur, Bankura, 24 Parganas (S), Darjeeling, Birbhum, Purulia, Kolkata
7	Percentage of Agricultural workers to total ( main ) workers	25.538	Uttar Dinajpur, Birbhum, Dakshin Dinajpur, Purulia, Bankura, Midnapore, Malda, Burdwan, Cooch Behar, Murshidabad, 24 Parganas (S)	Hooghly, Nadia, Jalpaiguri, 24 Parganas (N), Darjeeling, Howrah, Kolkata
8	Credit to Agriculture ( Rs. Per Capita)	97.000	Darjeeling, Birbhum, Hooghly, Midnapore, Burdwan, Nadia, Bankura, Malda, Cooch Behar	Murshidabad, 24 Parganas (N), 24 Parganas (S), Jalpaiguri, Purulia, Howrah, Uttar Dinajpur, Dakshin Dinajpur, Kolkata
9	Consumption of fertilizer per hectare of gross cropped area	127.91 (Kg)	Howrah, Hooghly, Darjeeling, Burdwan, Purulia, Birbhum	24 Parganas (N), 24 Parganas (S), Cooch Behar, Midnapore, Bankura, Jalpaiguri, Malda, Uttar Dinajpur, Nadia, Murshidabad, Dakshin Dinajpur,

				Kolkata
10	Average size of holdings (in hectare)	0.785	Darjeeling, Jalpaiguri, Birbhum, Bankura, Burdwan, Cooch Behar, Nadia, Purulia, Malda	Murshidabad, 24 Parganas (N), Hooghly, Midnapore, 24 Parganas (S), Uttar Dinajpur, Howrah, Dakshin Dinajpur, Kolkata

Indicator 8, in the year 1990-91 and 2000-01 although some districts are reshuffled, viz. Uttar Dinajpur, Dakshin Dinajpur, Malda, Bankura and other districts remain the same positioned in respect of credit to agriculture (Rs. Per capita) these districts are Darjeeling, Birbhum, Hooghly, Midnapore, Burdwan, Nadia, which improve is an outcome of utilization of several inputs like improved seeds, fertilizer and this shows the extent of modernization of agriculture in these districts. Being an agricultural state, average size of holdings is an important indicator in the aspect of agricultural development, viz. Darjeeling, Jalpaiguri, Birbhum, Bankura, Burdwan, Cooch Behar, Nadia, Purulia and Malda districts are above in the state average which indicates that, capability of land holding are high in comparison of other districts in the year 1990-91 and 2000-01.

**Table 3.5: Indicator-wise Coefficient of Variation (%)**

Sl. No.	Indicators	1980-81	1990-91	2000-01
1	Gross value of agricultural produce per hectare of net area sown	43.05	41.00	40.15
2	Gross value of agricultural produce per capita of rural population	40.50	36.38	34.05
3	Gross value of agricultural produce per agricultural worker	31.57	48.02	56.88
4	Percentage of area under commercial crops to gross cropped area	70.21	57.08	64.19
5	Percentage of net area sown to total geographical area	37.16	30.44	32.89
6	Cropping intensity	39.15	31.62	30.89
7	Percentage of agricultural workers to total (main) workers	38.96	37.40	42.05
8	Credit to Agriculture ( Rs. Per Capita)	121.49	64.68	47.16
9	Consumption of fertilizer per hectare of gross cropped area	80.56	61.02	59.77
10	Average size of holdings	48.82	49.86	44.76

Source: Authors Calculation

Inter-districts variations have been examined with the help of the coefficient of variation at three points of time as depicted in Table 3.5. The analysis of trends in the inter-district variation presents a mixed picture as the value of the

co-efficient of variation suggests. Disparities in most of the indicators remain wide in spite of the planned efforts to reduce them. Disparities as per the gross value of agricultural produce per hectare of net area sown, agricultural produce per capita of rural population, cropping intensity, credit to agriculture and consumption of fertilizer per hectare of gross cropped area have shown declining trend.

On the other hand, the disparities with respect to the indicator like, gross value of agricultural produce per agricultural workers shown a rising trend between 1980-81 and 2000-01. In the case of indicator average size of holding has increased slightly between 1980-81 and 1990-91 but declined in 2000-01.

### **3.3.3 District-wise Composite Indices of Agriculture Development:**

#### *District-wise Analysis of the Level of Agricultural Development*

District-wise level of agricultural development has been analyzed with the help of composite indices of agricultural development. These indices have been calculated by taking first principal component from the principal component matrix derived from the inter-correlation matrix of 10 (ten) variables.

The inter-correlation matrices of the selected 10 variables of agricultural development separately for the years 1980-81, 1990-91 and 2000-01 are given in Tables 3.6, 3.7 and 3.8 respectively.

It may be observed from Table 3.6 that the value of agricultural produce per hectare of net area sown is positively and significantly correlated with value of agricultural produce per capita of rural population, cropping intensity and consumption of fertilizer per hectare of gross cropped area.

Correspondingly, Table 3.7 reveals that value of agricultural produce per hectare of net area sown is significantly and positively correlated with value of agricultural produce per capita of rural population, percentage of area under commercial crops to gross cropped area, percentage of net area sown to total geographical area, cropping intensity and consumption of fertilizer per hectare of gross cropped area.

Inter-correlation matrix of 2000-01, Table 3.8 depicts that value of agricultural produce per hectare of net area sown is significantly and positively associated with gross value of agricultural produce per capita of rural population, percentage of area under commercial crops to gross cropped area, percentage of net area sown to total geographical area, cropping intensity and consumption of

fertilizer per hectare of gross cropped area. Obviously, this correlation matrix does not represent a clear-cut picture.

**Table 3.6: Inter-Correlation Matrix of Agriculture Development (1980-81)**

Variable Number	A - 1	A - 2	A - 3	A - 4	A - 5	A - 6	A - 7	A - 8	A - 9	A - 10
A - 1	1.000									
A - 2	0.613	1.000								
A - 3	0.242	0.627	1.000							
A - 4	0.168	0.134	0.279	1.000						
A - 5	0.401	0.712	0.033	0.328	1.000					
A - 6	0.489	0.201	0.111	0.616	0.166	1.000				
A - 7	0.254	0.725	-0.100	0.057	0.749	0.098	1.000			
A - 8	0.096	-0.138	0.386	0.667	-0.259	0.607	-0.350	1.000		
A - 9	0.744	0.200	-0.200	0.102	0.331	0.209	0.044	-0.068	1.000	
A - 10	0.210	0.128	0.423	0.476	-0.143	0.703	-0.027	0.816	-0.124	1.000

Note: Critical value of r at 10 percent level = 0.497  
 Critical value of r at 5 percent level = 0.576  
 Critical value of r at 1 percent level = 0.714

**Table 3.7: Inter-Correlation Matrix of Agriculture Development (1990-91)**

Variable number	A - 1	A - 2	A - 3	A - 4	A - 5	A - 6	A - 7	A - 8	A - 9	A - 10
A - 1	1.000									
A - 2	0.615	1.000								
A - 3	-0.223	0.014	1.000							
A - 4	0.672	0.719	0.171	1.000						
A - 5	0.598	0.673	-0.588	0.548	1.000					
A - 6	0.804	0.527	-0.538	0.590	0.828	1.000				
A - 7	0.204	0.466	-0.723	0.168	0.751	0.522	1.000			
A - 8	0.114	0.546	-0.087	0.347	0.536	0.311	0.491	1.000		
A - 9	0.600	0.031	-0.371	0.097	0.313	0.578	-0.006	-0.049	1.000	
A - 10	0.213	0.654	0.318	0.437	0.140	0.134	0.063	0.194	-0.038	1.000

Note: Critical value of r at 10 percent level = 0.497  
 Critical value of r at 5 percent level = 0.576  
 Critical value of r at 1 percent level = 0.714

**Table 3.8: Inter-Correlation Matrix of Agriculture Development (2000-01)**

Variable number	A - 1	A - 2	A - 3	A - 4	A - 5	A - 6	A - 7	A - 8	A - 9	A - 10
A - 1	1.000									
A - 2	0.570	1.000								
A - 3	-0.033	0.070	1.000							
A - 4	0.617	0.540	0.054	1.000						
A - 5	0.498	0.679	-0.484	0.615	1.000					
A - 6	0.829	0.679	-0.297	0.683	0.777	1.000				
A - 7	-0.060	0.356	-0.761	-0.005	0.644	0.316	1.000			
A - 8	0.421	0.585	0.093	0.254	0.293	0.343	0.209	1.000		
A - 9	0.559	0.109	-0.066	0.110	0.162	0.256	-0.149	0.328	1.000	
A - 10	0.207	0.637	0.258	0.179	0.161	0.275	0.140	0.726	0.148	1.000

Note: Critical value of r at 10 percent level = 0.497  
 Critical value of r at 5 percent level = 0.576  
 Critical value of r at 1 percent level = 0.714

Hence, from this inter-correlation matrix (Table 3.6), a matrix of Principal Components (PCs) has been derived as per the procedure explained in *Methodology* for the year 1980-81 which is presented in Table 3.9. In the same way, Principal Component matrices for the years 1990-91 and 2000-01 have also been derived and presented in Tables 3.10 and 3.11 respectively.

It may be observed from Table 3.9 that the principal component matrix has retain four principal components, which taken together, explains 88.85 per cent of the total variance. Four principal indicators are significantly correlated with the first principal component ( $a_i s > or = 0.576$  is significant for 10 degrees of freedom at 5 per cent level of significance). It explained 38.53 per cent of the total variance.

As is obvious from the last column of Table 3.9, all the communalities ( $h^2$ ) are very high ranging from +0.69 to +0.98, which indicates that each variable taken for analysis is significantly correlated with all other variables.

**Table 3.9: Principal Component Matrix of Agricultural Development (1980-81)**

Variable	$P_1$	$P_2$	$P_3$	$P_4$	$h^2$
1	-0.044	0.716	-0.615	-0.234	0.947
2	-0.489	0.760	0.339	-0.216	0.979
3	0.255	0.735	0.473	-0.287	0.911
4	0.535	0.358	0.163	0.724	0.965
5	-0.702	0.359	0.139	0.540	0.932
6	0.758	0.200	-0.169	0.217	0.691
7	-0.735	0.072	0.424	0.132	0.743
8	0.930	0.162	0.107	0.095	0.912
9	-0.163	0.363	-0.864	0.117	0.919
10	0.873	0.099	0.261	-0.215	0.886
<i>Eigenvalue</i>	3.853	2.099	1.799	1.134	
<i>Percentage Variance</i>	38.530	20.991	17.985	11.339	
<i>Cumulative Variance (%)</i>	38.530	59.522	77.507	88.846	

The selected indicators were, by and large, correlated with each other in the reference years, i.e. 1980-81, 1990-91 and 2000-01, and in most of the cases the correlation was significant as well. The first principal component explained 38.53 percent of the total variance in 1980-81, 46.39 percent in 1990-91 and 43.55 percent in 2000-01.

The composite index of agricultural development for each district at three selected points of time was computed. Such an index of Agricultural Development ( $AD_1$ ) for 1980-81 was computed by using the following equation:

$$AD_1 = (-0.04399) Z_1 + (-0.48874) Z_2 + (0.25493) Z_3 + (0.53487) Z_4 + (-0.70163) Z_5 + (0.75832) Z_6 + (-0.73493) Z_7 + (0.93016) Z_8 + (-0.16285) Z_9 + (0.87291) Z_{10} \dots\dots\dots (I)$$

Where,  $AD_1$  is composite index of agricultural development of a district,  $Z_1, Z_2, Z_3, Z_4, \dots, Z_{10}$  are the values of variables in standardized form and the figures in parentheses are factor *loadings* or *weights*.

The above Equation (I) shows that the coefficient of correlation of agricultural development ranges between -0.04 and +0.93.

Variable	$P_1$	$P_2$	$P_3$	$h^2$
1	0.785	0.043	0.538	0.908
2	0.801	0.503	-0.146	0.916
3	-0.452	0.828	0.176	0.921
4	0.701	0.518	0.185	0.794
5	0.926	-0.187	-0.177	0.923
6	0.900	-0.224	0.242	0.919
7	0.667	-0.347	-0.587	0.909
8	0.538	0.184	-0.548	0.623
9	0.412	-0.392	0.678	0.783
10	0.339	0.717	-0.010	0.629
<i>Eigenvalue</i>	4.640	2.116	1.571	
<i>Percentage Variance</i>	46.397	21.163	15.705	
<i>Cumulative Variance (%)</i>	46.397	67.560	83.265	

Variable	$P_1$	$P_2$	$P_3$	$P_4$	$h^2$
1	0.785	0.254	-0.465	0.129	0.913
2	0.855	0.146	0.277	-0.224	0.881
3	-0.223	0.883	0.059	-0.328	0.940
4	0.700	0.134	-0.353	-0.453	0.838
5	0.835	-0.435	-0.064	-0.124	0.906
6	0.896	-0.111	-0.265	-0.107	0.898
7	0.415	-0.776	0.438	0.092	0.975
8	0.632	0.363	0.468	0.292	0.835
9	0.361	0.287	-0.365	0.761	0.925
10	0.515	0.448	0.647	0.071	0.890
<i>Eigenvalue</i>	4.355	2.102	1.458	1.085	
<i>Percentage Variance</i>	43.552	21.023	14.584	10.847	
<i>Cumulative Variance (%)</i>	43.552	64.575	79.159	90.006	

The composite index of agricultural development of a district for 1990-91 was constructed by using the following formula:

$$AD_2 = (0.78539) Z_1 + (0.80120) Z_2 + (-0.45224) Z_3 + (0.70100) Z_4$$

$$\begin{aligned}
 &+ (0.92578) Z_5 + (0.89996) Z_6 + (0.66660) Z_7 + (0.53776) Z_8 \\
 &+ (0.41155) Z_9 + (0.33926) Z_{10} \dots\dots\dots (II)
 \end{aligned}$$

Where,  $AD_2$  is composite index of agricultural development of a district,  $Z_1, Z_2, Z_3, Z_4, \dots, Z_{10}$  are the values of variables in standardized form and the figures in parentheses are factor *loadings or weights*.

The above equation (II) shows that the coefficient of correlation of agricultural development ranges between +0.33 and +0.92.

Similarly, the composite index of agricultural development of a district for the year 2000-01 was constructed by using the following formula:

$$\begin{aligned}
 AD_3 = &(0.78513) Z_1 + (0.85548) Z_2 + (-0.22307) Z_3 + (0.70042) Z_4 \\
 &+ (0.83471) Z_5 + (0.89635) Z_6 + (0.41540) Z_7 + (0.63158) Z_8 \\
 &+ (0.36072) Z_9 + (0.51461) Z_{10} \dots\dots\dots (III)
 \end{aligned}$$

Where,  $AD_3$  is composite index of agricultural development of a district,  $Z_1, Z_2, Z_3, Z_4, \dots, Z_{10}$  are the values of variables in standardized form and the figures in parentheses are factor *loading or weights*.

The equation (III) reveals that the coefficient of correlation of agricultural development ranges between -0.22 and +0.89.

All the eighteen districts of West Bengal have been ranked according to their levels of agricultural development as per values of indices during three selected points of time, i.e. 1980-81, 1990-91 and 2000-01 (Table 3.12).

It is clear from the Table 3.12 (*Figure 3.1*) that on the basis of level of agricultural development in 1980-81, district Darjeeling was at the top position followed by Jalpaiguri, Nadia and Cooch Behar, in that order. On the other hand, district Dakshin Dinajpur was at bottom, preceded immediately by Uttar Dinajpur. After a decade, in 1990-91, district Hooghly was at the topmost position, followed by Nadia, Uttar Dinajpur, Murshidabad, Burdwan, Birbhum, Dakshin Dinajpur, Malda, Cooch Behar, 24 Parganas (N), Bankura and Jalpaiguri. On the other hand, district Kolkata was at the bottom, preceded immediately by Purulia. The comparative levels of agricultural development as reflected in the ranking of the districts in the year 2000-01 at top position was Nadia, followed by Hooghly, Cooch Behar, Malda, Burdwan, Murshidabad, Darjeeling, Birbhum, 24 Parganas (N), Uttar Dinajpur, Jalpaiguri, Midnapore, Dakshin Dinajpur and Howrah. On the other hand, district Kolkata was at the bottom preceded immediately by Purulia, 24 Parganas (S) and Bankura.

<b>Table 3.12: District-wise Indices of Agricultural Development</b>						
<i>Districts</i>	1980-81		1990-91		2000-01	
	<i>Index</i>	<i>Rank</i>	<i>Index</i>	<i>Rank</i>	<i>Index</i>	<i>Rank</i>
Burdwan	0.1399	9	0.8450	5	0.8429	5
Birbhum	0.0711	16	0.8285	6	0.7980	8
Bankura	0.1143	12	0.7546	11	0.7265	15
Midnapore	0.0810	15	0.7066	14	0.7700	12
Howrah	0.1260	11	0.7268	13	0.7519	14
Hooghly	0.1593	6	1.0000	1	0.9796	2
24 Parganas (N)	0.1313	10	0.7641	10	0.7949	9
24 Parganas (S)	0.1112	14	0.5443	17	0.5613	16
Nadia	0.2340	3	0.9409	2	1.0000	1
Murshidabad	0.1490	7	0.8451	4	0.8313	6
Malda	0.1115	13	0.8167	8	0.8490	4
Uttar Dinajpur	0.0692	17	0.8867	3	0.7933	10
Dakshin Dinajpur	0.0000	18	0.8183	7	0.7698	13
Jalpaiguri	0.5814	2	0.7518	12	0.7747	11
Darjeeling	1.0000	1	0.7054	15	0.8239	7
Cooch Behar	0.2273	4	0.8111	9	0.8559	3
Purulia	0.1633	5	0.5527	16	0.5586	17
Kolkata	0.1478	8	0.0000	18	0.0000	18
<i>Mean</i>	<i>0.2010</i>		<i>0.7388</i>		<i>0.7490</i>	
<i>S.D.</i>	<i>0.2621</i>		<i>0.2225</i>		<i>0.2171</i>	
<i>C.V.</i>	<i>130.43</i>		<i>30.11</i>		<i>28.99</i>	
<i>Rank Correlation Coefficients are: <math>R_{12} = -0.084</math>, <math>R_{13} = +0.33</math>, <math>R_{23} = +0.76</math></i>						

It may be observed from the Table 3.12 that the absolute average index for the state as a whole has increased marginally during the three points of time as it increased by + 0.5378 and + 0.0102 points in the reference years. Thus, marginal increase points towards improvement in the level of agricultural development.

The extent of disparities may also be visualized from the Table 3.12. It is found that the value of coefficient of variation has shown declining trend during the period of 1980-81 to 2000-01.

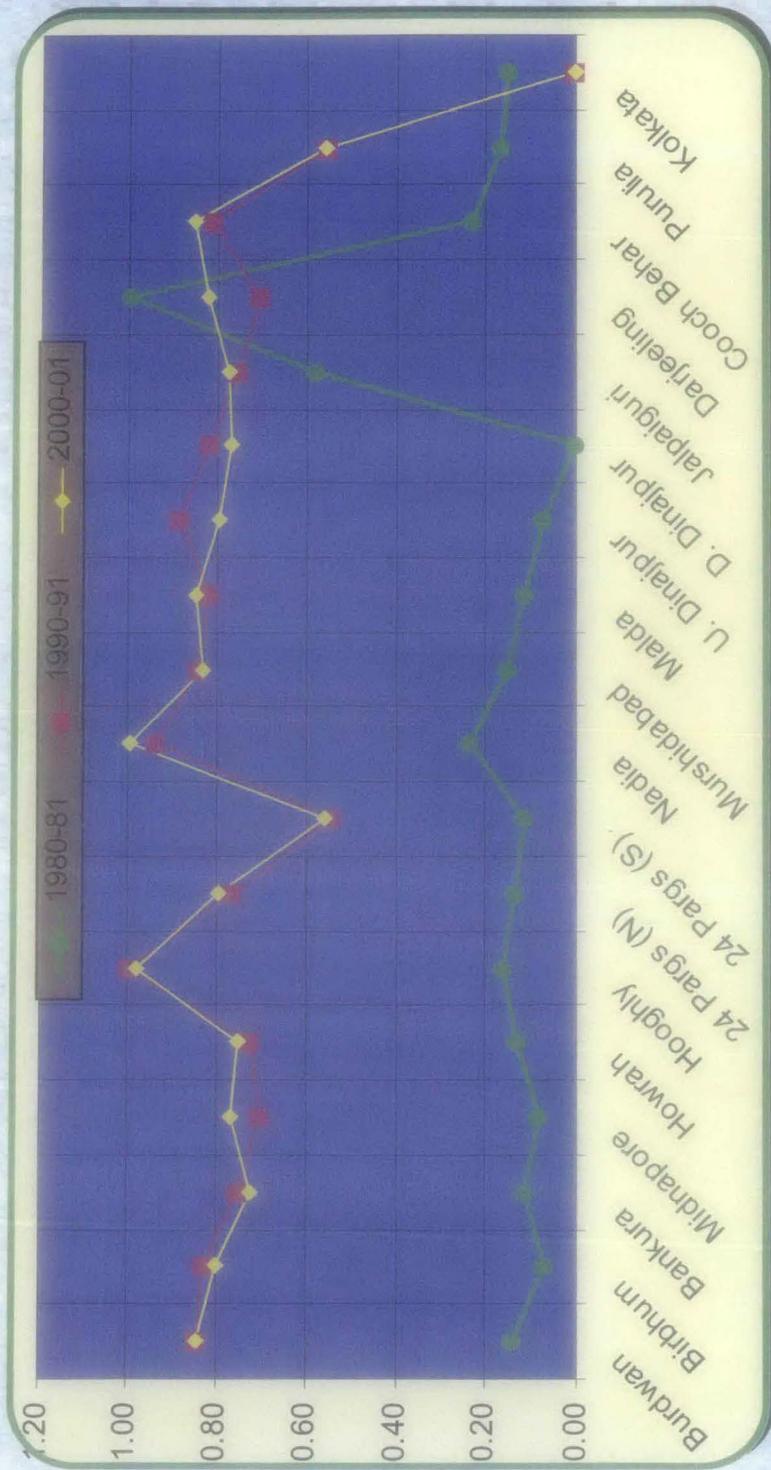


Figure 3.1: Patterns of Agricultural Development

Further, the districts have been classified into two categories on the basis of their levels of agricultural development. On the basis of levels of development the districts have been classified as developed and developing. Developed districts are those which have the composite index value of agricultural development above the state average whereas developing districts have a value below the state average.

<b>Table 3.13: Classification of District According to Level of Agricultural Development</b>					
1980-81		1990-91		2000-01	
<i>Districts</i>	<i>Index</i>	<i>Districts</i>	<i>Index</i>	<i>Districts</i>	<i>Index</i>
<i>Developed Districts</i>					
Darjeeling	1.0000	Hooghly	1.0000	Nadia	1.0000
Jalpaiguri	0.5814	Nadia	0.9409	Hooghly	0.9796
Nadia	0.2340	Uttar Dinajpur	0.8867	Cooch Behar	0.8559
Cooch Behar	0.2273	Murshidabad	0.8451	Malda	0.8490
		Burdwan	0.8450	Burdwan	0.8429
		Birbhum	0.8285	Murshidabad	0.8313
		Dakshin Dinajpur	0.8183	Darjeeling	0.8239
		Malda	0.8167	Birbhum	0.7980
		Cooch Behar	0.8111	24 Parganas (N)	0.7949
		24 Parganas (N)	0.7641	Uttar Dinajpur	0.7933
		Bankura	0.7546	Jalpaiguri	0.7747
		Jalpaiguri	0.7518	Midnapore	0.7700
				Dakshin Dinajpur	0.7698
				Howrah	0.7519
<i>Mean</i>	<i>0.5107</i>		<i>0.8386</i>		<i>0.8311</i>
<i>C.V.</i>	<i>66.61</i>		<i>16.50</i>		<i>17.27</i>
<i>Developing Districts</i>					
Purulia	0.1633	Howrah	0.7268	Bankura	0.7265
Hooghly	0.1593	Midnapore	0.7066	24 Parganas (S)	0.5613
Murshidabad	0.1490	Darjeeling	0.7054	Purulia	0.5586
Kolkata	0.1478	Purulia	0.5527	Kolkata	0.0000
Burdwan	0.1399	24 Parganas (S)	0.5443		
24 Parganas (N)	0.1313	Kolkata	0.0000		
Howrah	0.1260				
Bankura	0.1143				
Malda	0.1115				
24 Parganas (S)	0.1112				
Midnapore	0.0810				
Birbhum	0.0711				
Uttar Dinajpur	0.0692				
Dakshin Dinajpur	0.0000				
<i>Mean</i>	<i>0.1125</i>		<i>0.53932</i>		<i>0.46162</i>
<i>C.V.</i>	<i>95.80</i>		<i>56.47</i>		<i>70.24</i>

The classification of districts according to composite index of agricultural development for the year 1980-81, 1990-91 and 2000-01 is given in Table 3.13.

It is important to note that in order to compute mean and standard deviation, a positive constant of maximum minus value has been added to the entries in all the variables to have a data set with all positive values.

Inter-temporal analysis of Table 3.13 reveals that in 1980-81 four districts, viz. Darjeeling, Jalpaiguri, Nadia and Cooch Behar were in the developed districts category. In 1990-91, twelve districts, namely Hooghly, Nadia, Uttar Dinajpur, Murshidabad, Burdwan, Birbhum, Dakshin Dinajpur, Malda, Cooch Behar, 24 Parganas (N), Bankura and Jalpaiguri, got placed in this category. Further, in 2000-01, here also fourteen districts, viz. Nadia, Hooghly, Cooch Behar, Malda, Burdwan, Murshidabad, Darjeeling, Birbhum, 24 Parganas (N), Uttar Dinajpur, Jalpaiguri, Midnapore, Dakshin Dinajpur and Howrah fell in the developed category districts but some districts have changed their position in comparison to 1990-91.

Thus, it appears that the inter-district disparities of agricultural development, which actually featured in the year 1990-91 and also continued to exist up to 2000-01 with inconsequential shifting in the ranking pattern. But in the year 1980-81, the patterns of agricultural development have considerably changed. One district, viz. Darjeeling which was in the list of developed districts during 1980-81, but in 1990-91 and also in 2000-01 reshuffled some districts, namely, Uttar Dinajpur, Dakshin Dinajpur, Malda, Midnapore, Birbhum and 24 Parganas (N) are emerged from developing to developed districts. This fact may be seen in the context of considerable increase in some of the key indicators, viz. value of agricultural produce in terms of per hectare net area sown, per capita rural population, per agricultural workers and also percentage of area under commercial crops to gross cropped area in these districts.

Level of agricultural development at district level has further been analyzed with the help of varimax rotation of the factors of agricultural development so that various dimensions of agricultural development could be traced at district level.

### **3.4 District-wise Dimensions of Agricultural Development**

The various dimensions (*see note end of the chapter-3*) of agricultural development at district level with the help of Factor Analysis (cluster analysis) as

the purpose of Factor Analysis is to identify groups of variables with shared common variance. The various dimensions of agricultural development have been identified by rotating the principal component matrix with varimax rotation (Kaiser Varimax Method) for the selected reference years, i.e. 1980-81, 1990-91 and 2000-01. It is relevant to mention that the Principal Component Matrices have further been transformed into Rotated Factor Matrices for identification of various dimensions and extent of dimensional agricultural development at district level. Further, districts have been ranked according to level of development in various dimensions. For studying the nature and extent of dimensional development of different districts similarly selected indicators of agricultural development have been taken for analysis.

Evaluation of the factor loadings for the years 1980-81, 1990-91 and 2000-01 enables us to determine the factors. Each variable has been assigned to the factor with which it has the highest loading. The second, third and fourth highest loadings, if significant have also been considered. Only those factor loadings, which are greater than 0.576 (or nearer to this value), are considered as significant. Therefore, for calculating composite scores of different dimensions of each district only significant factor loadings have been considered. It is evident from the Tables 3.14, 3.16 and 3.18 that each variable is significantly correlated with at least one factor.

#### **3.4.1 (A) Dimensions of Agricultural Development, 1980-81:**

For the year 1980-81, the *first factor* explains 29.66 per cent of the total variance and two indicators are positively correlated with this factor. These indicators are percentage of net area sown to total geographical area and percentage of agricultural workers to total (main) workers. Again two indicators, namely credit to agriculture (Rs. per capita) and average size of holdings are negatively and significantly correlated with this factor. Evidently, only two indicators are positively and significantly correlated with this dimension of agricultural development. Hence, this cluster does not point out towards specific dimension of agricultural development.

The *second factor* explains 21.54 per cent of the total variance and three indicators are positively and significantly correlated with this factor. These indicators are namely, percentage of area under commercial crops to gross cropped area, cropping intensity and credit to agriculture (Rs. per capita). The

positive and significant association of proportion of area under commercial crops to gross cropped area which is an outcome of utilization of several inputs like improved seeds, fertilizer and irrigation shows the extent of modernization in agriculture. Therefore, this dimension of agricultural development may be named as *Modernized Agricultural Development*.

**Table 3.14: Rotated Factor Matrix (Varimax Method) 1980-81**

Variable	Factor-1	Factor-2	Factor-3	Factor-4	h <sup>2</sup>
1	-0.070	-0.025	0.907	0.343	0.947
2	0.469	-0.160	0.162	0.841	0.979
3	-0.154	0.222	-0.032	0.915	0.911
4	0.043	0.979	-0.034	0.062	0.965
5	0.942	0.125	0.112	0.127	0.932
6	-0.492	0.649	0.166	-0.018	0.691
7	0.750	-0.262	-0.258	0.211	0.743
8	-0.657	0.672	-0.100	0.138	0.912
9	0.111	0.027	0.932	-0.193	0.919
10	-0.761	0.404	-0.244	0.291	0.886
<i>Eigenvalue</i>	2.97	2.15	1.90	1.87	
<i>Percentage of Variance</i>	29.66	21.54	18.97	18.68	
<i>Cumulative Variance (%)</i>	29.66	51.20	70.17	88.85	

Note: Critical value of  $a_i$  at 5 per cent level = 0.576  
 Critical value of  $a_i$  at 1 per cent level = 0.714

The *third factor* explains 18.97 per cent of the total variance which has positive and significant correlation with two indicators, namely gross value of agricultural produce per hectare of net area sown and consumption of fertilizer per hectare of gross cropped area. Hence, this cluster does not point out towards specific dimension of agricultural development.

The *fourth factor* explains 18.68 per cent of total variance which has positive and significant correlation with two indicators, namely gross value of agricultural produce per capita of rural population and gross value of agricultural produce per agricultural workers. This dimension of agricultural development may be given the name *traditional agricultural development*.

The factor scores with respect to the first, second, third and fourth factors for the year 1980-81 have been calculated with the help of the following equations and presented in Table 3.15.

*First Dimension of Agricultural development*

$$AD_4 = (0.9423) Z_5 + (0.7502) Z_7 + (-0.6570) Z_8 + (-0.7606) Z_{10} \dots\dots\dots (IV)$$

Where  $AD_4$  is the first dimension of agricultural development;  $Z_5, Z_7, Z_8$  and  $Z_{10}$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the first factor.

*Second Dimension of Agricultural development*

$$AD_5 = (0.9789) Z_4 + (0.6486) Z_6 + (0.6717) Z_8 \dots\dots\dots (V)$$

Where  $AD_5$  is the second dimension of agricultural development;  $Z_4, Z_6$  and  $Z_8$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the second factor.

*Third Dimension of Agricultural development*

$$AD_6 = (0.9075) Z_1 + (0.9321) Z_9 \dots\dots\dots (VI)$$

Where  $AD_6$  is the third dimension of agricultural development;  $Z_1$  and  $Z_9$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the third factor.

*Fourth Dimension of Agricultural development*

$$AD_7 = (0.8407) Z_2 + (0.9152) Z_3 \dots\dots\dots (VII)$$

Where  $AD_7$  is the fourth dimension of agricultural development;  $Z_2$  and  $Z_3$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the fourth factor.

It may be observed from the Table 3.15 (Figures 3.2 and 3.3) that the first dimension of agricultural development is a cluster of indicators of agricultural sector. This dimension included the indicators percentage of net area sown to total geographical area and percentage of agricultural workers to total (main) workers, these two indicators has shown negative association with the factor. Therefore, proportion of geographical area and agricultural workers did not show any positive effect on development of agricultural sector relative to first dimension at district level. But two indicators are in positive association with the first factor which represents the performance of agricultural credit and land holdings on development of agricultural sector at district level, in these respects fourteen districts are positioned above the state average.

Likewise, second dimension of agricultural development during the same period was a cluster of indicators pertaining to multiple cropping intensity and agricultural credit which is dependency on agriculture sector for employment purpose. District Darjeeling emerged as the most developed, closely followed by

Jalpaiguri, Nadia, Hooghly, Cooch Behar, Uttar Dinajpur and Murshidabad as is evident from the ranking of these districts (Table 3.15).

The third dimension of agricultural development is a cluster of indicators of agricultural sector, which represent performance of value of agricultural produce and fertilizer consumption. In this respect district Hooghly was at the top in the list, closely followed by Howrah, Burdwan, 24 Parganas (N), Birbhum, Nadia and Darjeeling districts. On the other hand, the district which could be identified as the least developed was Kolkata, preceded by Jalpaiguri district.

The fourth dimension of agricultural development is cluster of indicators of agricultural sector, which represent performance of land and labour. In this respect district Dakshin Dinajpur was at the top in the Table 3.15 shown, closely followed by Burdwan, Hooghly, Birbhum, Bankura, Jalpaiguri, 24 Parganas (N), Cooch Behar, Purulia, Uttar Dinajpur and Midnapore districts. On the other hand, the district which could be identified as the least developed was Kolkata, preceded by 24 Parganas (S) district.

Table 3.15: Dimensions of Agricultural Development in 1980-81									
Sl. No.	Districts	First Dimension Index	Rank	Second Dimension Index	Rank	Third Dimension Index	Rank	Fourth Dimension Index	Rank
1	Burdwan	0.7503	13	0.3709	9	0.6965	3	0.9743	2
2	Birbhum	0.8447	5	0.3009	12	0.4910	5	0.9051	4
3	Bankura	0.7693	11	0.2675	13	0.3037	13	0.8664	5
4	Midnapore	0.8310	6	0.2497	14	0.3900	9	0.6991	11
5	Howrah	0.7805	10	0.3155	11	0.8146	2	0.4716	16
6	Hooghly	0.8007	9	0.5568	4	1.0000	1	0.9157	3
7	24 Parganas (N)	0.7568	12	0.2494	15	0.5748	4	0.7699	7
8	24 Parganas (S)	0.7456	14	0.1931	16	0.2981	15	0.3984	17
9	Nadia	0.8141	7	0.6081	3	0.4589	6	0.6736	12
10	Murshidabad	0.8798	3	0.4777	7	0.4052	8	0.5887	15
11	Malda	0.8710	4	0.3777	8	0.3687	10	0.5969	14
12	Uttar Dinajpur	0.9911	2	0.4931	6	0.3088	12	0.7235	10
13	Dakshin Dinajpur	1.0000	1	0.3690	10	0.3229	11	1.0000	1
14	Jalpaiguri	0.3706	17	0.7361	2	0.2137	17	0.8129	6
15	Darjeeling	0.0000	18	1.0000	1	0.4227	7	0.6274	13
16	Cooch Behar	0.8097	8	0.5306	5	0.3006	14	0.7441	8
17	Purulia	0.6686	15	0.1736	17	0.2881	16	0.7423	9
18	Kolkata	0.5007	16	0.0000	18	0.0000	18	0.0000	18
	Mean	0.7325		0.4039		0.4255		0.6950	
	C. V.	31.55		74.04		70.46		35.90	

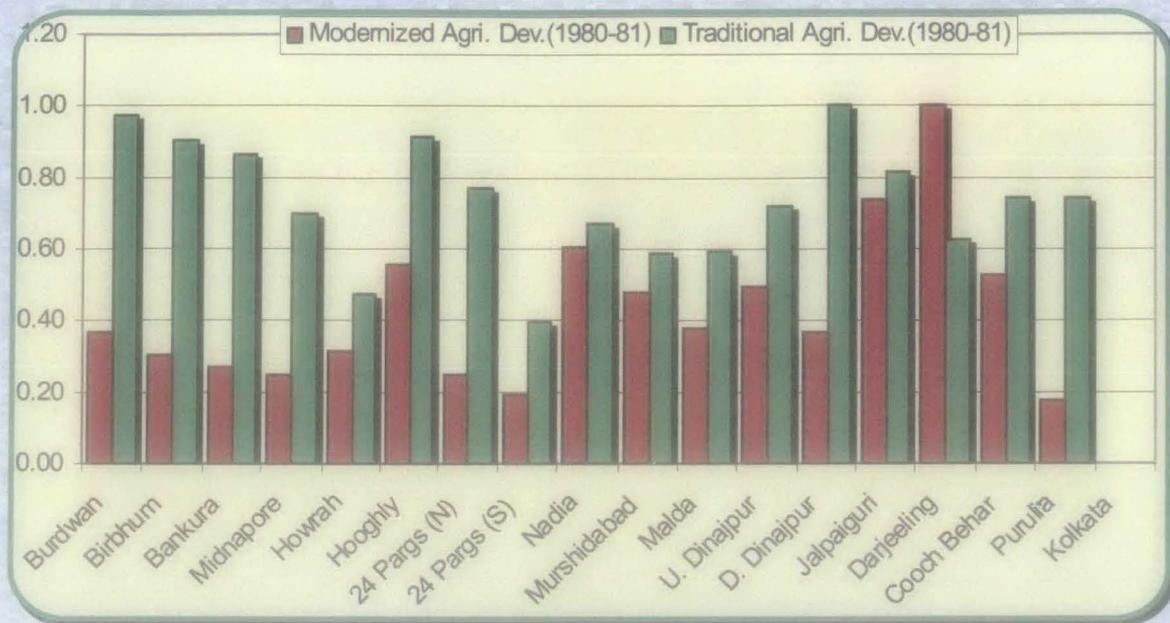


Figure 3.2: Dimensions of Agricultural Development in 1980-81

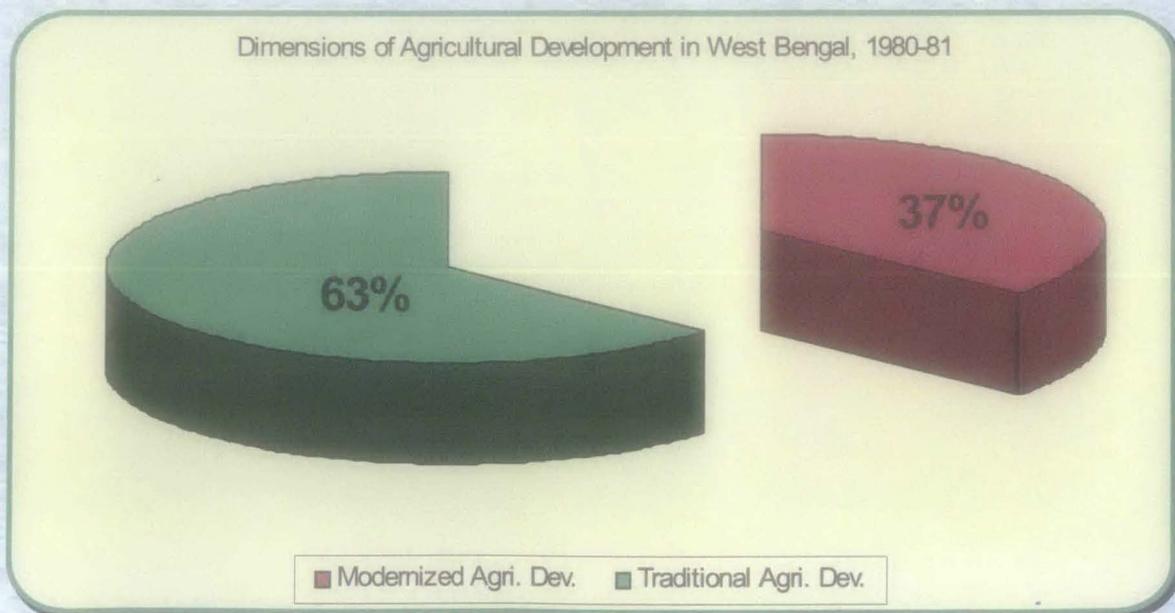


Figure 3.3

### 3.4.2 (B) Dimensions of Agricultural Development, 1990-91:

On the basis of three identified factors after rotating principal component matrix into varimax rotation, three dimensions of agricultural development have been worked for the year 1990-91.

Variable	Factor-1	Factor-2	Factor-3	$h^2$
1	0.133	0.425	0.843	0.908
2	0.416	0.841	0.190	0.916
3	-0.728	0.484	-0.397	0.921
4	0.128	0.798	0.375	0.794
5	0.785	0.308	0.461	0.923
6	0.505	0.257	0.773	0.919
7	0.951	0.046	0.056	0.909
8	0.636	0.439	-0.161	0.623
9	-0.031	-0.141	0.873	0.783
10	-0.053	0.790	-0.044	0.629
Eigenvalue	2.92	2.76	2.65	
Percentage of Variance	29.21	27.59	26.47	
Cumulative Variance (%)	29.21	56.79	83.27	

Note: Critical value of  $a_i$  at 5 per cent level = 0.576  
Critical value of  $a_i$  at 1 per cent level = 0.714

The *first dimension* of agricultural development exhibits a cluster of indicators, namely percentage of net area sown to total geographical area, cropping intensity, percentage of agricultural workers to total (main) workers and credit to agriculture (Rs. per capita), which has been named as *traditional agricultural development*.

The *second dimension* is group of indicators, viz. gross value of agricultural produce per capita of rural population, percentage of area under commercial crops to gross cropped area and average size of holdings. Hence, this cluster does not point out towards specific dimension of agricultural development.

The *third dimension* is group of indicators, viz. gross value of agricultural produce per hectare of net area sown, cropping intensity and consumption of fertilizer per hectare of gross cropped area, which has been named as *modernized agricultural development*.

The factor scores with respect to the first and third factors for the year 1990-91 have been calculated with the help of the following equations and presented in Table 3.17.

*First Dimension of Agricultural development*

$$AD_8 = (-0.7277) Z_3 + (0.7848) Z_5 + (0.5051) Z_6 + (0.9508) Z_7 + (0.6365) Z_8 \dots\dots\dots (VIII)$$

Where  $AD_8$  is the first dimension of agricultural development;  $Z_3$ ,  $Z_5$ ,  $Z_6$ ,  $Z_7$  and  $Z_8$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the first factor.

*Second Dimension of Agricultural development*

$$AD_9 = (0.8410) Z_2 + (0.7979) Z_4 + (0.7901) Z_{10} \dots\dots\dots (IX)$$

Where  $AD_9$  is the second dimension of agricultural development;  $Z_2$ ,  $Z_4$  and  $Z_{10}$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the second factor.

*Third Dimension of Agricultural development*

$$AD_{10} = (0.8426) Z_1 + (0.7730) Z_6 + (0.8729) Z_9 \dots\dots\dots (X)$$

Where  $AD_{10}$  is the third dimension of agricultural development;  $Z_1$ ,  $Z_6$  and  $Z_9$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the third factor.

**Table 3.17: Dimensions of Agricultural Development in 1990-91**

Sl. No.	Districts	First Dimension Index	Rank	Second Dimension Index	Rank	Third Dimension Index	Rank
1	Burdwan	0.7456	8	0.7640	5	0.5986	8
2	Birbhum	0.8407	3	0.6577	8	0.5829	9
3	Bankura	0.7120	11	0.6816	7	0.5143	13
4	Midnapore	0.7266	9	0.4711	14	0.5254	11
5	Howrah	0.5701	12	0.2911	17	0.9837	2
6	Hooghly	0.7759	7	0.7785	4	1.0000	1
7	24 Parganas (N)	0.5680	13	0.5976	10	0.7188	4
8	24 Parganas (S)	0.5395	16	0.3254	16	0.4359	16
9	Nadia	0.8105	5	0.8028	3	0.7741	3
10	Murshidabad	0.7832	6	0.6539	9	0.6413	6
11	Malda	0.8121	4	0.5573	13	0.6556	5
12	Uttar Dinajpur	1.0000	1	0.5928	11	0.5250	12
13	Dakshin Dinajpur	0.8779	2	0.5666	12	0.4813	15
14	Jalpaiguri	0.5532	14	1.0000	1	0.4977	14
15	Darjeeling	0.5103	17	0.9885	2	0.5547	10
16	Cooch Behar	0.7257	10	0.7081	6	0.6174	7
17	Purulia	0.5515	15	0.4151	15	0.3825	17
18	Kolkata	0.0000	18	0.0000	18	0.0000	18
<i>Mean</i>		<i>0.6724</i>		<i>0.6029</i>		<i>0.5827</i>	
<i>C. V.</i>		<i>37.55</i>		<i>47.22</i>		<i>48.31</i>	

It is evident from the Table 3.17 (Figures 3.4 and 3.5) that second dimension revealed ten districts, namely Jalpaiguri, Darjeeling, Nadia, Hooghly, Burdwan, Cooch Behar, Bankura, Birbhum, Murshidabad and 24 Parganas (N) were fairly developed districts in respect of the second dimension or *traditional agricultural development*, and the remaining eight districts were found to be less developed due to their value of composite indices being lower than the state average.

Similarly, in the matter of third dimension, i.e., *modernized agricultural development* Hooghly, Howrah, Nadia, 24 Parganas (N), Malda, Murshidabad, Cooch Behar, Burdwan and Birbhum districts have emerged as developed districts and the remaining nine districts fall in the less developed category. It has been observed that commercialization of agricultural development has been taken place due to maximum use of fertilizer, which increases cropping intensity, which leads to increased value of agricultural produce in agricultural sector.

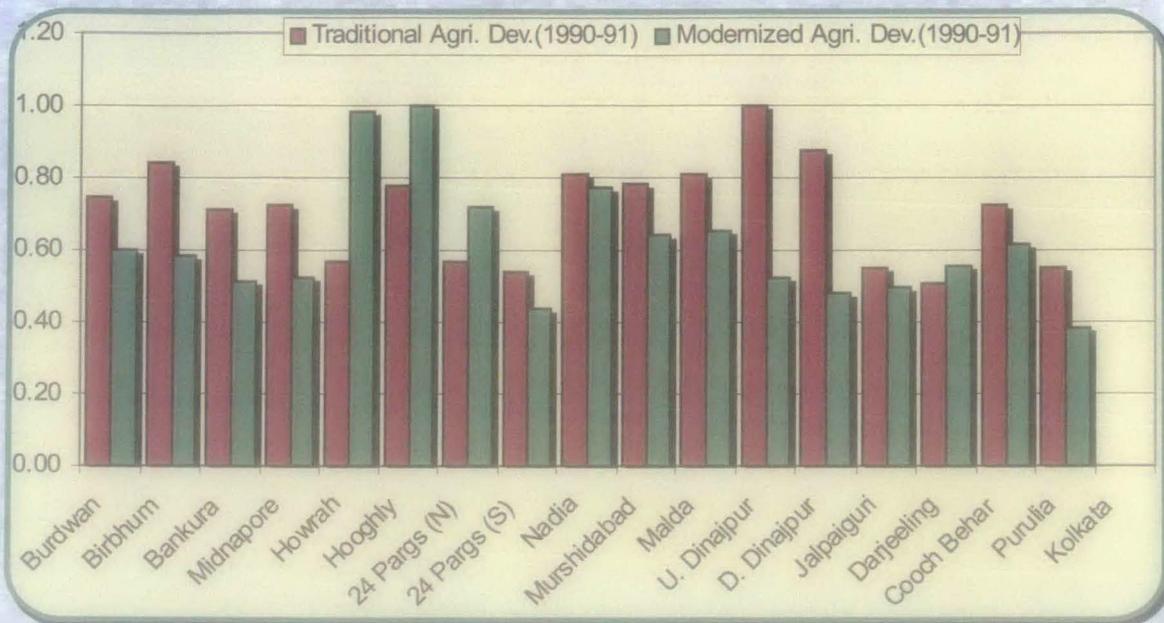


Figure 3.4: Dimensions of Agricultural Development in 1990-91

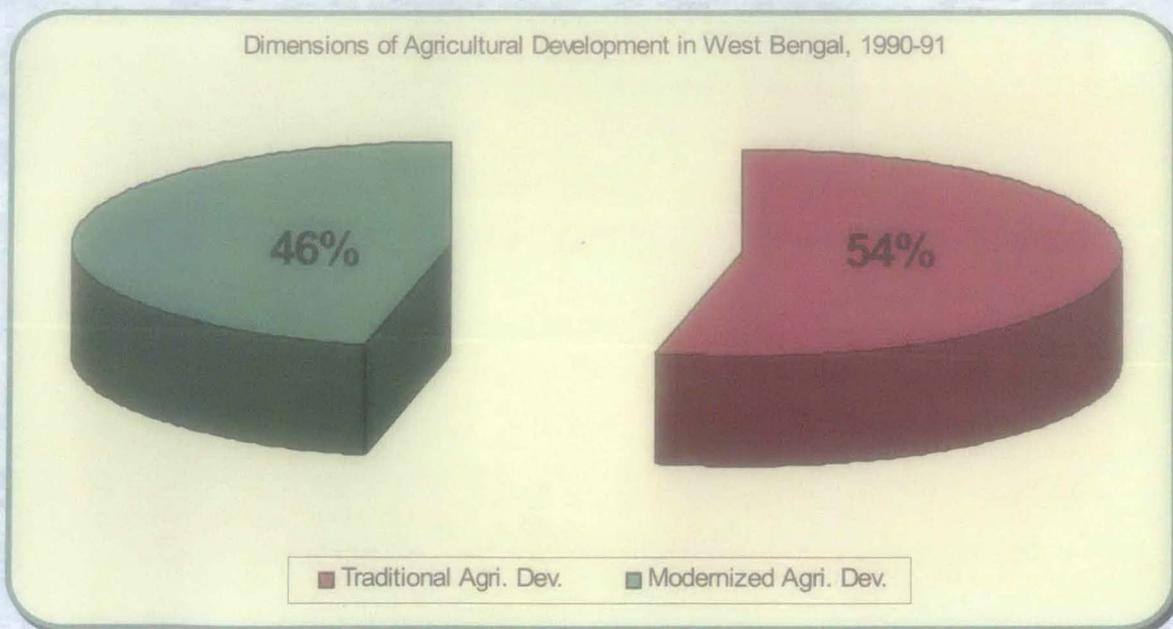


Figure 3.5

### 3.4.3 (C) Dimensions of Agricultural Development, 2000-01:

The *first factor* brings out the first dimension of agricultural development for the year 2000-01. This factor clearly forms a cluster of five variables, namely gross value of agricultural produce per hectare of net area sown, gross value of agricultural produce per capita of rural population, percentage of area under commercial crops to gross cropped area, percentage of net area sown to total geographical area and cropping intensity. This dimension may be designated as *overall agricultural development*.

The *second factor* brings out another dimension of agricultural development. This factor forms a cluster of three indicators, viz. gross value of agricultural produce in respect of per capita of rural population, credit to agriculture (Rs. per capita) and average size of holdings, but this cluster does not point out towards specific dimension of agricultural development.

The *third factor* explains 22.03 per cent of the total variance which has positive and significant correlation with two indicators, namely percentage of net area sown to total geographical area and percentage of agricultural workers to total (main) workers. Evidently, only one indicator is negative and significantly correlated with this dimension of agricultural development. Hence, this cluster does not point out towards specific dimension of agricultural development.

The *fourth factor* brings out the fourth dimension of agricultural development for the year 2000-01. This factor clearly forms a cluster of two variables, namely gross value of agricultural produce per hectare of net area sown and consumption of fertilizer per hectare of gross cropped area. This dimension may be designated as *modern agricultural development*.

The factor scores with respect to the first, second and fourth factors for the year 2000-01 have been calculated with the help of the following equations and presented in Table 3.19.

#### *First Dimension of Agricultural development*

$$AD_{11} = (0.7578) Z_1 + (0.6486) Z_2 + (0.9057) Z_4 + (0.7264) Z_5 + (0.8592) Z_6 \dots\dots\dots (XI)$$

Where  $AD_{11}$  is the first dimension of agricultural development;  $Z_1$ ,  $Z_2$ ,  $Z_4$ ,  $Z_5$  and  $Z_6$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the first factor.

Variable	Factor-1	Factor-2	Factor-3	Factor-4	h <sup>2</sup>
1	0.758	0.159	-0.053	0.558	0.913
2	0.649	0.661	0.134	-0.069	0.881
3	-0.036	0.250	-0.924	-0.148	0.940
4	0.906	0.073	-0.109	-0.026	0.838
5	0.726	0.169	0.591	0.023	0.906
6	0.859	0.182	0.283	0.215	0.898
7	0.078	0.231	0.937	-0.195	0.975
8	0.161	0.854	0.060	0.276	0.835
9	0.098	0.125	-0.015	0.948	0.925
10	0.093	0.936	-0.071	0.005	0.890
<i>Eigenvalue</i>	3.13	2.27	2.20	1.40	
<i>Percentage of Variance</i>	31.32	22.66	22.03	13.99	
<i>Cumulative Variance (%)</i>	31.32	53.99	76.02	90.01	
Note: Critical value of $a_i$ at 5 per cent level = 0.576 Critical value of $a_i$ at 1 per cent level = 0.714					

### *Second Dimension of Agricultural development*

$$AD_{12} = (0.6612) Z_2 + (0.8451) Z_8 + (0.9359) Z_{10} \dots\dots\dots (XII)$$

Where  $AD_{12}$  is the second dimension of agricultural development;  $Z_2$ ,  $Z_8$  and  $Z_{10}$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the second factor.

### *Third Dimension of Agricultural development*

$$AD_{13} = (-0.9245) Z_3 + (0.5908) Z_5 + (0.9369) Z_7 \dots\dots\dots (XIII)$$

Where  $AD_{13}$  is the third dimension of agricultural development;  $Z_3$ ,  $Z_5$  and  $Z_7$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the third factor.

### *Fourth Dimension of Agricultural development*

$$AD_{14} = (0.5578) Z_1 + (0.9484) Z_9 \dots\dots\dots (XIV)$$

Where  $AD_{14}$  is the fourth dimension of agricultural development;  $Z_1$  and  $Z_9$  are values of variables in standardized form and the figures in parentheses are factor loadings with respect to the fourth factor.

The district-wise indices of the first dimension i.e. overall agricultural development, have been presented in Table 3.19 (*Figures 3.6 and 3.7*). It may be observed from this table that twelve districts, namely Nadia, Hooghly, Murshidabad, Cooch Behar, 24 Parganas (N), Malda, Uttar Dinajpur, Dakshin Dinajpur, Jalpaiguri, Howrah, Burdwan and Darjeeling were above or near the value of the state average. Hence, these twelve districts may be considered as

developed districts in respect of overall agricultural development. On the other hand, remaining six districts were placed below the state average and as such these districts may be considered as less developed in this respect. It may also be observed that extent of inter-district disparity in respect of overall agricultural development was fairly low.

**Table 3.19: Dimensions of Agricultural Development in 2000-01**

Sl. No.	Districts	First Dimension Index	Rank	Second Dimension Index	Rank	Third Dimension Index	Rank	Fourth Dimension Index	Rank
1	Burdwan	0.6942	11	0.7106	3	0.8058	5	0.4920	5
2	Birbhum	0.5895	14	0.7290	2	0.9198	2	0.4128	9
3	Bankura	0.5491	15	0.6673	5	0.8057	6	0.3945	11
4	Midnapore	0.6421	13	0.5945	9	0.7921	8	0.4169	8
5	Howrah	0.7112	10	0.3369	17	0.5055	15	1.0000	1
6	Hooghly	0.9099	2	0.6387	7	0.7346	11	0.8173	2
7	24 Parganas (N)	0.7852	5	0.4841	12	0.5699	14	0.5259	4
8	24 Parganas (S)	0.4478	16	0.3933	16	0.6859	12	0.3910	12
9	Nadia	1.0000	1	0.6788	4	0.6425	13	0.4594	7
10	Murshidabad	0.8081	3	0.5089	11	0.7791	9	0.3627	15
11	Malda	0.7732	6	0.5899	10	0.7599	10	0.4763	6
12	Uttar Dinajpur	0.7505	7	0.4129	15	1.0000	1	0.3158	16
13	Dakshin Dinajpur	0.7477	8	0.4197	14	0.9108	3	0.2964	17
14	Jalpaiguri	0.7259	9	0.6522	6	0.4989	16	0.3640	14
15	Darjeeling	0.6644	12	1.0000	1	0.1050	17	0.5603	3
16	Cooch Behar	0.7862	4	0.6000	8	0.7988	7	0.4049	10
17	Purulia	0.3878	17	0.4484	13	0.8669	4	0.3704	13
18	Kolkata	0.0000	18	0.0000	18	0.0000	18	0.0000	18
	<i>Mean</i>	0.6652		0.5481		0.6767		0.4478	
	<i>C.V.</i>	38.63		51.81		39.33		64.92	

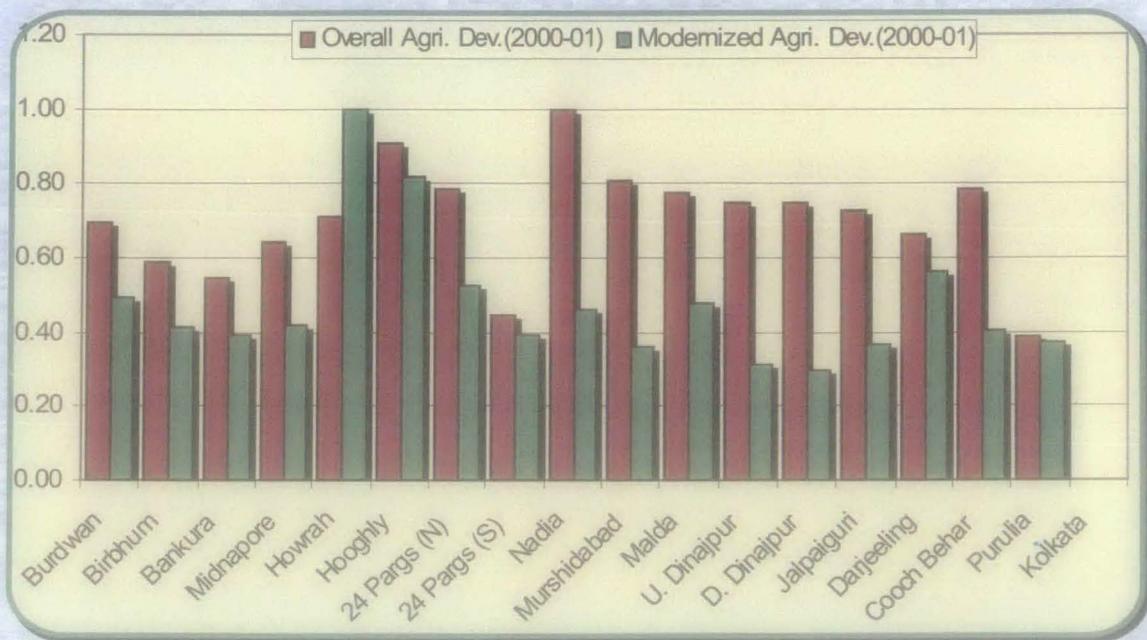


Figure 3.6: Dimensions of Agricultural Development in 2000-01

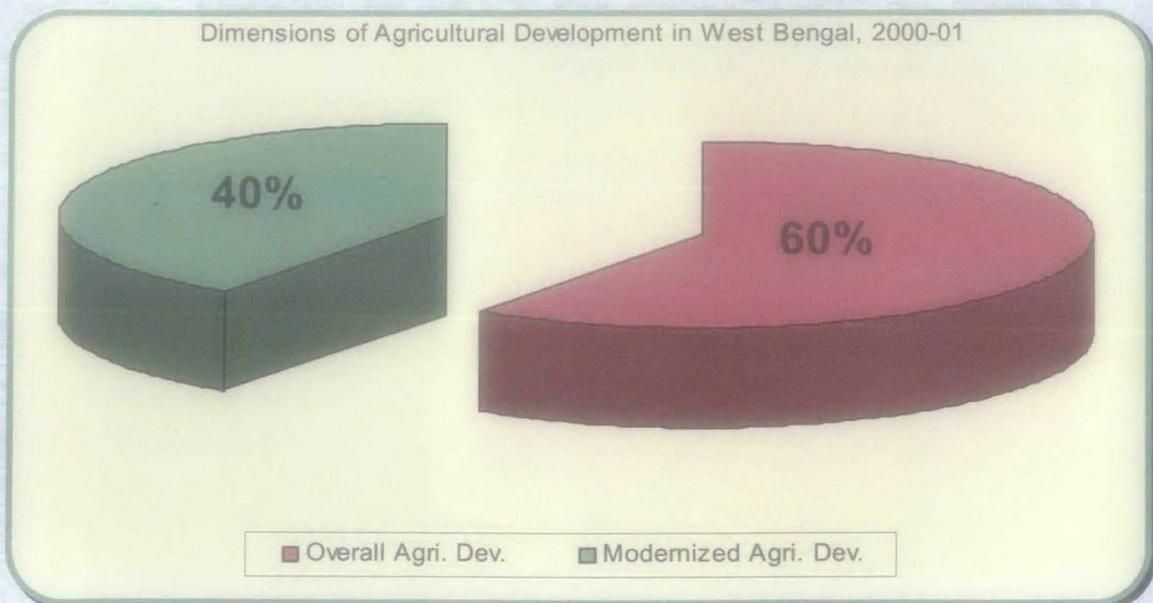


Figure 3.7

In the matter of fourth dimension i.e. modernized agricultural development, namely Howrah, Hooghly, Darjeeling, 24 Parganas (N), Burdwan, Malda and Nadia emerged as developed districts due to their placement above the state average. Remaining eleven districts were less developed in this respect. Extent of inter-district disparities was relatively high in this respect than the first dimension.

### **3.5 Summary**

1. The problem of regional imbalances, at both inter-state and intra-state levels has persisted in India even during the post-plan era. Although concern was voiced about regional disparities in India right from the beginning of the planning era, yet a more concerted effort to address his problem was made only in the Third Five-Year Plan. In the subsequent plans also this problem was taken up seriously and as a consequence, several area development programmes were started to mitigate the extent of disparities in the socio-economic development. West Bengal is one of the recipients of funds under various Area Development Programmes initiated by the Central Government, under full or partial sponsorship.
2. Indicator-wise analysis revealed that there was incessant increase in the state average in terms of majority of indicators pertaining to key sector of the economy, i.e., agricultural sector.
3. It was noted that, inter-district disparities have shown increasing trend in respect of indicator such as gross value of agricultural produce per agricultural workers. On the other hand, decreasing trend in respect of indicators i.e. gross value of agricultural produce per hectare of net area sown, per capita of rural population, cropping intensity, credit to agriculture (Rs. per capita), consumption of fertilizer per hectare of gross cropped area and remaining other indicators have the mixed trend in the reference years.
4. The average level of agricultural development of West Bengal exhibits an increasing trend during 1980-81 to 2000-01. The ranking pattern of districts is similar in inter-district diversities, the rank correlation coefficient being  $R_{12} = -0.084$  for the period 1980-81 and 1990-91. This shows that the level of agricultural development is not associated with resources endowment of the districts in this state.

5. Inter-district variations in levels of agricultural development demonstrate a declining trend in the reference years.
6. Various dimensions of agricultural development have been identified with the help of *Factor Analysis and Partial Cluster Analysis* in the reference years. These dimensions are mainly named as modernized agricultural development, traditional agricultural development and overall agricultural development- on the basis of formation of cluster in the reference years under study.
7. In the first dimension, i.e., modernized agricultural development shows that in the beginning, Hooghly, Howrah, Burdwan, 24 Parganas (N), Birbhum and Nadia were the developed districts but in the remaining twelve districts lagged behind. On the other hand, Dakshin Dinajpur, Jalpaiguri, Burdwan, Hooghly, Birbhum, Bankura, Darjeeling, Cooch Behar, Purulia and 24 Parganas (N) emerged as developed districts in respect of traditional agricultural development and the remaining eight districts remained in the backward category.
8. In the year 1990-91, Uttar Dinajpur, Dakshin Dinajpur, Birbhum, Malda, Nadia, Murshidabad, Hooghly, Burdwan, Midnapore, Cooch Behar and Bankura districts emerged as developed districts in the matter of first dimension, i.e., traditional agricultural development, and the remaining seven districts were less developed. Alternatively, nine districts, namely Hooghly, Howrah, Nadia, 24 Parganas (N), Malda, Murshidabad, Cooch Behar, Burdwan and Birbhum were identified as developed districts in respect of modernized agricultural development and the remaining nine districts were backward.
9. During 2000-01, two dimensions namely overall agricultural development and modernized agricultural development were recognized. Twelve districts namely Nadia, Howrah, Murshidabad, Cooch Behar, 24 Parganas (N), Malda, Uttar Dinajpur, Dakshin Dinajpur, Jalpaiguri, Howrah, Burdwan and Darjeeling emerged as developed districts in respect of overall agricultural development but the remaining six districts lagged behind. On the other hand, in the case of other dimension, i.e., modernized agricultural development, seven districts, namely Howrah, Hooghly, Darjeeling, 24

Parganas (N), Burdwan, Malda and Nadia emerged as developed districts but the remaining eleven districts were less developed.

**Note:** *Agricultural sector reveals three dimensional development– Modernized Agricultural Development, traditional Agricultural Development and Overall Agricultural Development. In the present study, modernized agricultural development is named to that dimension of agricultural development in which indicators such as consumption of fertilizer per hectare of gross cropped area, percentage of area under commercial crops to gross cropped area and credit to agriculture are positively and significantly associated with that dimension or factor in addition to other indicators. Traditional agricultural development points towards that dimensions in which above said three indicators do not have positive and significant correlation with that particular factor. Overall agricultural development is named to that dimension which is positively associated with first three indicators, viz. gross value of agricultural produce per hectare of net area sown, gross value of agricultural produce per capita of rural population and gross value of agricultural produce per agricultural workers (which are measuring performance of agriculture sector), along with indicators pertaining to modernization and commercialization of agriculture.*