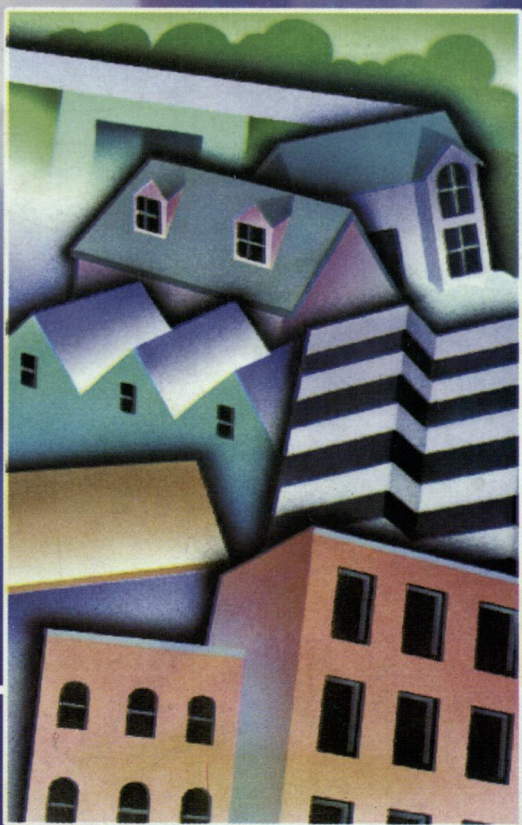


Developmental Disparities

A QUANTITATIVE INSIGHT



A.K. Agarwala
P. Hazarika

Balanced development of regions is one important objective of our national planning. Reduction of regional developmental disparities both at inter-state and intra-state level is very important for a pluralistic and multiethnic society like India. The benefits of economic development should go more and more to the relatively economically poorer regions of the country and there should be a progressive reduction of the concentration of income, wealth and economic power.

Reduction of regional disparities is a prime objective running through all the five year plans in India. In this book the authors have studied the regional disparities at district level of the state of Assam which is one of the backward states in India. The prime objective of this book is to focus the relatively more backward districts of this backward state so that the planning authorities as well as the state and central governments may adopt appropriate measures for developing the relatively backward districts in particular and the state of Assam in general.

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**DEVELOPMENTAL DISPARITIES:
A Quantitative Insight**

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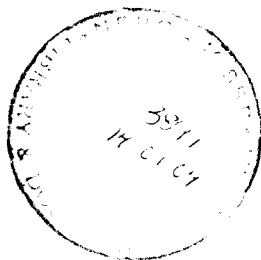
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Contents

<i>Preface</i>	<i>vii</i>
1. Introduction	01
2. Eco-Geographical Profile of Assam and its Districts	27
3. Spatial Disparities in Agricultural Development in Assam	72
4. Level of Industrial Development in Assam	102
5. Inter-District Developmental Disparities in Basic Infrastructure and Services (BIS) in Assam	122
6. Inter-District Variation in Overall Economic Development	153
7. Development Planning and Policy Measures in Assam	172
8. Summary of Findings and Conclusion	205
<i>Bibliography</i>	214
<i>Index</i>	228

1

Introduction

1.1 Besides accelerating the pace of economic development in the country, the main objectives of planning have always aimed at the attainment of an egalitarian socio-economic order with balanced development of regions. The attainment of the objective of reduction of regional development disparities both at the inter-state and intra-state level is very important for a pluralistic and multiethnic society like India. The First-Five Year Plan had two basic objectives – (i) correction of the inequilibrium in the economy caused by the war and the partition of the country, and (ii) initiation of a process of all-round balanced development which would ensure a rising national income and a steady improvement in living standards over time. At the time of the formulation of the Second Five-Year Plan, the objective of socialist pattern of society came to be adopted. This was meant to imply that “the basic criterion for determining the lines of advance must not be private profit but social gain, and that the pattern of development and the structure of socio-economic relations should be so planned that they result not only in appreciable increases in national income and employment but also in greater equality of income and wealth. Major decisions regarding production, distribution, consumption and investment and, in fact, all socio-economic relationships must be made by agencies informed by social purpose. The benefits of economic development must occur more and more to the relatively less privileged classes of society, and there should be a progressive reduction of the concentration of income, wealth and economic power.” (Planning Commission, 1956, p 22). This statement has been, in fact, the guiding principle of planning in the country. An objective running

through all the nine Five-Year-Plans has been the reduction of regional disparities.

Although the Government of India has given much stress on the removal of regional disparities yet the present trend of economic development in the country has not only led to an increasing level of disparity at the inter-state level but also intra-state and intra-district disparities at the state as well as district levels. In spite of a significant portion of public sector investment in the backward areas during the planning era prevention of "enclave type" development has not become possible. The policy of development of backward regions has not led to place prosperity with people prosperity. Because of the existence of high magnitude of regional disparities at macro as well as micro level, the country and some states of the country have encountered the problem of regionalism and nativistic tendency of the ethnic population at various levels. For example, one of the reasons for demand for the formation of different states within the state of Assam is nothing but spatial disparities. Hence, the Central and the various State Governments should be very serious so that the problem of regional disparities can be effectively dealt with.

1.2 PRESENT STUDY

The present study is concerned primarily with the analysis of inter-district development disparities in Assam which is known as one of the backward states of the country. There are, at present, twenty three districts in Assam. An analysis of the disparities in different sectors of the state economy such as agriculture, industry and basic infrastructure and services (BIS) at the inter-district level is attempted through secondary statistics. An overall inter-district disparities has also been analysed taking cognisance of disparities at inter-district level in the three sectors: agriculture, industry and basic infrastructure and services.

1.3 REVIEW OF EXISTING LITERATURE

We have come across several studies made on regional disparities.

These studies may precisely be classified as -- (i) disparities in terms of agriculture, (ii) disparities in terms of industry, (iii) disparities in terms of infrastructure, (iv) overall development disparities based on agriculture, industry and infrastructure. We have, of course, come across some works relating to disparities in terms of education, disparities in terms of health facilities and the like. However, health facilities etc. relate to infrastructure. Review of literature relating to regional disparities in agricultural development has been done in the Chapter 3 entitled "Spatial Disparities in Agricultural Development in Assam". Similarly, we have incorporated review of literature relating to regional disparities in industry and basic infrastructure and services in the chapters 4 and 5 entitled "Levels of industrial development in Assam" and "Inter-district developmental disparities in basic infrastructure and services (BIS) in Assam" respectively. Below we have discussed some studies made on overall developmental regional disparities.

Ashok Mitra's Study

Ashok Mitra (1965), the then Registrar General of India conducted a pioneering study on levels of regional development in India using district level data. The indicators used by Mitra were divided by him into the following six blocks and information collected on them for each district of India:

Block I

(A) Geology, Topography, Rainfall, House Type, Language and Scheduled tribes and casts; (B) Soil, Crops and Yield of Rice.

Block II

Agricultural infrastructure which included seven indicators like area under double crop, per cent of net area sown, gross area irrigated per cent of gross area sown, etc.

Block III

Participation rates in trading sector which included five indicators like male participation rate, female participation rate, males working in agriculture per cent of male working population, etc.

Block IV

Potential of human resources which included nine indicators like persons per square mile, females per 1,000 males, rural population per 1,000 of total population, etc.

Block V

Distributive trade, manufacturing and infrastructure which included four indicators like workers in retail trade per 1,000 of population, workers in manufacturing per 1,000 of population, etc.

Block VI

Organized industrial activity in the modern sector which included establishments run on electricity per cent of all industrial establishments, workers in registered factories per cent of all workers and degree of congestion in housing.

Mitra's analysis showed that out of the total of 327 districts in India, 79 were at the lowest level of development and 88 at the second lowest level of development. The number of districts at the highest level of development was 84; 19.66% of the total population of the country lived in districts at the lowest level of development, and 30.72% of the total population in India lived in districts in the highest level of development. *Mitra's study was based on a simple method of "assigning and adding up ranks" to highlight regional disparities.*

Nath's Study

Utilizing the conclusions of Ashok Mitra's study and adopting a similar method of combining ranks (unweighted ranks are simply added up). V. Nath (1970) attempted to highlight disparities between different regions of India. Nath considered data for 14 states and took the following indicators into account: (i) per capita income, (ii) proportion of urban population to total population, (iii) proportion of male workers in manufacturing industry to all male workers, (iv) proportion of population living in districts at the two higher levels of development (data for this indicator were obtained from Ashok Mitra's study), and (v) literacy rate for population in age groups of five years and above.

Nath ranked all the 14 states in respect of each indicator. He then added up the five ranks in respect of five indicators for each state and thus obtained the total rank for each state. The states were then arranged in an ascending order of total rank score, the state having the lowest total rank score being the most developed state and the state having the highest rank score being the least developed one. In Nath's study, Maharashtra and Tamil Nadu had the lowest rank score of 14 and thus were considered as the most developed states. Gujarat with rank score of 16 came next. Then came West Bengal, Punjab and Kerala. These six states were considered by Nath as the relatively developed states and the remaining eight states were considered as less developed.

Hemanta Rao's Study

Hemanta Rao's Study (1977) relates to the estimation of regional disparities in India. Rao also made an attempt to answer whether regional disparities reduced over time. He selected 24 variables from the following four specific sectors – agriculture, industry, education and banking. Five indicators related to agriculture, eight to industry, five to education and six to banking.

To form an overall view of regional disparities, Rao combined the indices obtained from the agricultural, industrial, educational and banking sectors into composite index of development. The composite Index showed that West Bengal was the most developed state in all the three years - 1956, 1961 and 1965. The second position was occupied by Maharashtra in all the three years. Tamil Nadu occupied the third position in 1956 and 1961 and Gujarat was fourth in both these years. In 1965, these two states interchanged their places. The agriculturally most developed state of Punjab occupied the fifth position in all the three years. The value of composite index for the nation as a whole was 13.37, in 1956, 14.85 in 1961 and 15.96 in 1965. The index values for the states of Orissa, Rajasthan, Madhya Pradesh, Assam and Bihar were below the national average in all the three years and consequently these states were classified by Hemanta Rao as 'less developed states'. Uttar Pradesh was just around the national average in all the three years.

Rao concluded that regional disparities declined over time. His conclusion was based on the following three observations – (i) there has been a general decline in absolute differentials between the developed and the less developed states, (ii) the national average of composite index has registered an upward trend over time, and (iii) the coefficient of variation of the estimated values of the composite index has declined from 19.70% in 1956 to 13.72% in 1965. While the absolute differential between the first and the last ranked states was 8.8 index points in 1956, it fell to 6.08 index points in 1965. Over the same period, the national average rose from 13.37 to 15.96 index points. The study of Hemanta Rao depends exclusively on the technique of principal component analysis.

Ganguli and Gupta's Study

B. N. Ganguli and Debendra B. Gupta (1976) constructed levels of living indices for 15 states of India. They took into account three periods of time – around 1955, around 1960, and around 1965. The following components of levels of living were considered in the study: nutrition, housing, medical care, education, clothing, leisure, security, and environment. The first five relate to 'primary' components and last three relate to 'secondary' components. Three sets of composite indices were presented. The first covered the 'primary' components, the second covered the 'secondary' components, and the third was an overall index of the level of living which was constructed by taking into account both the 'primary' and the 'secondary' components. As far as the primary aspects of the levels of living were concerned, it was found that in all the three years considered (1955, 1960 and 1965) the states of Punjab, Tamil Nadu, Maharashtra, Kerala and West Bengal showed the highest levels of living. Bihar, Orissa, Uttar Pradesh, Madhya Pradesh and Andhra Pradesh showed the lowest levels. Punjab led as the 'highest' state with respect to the nutritional level, Kerala in respect of housing and education and Tamil Nadu and West Bengal in respect of medical care. Examining whether inter-district disparities had reduced over the period 1955-65, Ganguli and Gupta found that in the matter of nutrition and medical care disparities had indeed reduced and in the field of education disparities

had widened. As far as the overall primary aspects of living were concerned, it was found that the value of the 'critical minimum distance' had declined from 6.04 in 1955 to 5.61 in 1960 and further to 4.88 in 1965.

By using the method of principal component analysis and taxonomy, Ganguli and Gupta calculated a composite index of the levels of living by combining all primary and secondary indicators. It was found that in 1955, Tamil Nadu, West Bengal, Punjab, Maharashtra, and Kerala had the highest levels of living while Orissa, Bihar, Uttar Pradesh, Madhya Pradesh, and Assam were at the lowest levels. The same grouping existed in 1960 and 1965 as well, although while Karnataka and Jammu and Kashmir improved their positions considerably, Rajasthan declined to the bottom group. A very important conclusion of the study related to reduction in disparities. It was found that the value of the critical minimum distance declined from 6.04 in 1955 to 5.61 in 1960 and further to 4.88 in 1965 which shows that the disparities in the overall levels of living among the states declined during the period 1955-1965.

Murugaiah's Study

V. Mugugaiah (1997) made a study relating to economic disparities in Karnataka. His study relates to inter and intra-district disparities in economic development of Karnataka at two points of time namely 1980-81 and 1990-91. The districts in the state, based on per capita income, have been classified as highly, moderately and less developed categories. Sectoral composition of output in the districts discloses that tertiary sector exhibits fast growth as well as more contribution for the period of study to district domestic product (DDP) than other two sectors and the contribution of primary sector is slowed down. It resulted to have more number of less developed districts in the state in 1990-91, than in 1980-81.

Dhian Kaur and B. S. Ghuman's Study

Dhian Kaur and B. S. Ghuman (1995) carried out a study for the period 1980-81 to 1988-89 to decompose the prosperity of the state of Punjab over the twelve districts. The study was done on

the basis of the indicator 'average per capita income'. Relevant data were collected from the Economic and Statistical Organization, Punjab. Data were analysed by employing techniques such as averages, percentages, growth rates, coefficient of variation and maps.

On the basis of the level of development, various districts of the state were classified into three categories – (i) highly developed, (ii) moderately developed and (iii) less developed. The classification was made for both points of time keeping in view the state average and the behaviour of income across districts.

The study reveals that various districts of Punjab recorded differential rate of growth in their economies during the 1980's. It resulted in both inter and intra-category shifts in their positions. There appeared a notable spatial variation in levels of development in the state by 1988-89. Southern Punjab was more developed than Northern Punjab. It specified that Ludhiana, Sangrur, Ferozpur, Faridkot and Kapurthala districts were highly developed whereas Hoshiarpur and Gurdaspur districts were at a low level of development. The group of remaining districts namely Patiala, Bhatinda, Rupnagar, Amritsar and Jalandhar stood in between the two extremes. It was also found that southern Punjab was more developed in terms of primary activities whereas northern Punjab was more developed in regard to non-primary activities.

Rajkishore Meher's Study

The study made by Rajkishore Meher (1999) was primarily concerned with the issue of inter-district development disparities in Orissa. An attempt was made to detect the number of advance and backward districts by taking key development indicators of agriculture, industry and basic infrastructure and services (BIS) from the state and district level secondary statistics. Meher had chosen *seven indicators of agriculture development* (viz. percentage of cultivable land to total land area, percentage of area sown to total cultivable area, percentage of irrigated area to net sown area, number of electric/diesel pump per 1,000 hectares of area sown, cropping intensity and average yield of food grains per hectare (in tonnes); four indicators of *industrial development* (viz. percentage

of secondary sector workers to total workforce, percentage of registered factory workers to total workers, per capita value of industrial output and per capita value added by manufacture) and sixteen indicators of basic infrastructure and services (viz. percentage of literate population, percentage of urban population, percentage of tertiary sector workers to total work force, number of primary and middle school per 10,000 population, number of general colleges per 1 lakh population, number of hospitals/dispensaries per 1 lakh population, number of medical beds per 10,000 population, infant mortality per 1000 births, road length per 100 sq. km area, road length per 1 lakh population, percentage of villages electrified, per capita consumption of electricity (in kWh), number of post offices per 10,000 population, number of banks per 1 lakh population and number of co-operative societies per 10,000 population).

Construction of composite index of development is mainly based on two methods namely, the *Indexing Method* and *Deprivation Method*. An analysis of the disparities trend, especially since 1970s in different sectors of the economy such as agriculture, industry and basic infrastructure and services (BIS) at the inter-district level of the old and undivided 13 districts of Orissa is attempted through secondary statistics. Further, in order to probe deeper into the issue of inter-district level of development disparities and regional backwardness a random sample survey of rural households in four districts of the state, namely, two of the most advanced and two of the most backward, was done.

Jayanta Madhab's Study

Dr. Jayanta Madhab (2001) observes that both foreign investors and all-India financial institutions have shown a bias in favour of the more advanced western region comprising Goa, Gujarat and Maharashtra in financing investment because of their better infrastructure and market-friendly environment resulting in what he calls "viscious circle of prosperity". In contrast, comparative neglect by foreign as well as domestic investors owing to lack of infrastructure, local entrepreneurs and congenial law and order, the north-eastern states, despite their rich resource base, have failed to come out of the "vicious circle of poverty" already in

operation there. Consequently, the disparities between the western region and the north-eastern region has got widened during the post-reforms period.

1.4 RATIONALE OF THE STUDY

Because of the glaring regional disparities in India, the planners have accepted the importance of balanced regional planning. In this context the second plan stated: "In any comprehensive plan of development, it is axiomatic that the special needs of the less developed areas should receive due attention. The pattern of investment must be devised as to lead to balanced regional development. The problem is particularly difficult in the early stages when the resources available are very inadequate in relation to needs. But, more and more, as development proceeds and large resources become available for investment, the stress of development programme should be on extending benefits of investment to underdeveloped regions. Only thus a diversified economy be built up." [Government of India, Planning Commission, Second Five-Year Plan, p. 36]

The third plan devoted a separate chapter (Chapter IX) to "Balanced Regional Development." It was once again emphasised that "balanced development of different parts of the country, extension of the benefits of economic progress to the less developed regions and widespread diffusions of industry are among the major aims of planned development." [Government of India, Planning Commission, Third Five Year Plan, p. 142]. The third plan admitted that, on account of technological reasons, it might become necessary to localise production in the large industrial sector. Therefore, it was necessary "to provide for more dispersed advance in sectors like agriculture, small industries, power, communication and social services." The approach in the third plan was to – (i) help the state in reducing intra-state disparities i.e. disparities among different regions of the same state, and (ii) initiate new programmes and extend programmes adopted in previous plans to reduce inter-state inequalities. As far as the first issue is concerned, the programmes included related to – (a) increasing agricultural production, (b) taking steps to ensure "largest feasible" increase in income and employment, (c) developing social services, especially elementary

education, water supply and sanitation and health services in rural areas, (d) developing communications and power, and (e) raising the standard of living for less developed areas of the state.

Accepting the importance of district planning in the overall planning process in general, and in the area development approach in particular the Planning Commission prepared a set of guidelines for the formulation of district plans in 1969. The guidelines state, "It has become apparent that plan formulation undertaken exclusively at the state level cannot possibly take fully into account the variety of conditions existing in the different physio-geographical and economic regions of the state." [Planning Commission, Guidelines for the Formulation of District Plans, 1969, pp. 1-2 (U.P. Government Edition)]. The guidelines advocate the adoption of district planning on the following considerations:

- (i) The wide disparities which exist between the levels of development attained by different areas and community groups within a state and their full potential for development cannot be narrowed down unless the resources to be provided and the programmes to be taken up in each area or for each community are determined on the basis of a specific local assessment of problems, resources and productive potentials;
- (ii) Underutilization of the already available natural resources, infrastructural facilities and productive capabilities in different areas cannot be properly assessed at the state level;
- (iii) The uniform application of development schemes formulated at the state level without regard to their suitability to local conditions, leads to inefficient utilization of physical and financial resources;
- (iv) Meaningful assessment of on-going schemes cannot be undertaken except at the ground level and with the active participation of local officials and the beneficiaries of schemes;
- (v) Without a systematic study and planning of the local infrastructure, a firm and objective basis cannot be provided for the planning of the state;

- (vi) Proper phasing to ensure synchronization of the programme with other related programmes cannot be attempted without working out the details of programmes at the ground level;
- (vii) Measures for the mobilization of local resources for development purposes cannot be planned realistically unless the specific context of the needs, aspirations and the economic condition of the people and the level of performance of local institutions are taken into consideration;
- (viii) The deliberate steps required to be taken to identify the growth centres and to provide the facilities and services required to meet the growing needs of the villages lying in their hinterlands cannot be taken except at the district level through the analysis of the emerging trends in the economic activities and the pattern of facilities and services already available.

District planning should be properly carried out in conformity with the basic objectives of the state as well as the central plan. Through proper planning at district level, regional disparities in terms of development can be considerably reduced. A state in general may be a developed one in spite of some districts being backward in terms of development. A study of intra-state imbalances will help the planners associated with the state plan to formulate suitable planning policies so as to reduce the regional imbalances to a considerable extent. Our study may help the policy makers, Government and other agencies in formulating future policy decisions in regards to the balanced economic growth of the state of Assam.

The spread of modern education and rapid advancement of modern transport and communication system in an unequal socio-economic set up exacerbates the sense of relative deprivation feeling between the people of various regions, caste and ethnic groups. One of the basic reasons for the demands for the formation of separate states within the state of Assam is spatial disparities. A proper study of regional disparities at district level will help the Central and the State Governments to give due attention to the root cause of separatist movements growing within the state of Assam.

1.5 OBJECTIVES OF THE STUDY

Precisely the main objectives of the study are as follows:

1. To find out the extent of disparity in development among the 23 districts of Assam in respect of agriculture, industry and basic infrastructure and services (BIS) separately;
2. To study an overall inter-district disparities in Assam taking cognisance of disparities at inter-district level in all the three sectors viz. agriculture, industry and BIS;
3. To analyse in relative terms the development of different districts in relation to the development of Assam;
4. To delve into the development problem of backward districts *vis-à-vis* the comparatively advance districts and to explore into the causes of backwardness;
5. To critically examine the role of various policy measures and decisions taken by the Government to reduce inter district disparities in the state;
6. To devise planning strategy for mitigating disparities on the basis of the findings of the study.

1.6 SCOPE OF THE STUDY

Such study may draw the attention of the government as well as the policy makers to initiate measures to reduce regional disparities which is one of the prime objectives of planning in India. On the basis of such study one may carry out research to know the changing pattern of development of regions over time and to discover the causes of such change.

1.7 INDICATORS OF DEVELOPMENT

Any development oriented study necessarily depends on certain indicators throwing light on living standards and development. Researchers all over the world have tried to define development in terms of certain selected indicators. Although many a researchers advocate per capita income index as singlemost indicator of development yet the use of per capita income as an indicator of development has always been questioned. It has become

questionable especially in view of the fact that high income middle east countries are also one of the most backward regions in the world in terms of infrastructure and other facilities. First of all challenge to the use of per capita income as the sole indicator of development came from United Nations Organization as early as in 1954 (Shrivastaba, 1999). The criticism labelled against the use of per capita income are as follows:

- (a) It is an aggregative concept and does not reflect structure and distribution of income. Consequently, while some regions with lower per capita income may attain a better distribution of income because of better income distribution among different sectors of economy and classes of society, some other regions with higher income may not be able to do so. For example, in our country, although Andhra Pradesh, Arunachal Pradesh, Karnataka, Mizoram and Nagaland fall within the same range of income of Rs. 5500 – Rs. 6000 on the basis of per capita income but the backwardness is much more pronounced in case of Arunachal, Mizoram and Nagaland than in Karnataka. Moreover, Mizoram and Nagaland have per capita income level even higher than the national average, but they figure towards the end of the list of states in India ranked in respect of development. Again, regions with lower per capita income may possess better infrastructure and other pre-conditions of development compared with regions with higher per capita income.
- (b) Another criticism labelled against the use of per capita income as an index for development is that it does not taken into account the concept, the goods and services which do not enter the market process due to limitations of accounting system. In the present context of development where sustainability of ecology and environment have also assumed equal importance, a very high level per capita income may, in fact, reflect a very poor quality of environment.
- (c) Data on the per capita income are collected by states on the basis of prices ruling therein. Since (i) price levels are

different in different states, (ii) commodities included in the compilation of price levels by different states are different, and (iii) weights assigned to different commodities in the compilation of price levels are not the same in all the states, per capita income of different states are not comparable.

- (d) For comparing inter-district disparities within a state, per capita income cannot be taken into account because per capita income at district level is not available. Per capita income figures, besides concealing differences in intra-state inequalities in distribution, may not truly reflect the per capita consumption levels. A part of the income earned within the jurisdiction of a state might not be available for consumption within the state, but may get transferred to other states by way of dividend and other remittances. Conversely, income originating within state might be supplemented by remittances of income from other states. Per capita consumption levels would reflect the net effect of such transfers. Thus, per capita consumption, rather than per capita income can be regarded as a more reliable measure of inter-state (regional) disparities. However, in our study we cannot consider per capita consumption as a measure of inter-district disparities due to the non-availability of per capita consumption figures at district level. Of late, the researchers have opted for 'component approach' to development using a large number of indicators of development. The component approach was recommended by the UN committee of experts as Measurement of Levels of Living (UNO, 1954). A number of researchers of our country and also the Planning Commission have used different indicators at different points of time. The Committee on Dispersal of Industries (1960) suggested three indicators of backwardness:

- (i) Poverty identifiable in terms of low per capita income and consumption;
- (ii) High population density in relation to available productive and developmental resources as well as the employment opportunity; and

(iii) Poverty of communication.

As a follow-up of Committee's Report, a working group (1969) was appointed by the Planning Commission in the context of Fourth Five-Year Plan to identify backward areas. The working group classified the backward areas of the country into five categories which were as follows:

- (i) Desert areas,
- (ii) Chronologically drought affected areas,
- (iii) Areas with high concentration of tribal population,
- (iv) Hill areas including boarder areas and,
- (v) Area with high density of population, low level of income, employment etc.

Most of the states of North-East India fall in the above categories (iii) and (iv). The working group recommended the following 15 indicators of backwardness/development which were accepted by the Planning Commission:

- (i) Total population and density of population;
- (ii) Cultivable area per cultivator;
- (iii) Net area sown per agricultural worker;
- (iv) Workers engaged in agriculture sector as percentage of total workers;
- (v) Percentage of gross irrigated area to net sown area;
- (vi) Intensity of cropping;
- (vii) Per capita (rural) gross value of agricultural produce;
- (viii) Establishments (manufacturing and repairs) using electricity;
- (ix) Number of workers per lakh of population employed in manufacturing sector;
- (x) Mileage of surfaced road per 100 sq. km. of area and per lakh of population;

- (xi) Number of commercial vehicles registered in a district;
- (xii) Percentage of literate population – (a) men and (b) women;
- (xiii) Number of seats per million of population for technical training;
- (xiv) Percentage of school going children – boys and girls – to the population in the age group of 6-11 and 11-14 years;
- (xv) Hospital beds per lakh of population.

The indicators suggested by the working group had major problems despite its exhaustiveness. For data relating to some of the indicators like value of agricultural produce are not available at district level and such data are not available even at the state level in case of state like Assam. Again, in what manner and in what way density of population is related to economic development or backwardness is not clear.

Despite some conceptual problems as well problems arising out of the non availability of data relating to some indicators, the working group's listing of indicators was a definite improvement and most of the researchers afterwards choose indicators from the above list. The list of indicators suggested by later government groups are fairly long and as such while every new classification was an improvement over the earlier ones, the shortcomings will also abound. Pandey Committee (1969) suggested six main indicators for identifying backward areas – (i) per capita income, (ii) per capita income from industry and mining, (iii) number of workers in registered factories, (iv) per capita annual consumption of electricity (v) length of surfaced road in relation to population and area of the state, and (vi) railway route length in relation to population and area of the state. Pandey Committee suggested another set of six indicators for identifying districts within the state (Mahesh Chand and Puri, 1983), most of which are not applicable even today in case of district level study of any state in the north-east region of India due to unavailability of data (Srivastava, 1996). After a careful study of the various secondary sources of information at district level pertaining to the state of Assam and

taking note of the various indicators of development/backwardness mentioned above we have finally selected -- (i) seven development indicators for agriculture, (ii) four development indicators for industry, and (iii) fourteen development indicators for basic infrastructure and services (BIS) sector. All these indicators are listed in the methodology of study. It is worth mentioning that while selecting these indicators of development we have been greatly influenced by the study made by Rajkishore Meher (1999).

1.8 SOURCES OF DATA

The very nature of investigation is such that it has to be carried out on the secondary sources of information. The data have been collected from *Statistical Hand Book of Assam, 1997*, (Directorate of Economics and Statistics, Assam); *Economic Survey, Assam, 1997-98* (Directorate of Economic and Statistics, Assam); *Development and Planning: Five Year Plan Documents*; Directorate of Information and Public Relations; *Assam Information, June - 1995*, Vol 47; *Census of India - 1991*; *Basic Agricultural Statistics, 1997-98* (Directorate of Agriculture, Government of Assam); *India's Agricultural Sector - A Compendium of Statistics*, September 1995, CME Pvt. Ltd. and *List of Registered Factories in Assam* (Published by Office of the Chief Inspector of Factories, Assam, 1996).

1.9 METHODOLOGY OF STUDY

(a) Development Indicators

The study broadly focusses on the development indicators of three sectors at the district level, namely (i) Agriculture, (ii) Industry, and (iii) Basic Infrastructure and Services (BIS) during 1997-98. This involves the choice of appropriate indicators of development or backwardness in these three sectors and the collection and formulation of such indicators for the different districts of the state of Assam. Of course, in a backward state like Assam where the nature of collection and compilation of statistics at the district level is still in rudimentary form, the choice and selection of appropriate development indicators inevitably depend on the availability and accessibility to data. The Third Five-Year Plan document of the country with regard to

balanced regional development mentions that for assessing levels of development in different regions, indicators of development based on agricultural production, industrial production, investment, unemployment, electricity consumption, irrigated areas, value of output by commodity producing sectors, level of consumption expenditure, road mileage, primary and secondary education and occupational distribution of population are useful. So in the present study the quantification of disparity between the districts and identification of backward districts and advance districts in Assam for different sectors are mainly based on – (i) seven development indicators for the agriculture, (ii) four development indicators for the industry, and (iii) fourteen development indicators of the BIS.

1. Indicators of agricultural development

- (i) Percentage of cultivable land to total land area,
- (ii) Percentage of area sown to total cultivable area,
- (iii) Percentage of irrigation potential created to net sown area,
- (iv) Cropping intensity.
- (v) Average yield of food grains per hectare (in kg),
- (vi) Percentage of high yielding variety area under paddy to net sown area,
- (vii) Average consumption of fertilizer per hectare of total cropped area.

2. Indicators of Industrial Development

- (i) Percentage of secondary sector workers to total work force,
- (ii) Percentage of registered factory workers to total workforce,
- (iii) Number of registered factories per 1000 sq. km area,
- (iv) Maximum horse-power (H.P.) installed per industrial worker in registered factories.

3. Basic Infrastructure and Services

- (i) Percentage of literate population,
- (ii) Percentage of urban population,
- (iii) Percentage of tertiary sector workers to total work force,
- (iv) Number of primary and middle schools per 10,000 of population,
- (v) Number of high schools per 10,000 of population,
- (vi) Number of general colleges per one lakh population,
- (vii) Number of hospitals/dispensaries per one lakh population,
- (viii) Number of medical beds per 10,000 population,
- (ix) Infant mortality per 1,000 births,
- (x) Road length per 100 square kilometre area,
- (xi) Road length per one lakh population,
- (xii) Percentage of villages electrified,
- (xiii) Number of post offices per 10,000 population,
- (xiv) Number of banks per one lakh population,

(b) Construction of Composite Index

The construction of a composite index is essential for the analysis of regional disparities on the basis of the chosen indicators of development. The selected indicators are to be converted into a single index of overall development, which is known as 'composite index'. Usually most of the 'regional disparity' studies made in the country have followed three methods of aggregating a number of indicators into a single indicator i.e. construction of a composite index. They are (i) Equal Weightage Index Method, (ii) Ranking Method and (iii) Method of Principal Component Analysis. There is another method of construction of a composite index known as 'Deprivation Method'. This method has been used in the construction of Human Development Index (HDI) in Human Development Report (HRD), 1990 published by the United Nations

Development Programme (UNDP, 1990). This type of composite Economic Development Index (EDI) is constructed in three steps. The first step is to define a measure of deprivation that a district suffers with respect to all the chosen variables for Agriculture, Industry, BIS and the total development *vis-à-vis* other districts of the state. A maximum and a minimum value is determined on the basis of the highest and the lowest for each of the 25 variables of the 23 districts of Assam given their actual values. The highest of a particular variable for a particular indicator among the 23 districts of the state is assigned the value one and the lowest is assigned the value zero. The deprivation measure places a district in the range of zero to one. If I_{ij} is the deprivation indicator for the j^{th} district with respect to the i^{th} variable then it is given by:

$$I_{ij} = \frac{(\text{Max}_j X_{ij} - X_{ij})}{(\text{Max}_j X_{ij} - \text{Min}_j X_{ij})}$$

Where X_{ij} indicates the value of the i^{th} indicator with respect to the j^{th} district.

The second step is to define an average indicator (I_j). This is done by taking a simple average of the chosen indicators for different sectors of agriculture, industry and BIS and thus

$$I_j = \frac{\sum_{i=1}^n I_{ij}}{n}$$

The third step is to measure the Economic Development Index on the basis of agriculture, industry and BIS development indices for each separate district as one minus the average deprivation index, i.e.

$$(\text{EDI})_j = (1 - I_j)$$

The districts for which the EDI score point is 0.8 and above, is termed as highly developed. If the score point lies between 0.5 and 0.8 (including 0.5 but excluding 0.8) then the district is termed as moderately developed and if the score point is below 0.5 then

the district is termed as less developed or backward. *It is to be noted that EDI is an absolute measure of development.*

In Equal Weightage Index Method, the chosen indicators for each of agriculture, industry and BIS are combinely worked out for each district taking the aggregate state value of each indicator as 100. Total index, say for agriculture, is a measure of the level of agricultural development of a district. It provides the value of the sum total of index of seven indicators used in this study for a particular year. The same divided by the number of indicators (here, seven in number) gives the average index of agricultural development in a district.

In ranking method, the individual ranks of a district by the seven indicators are simply to be added up to give a total rank for the district. Then taking the median value as the cut-off point, the district which has a value below the median value is to be considered as backward.

In our study we have refrained from constructing composite indices with the help of ranking method. This is due to the reason that ranking method totally disregards the absolute differences among the values corresponding to an indicator. With the help of ranking method we cannot compare the relative position of a district with respect to the entire state of Assam and also we cannot make inter-district comparison in absolute sense.

We have made our study on the basis of the construction of three composite indices, namely, (i) Equal Weightage Indexing Method or Indexing Method, (ii) Deprivation Method and (iii) Principal Component Method.

Principal Component Method

The method of Principal Component is a special case of the more general method of Factor Analysis. The mathematical formula of Principal Component Analysis was developed by Hotelling (1933). The aim of the method of Principal Component is the construction of a set of new variables P_i , called principal components ($i = 1, 2, \dots, k$) out of a set of variables, X_j 's ($j = 1, 2, \dots, k$). Each principal component is a linear combination of the X 's:

$$P_1 = a_{11}x_1 + a_{12}x_2 + \dots + a_{1k}x_k$$

$$P_2 = a_{21}x_1 + a_{22}x_2 + \dots + a_{2k}x_k$$

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$$P_k = a_{k1}x_1 + a_{k2}x_2 + \dots + a_{kk}x_k$$

The method of principal component can be applied by using the original values of the X_j 's or the standardized variables Z_j defined by

$$Z_j = \frac{X_j}{S_{X_j}}$$

The coefficients a_{ij} 's are called loadings of the factors (principal component) which are so chosen that the newly created variables called principal components satisfy the following two conditions

(i) principal component are orthogonal (uncorrelated), ii) the first principal component has a larger variance as possible; the second principal component is then chosen in such a way that it absorbs the maximum of the remaining variations in X 's after allowing for the variation accounted by the first principal component and so on. In this procedure the data matrix is transformed to a new set of uncorrelated variates (principal components) which account as much of the variation as possible in descending order. It may be that the first two or three of these variables (principal components) account for substantial variation, say 80 to 90% and the contribution of the remaining variables is very small. In such circumstances it becomes needless to derive the remaining principal components.

The steps in any principal component analysis are:

1. To prepare an inter-correlation matrix R from the variables given in the data matrix.
2. To work out the eigen values of R which imply the variances of various principal components. Let these eigen values arranged in descending order be $\lambda_1, \lambda_2, \dots, \lambda_p$

3. To take the first few values of λ s (say r values), and to find out the proportion

$$\frac{\lambda_1 + \lambda_2 + \dots + \lambda_p}{P}$$

If this value is satisfactory, say 70% or more (it may vary from problem to problem) then to find out the eigen vectors corresponding to these eigen values.

4. To convert the original variables into standard scores and using the elements given in the first eigen vector as weights, to get the weighted sum of the standardized scores for each observation. The values so obtained are the scores of the first principal component. Similarly, using the other eigen vectors the scores of 2nd, 3rd, and r^{th} principal components can be worked out.
5. To multiply each eigen vector used above by the square root of their corresponding eigen values and give them as factor loadings.

1.10 HYPOTHESES ENCOUNTERED

We have encountered the following hypotheses against their respective alternatives:

- (a) All the districts of the state of Assam are homogeneous with respect to agricultural development.

VIS-À-VIS

All the districts of the state are not homogeneous with respect to agriculture development.

- (b) The districts of the state are homogeneous with respect to industrial development.

VIS-À-VIS

The districts are not homogeneous with respect to industrial development.

- (c) All the district are homogeneous with respect to development in basic infrastructure and services.

VIS-À-VIS

The districts are not homogeneous with respect to development in basic infrastructure and services.

- (d) The districts of Assam are homogeneous with respect to overall development.

VIS-À-VIS

The districts are not homogeneous with respect to overall development.

- (e) Variations among the districts in respect of all the select indicators are uniform.

VIS-À-VIS

Variations among the districts in respect of all the select indicators are not uniform.

1.11 LIMITATIONS OF THE STUDY

Our study is based on secondary sources of information. As such, the limitations of secondary data will be applicable to our study. The study would have been more meaningful should we have been able to study inter-district disparities of Assam at two points of time. However, we have failed to make such a study because of the reasons that (i) most of the data are based on census information and there was no census in Assam in 1981, (ii) the data relating to 2001 census are not yet available. Moreover, new districts have come up at different times. Although some sub-divisions of existing districts get the district status yet due to non-availability of most data at sub-divisional level, we do not get data for the newly created districts. Consequently, we had to limit our study on the basis of the information based on 1991 census only. Major portion of the data that we have taken from *Statistical Hand Book of Assam, 1997, Economic Survey, Assam: 1997-98*, are based on 1991 census results. Our failure to study the changing pattern of development disparities among the districts of Assam over time is a severe limitation of our study. However, subsequent researchers may infuse inter-temporal dynamism in similar studies by taking the periodicity of study from 1991 to 2001 when the results of 2001 census would be available.

REFERENCES

- Chand, Mahesh and Puri, V.:** *Regional Planning in India*, Allied Publishers Pvt. Ltd., 1983.
- Ganguli, B. N. and Gupta, Debendra. B. (1976):** *Levels of Living in India – An inter-state profile*, S. Chand and Co. Ltd., New Delhi.
- Government of India, *Identification of Backward Areas*, Planning Commission, 1969.
- Hotteling, H. (1933):** Analysis of Complex Statistical Variable into Principal Component, *Journal of Educational Psychology*, 24: 407-441.
- Kaur Dhian and Ghuman, B. S. (1995):** "Inter district Disparities in Punjab -- Implication for planning," *Indian Journal of Regional Science*, 27: 1-2.
- Madhab, Jayanta (2001):** New Economic Policy and Regional Disparity, in: Atul Goswami (ed), *Regional Disparities in India*, Akansha Publishing House.
- Meher, Rajkishore (1999):** "Development Disparities in a Backward Region: A District Level Analysis", APH Publishing Corporation, New Delhi.
- Mitra, Ashok (1965):** *Levels of Regional Development in India*, Government of India.
- Murugaiah, V. (1997):** "Economic Disparities in Karnataka – A micro level study", *Indian Journal of Regional Science*, Vol. 29(1)
- Nath, V. (1970):** "Regional Development in Indian Planning", *Economic and Political Weekly*, Annual Number, 242-260.
- Planning Commission, Government of India, Second Five Year Plan, 1956, p 22.
- Rao, Hemanta (1977):** "Identification of Backward Regions and the Trends in Regional Disparities in India", *Artha Vijnana*, 19: 93-112
- Shrivastava, S. C. (1999):** *Levels and structure of development – An inter-district study of north-east India*, National Institute of Rural Development, Hyderabad, p 14.
- Srivastava, S. C.:** *Status of Micro Level Data in North-East India*, NIRD, NERC, 1996.
- United Nations Report on International Definitions and Measurement of Standards and Levels of Living*, 1954.