

INDUSTRIAL DEVELOPMENT IN INDIA REGIONAL ANALYSIS

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**Dedicated to
my mother and
my work**

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INTRODUCTION

Industrial growth in India has been synonymous with economic growth. At the time of independence it was considered to be a vital requirement for accelerated and sustained economic growth. It continues to be so. It is not only essential for raising productivity, upgrading technology and widening the production base, it is also necessary for reducing the regional disparity in the economy. It is essential to have industrial diversity for releasing the pressure on agriculture, which was rapidly crumbling under the weight of growing population, coupled with its institutional and technological infirmities. Industrial economy has, indeed, made a progress since independence.

The process of economic development of India is normally characterised by the structural diversity of its regions, with many factors acting and reacting with each other to determine a region's production and overall development potential. As the process of liberalisation and globalisation is taking deeper roots in the macro economic fabric of the Indian economy, it is essential to study the trends in industrial productivity in general and sectoral trends in particular.

Regional imbalances are inherent in the process of development and its degree goes on changing with the change in the state of development. There is an opinion that a trade-off exists between economic development at the national level and reduction of regional disparities within the nation. Professor Hirschman observes that "inter-regional inequality of growth is an inevitable for economic growth".¹

One of the arguments has been that regional growth is essentially an unequal due to the locational and structural variations between regions. Historically, growth

¹ Hirschman, A (1958), *The Strategy of Economic Development*, Yale University Press, NewHaven.

takes place only on some points in the region because “natural resources are not evenly distributed among regions, of a nation.

Access to market is essentially unequal... Inherited ‘know-how’ and labour skills are also unequally distributed, though such inequality is subject to change .

The increasing inequalities in the early states of economic development are not likely to decline, so easily, on their own. The unabated concentration of industries at few points in space has its roots in the fact that the spread effects are usually too weak to make any serious dent in the problem of regional imbalances, compared to the backwash effect. If the process of cumulative-causation is allowed to persist for a longer period, it is likely to result in social tension and political discontent. Therefore, arguments have been put forth in favour of government intervention for countermanding such equations.

Infrastructure is the basis for development² and for the economy it is the foundation on which the factors of production interact in order to produce output. This has been long recognised by development analysis and infrastructure, often termed “social overhead capital,” is considered to include: ...those services without which primary, secondary and tertiary production activities cannot function. In its wider sense it includes all public services from law and order through education and public health to transportation, communications, power and water supply, as well as such agricultural overhead capital as irrigation and drainage systems (Hirschman, 1958)

The economic and industrial development of a country directly depends on the quality and quantum of infrastructure facilities. Traditionally, the infrastructure provision has been the state responsibility and it accounted for a large share of planned investments. The waves of liberalisation and privatisation have started

² The dictionary’s definition of “Infrastructure is “the underlying foundation or basic framework”. See Webster’s Ninth Collegiate Dictionary, 1985.

looking at our doors even before the basic infrastructure could reach satisfactory levels. The challenge before the government now, is to establish a harmony between financial imperatives of commercial infrastructure provision and its own role as a welfare state and fair regulator.

There are many types of evidence regarding the contribution that infrastructure makes to development. The present study is an attempt to know how infrastructure can affect industrial development.

REVIEW OF LITERATURE

Ahluwalia(1986) has estimated that the average annual TFP change over the period 1959-80 for aggregate manufacturing ranged between -0.2 and 0.3 per cent and total industry between -0.3 and 0.6 per cent. The results show that during the periods of 60s and 70s as a whole there was little change in TFP. The second work of

Ahluwalia(1991) estimates TFP growth rate which shows suggest virtually zero growth (-0.04 per cent per annum) in TFP over the period from 1959-50 to 1985 - 86. Ahluwalia found out a turnaround in productivity growth in the period since 1982-83 after two decades of industrial stagnation. For the manufacturing sectors the turnaround was a negative and negligible growth in TFP in 60s and 70s to a significant 3.4 per cent per annum in the fist half of 80s. But Balakrishnan and Pushpangadan(1994), Rao(1996a) contested the result of Ahluwalia and they show opposite result of slower or negative growth in 80s.

Barthawal(1980) for example, has examined the distribution of the companies at work and their paid capital between 1975-76 and 1978-79. His study has shown the maximum concentration for the companies and their paid-up capital in Maharashtra, followed by West Bengal and Tamil Nadu.

Budhadeb & Prabir ((1998) have examined the role of infrastructure in regional development in twenty states over the period 1961-62 to 1994-95. They constructed composite index by using infrastructure variables viz. transport, power, teledensity, etc., and compared with PCNSDP (per capita net state domestic product). Their findings conclude that a low level of infrastructure rises the cost of production and the positions of the states remain unchanged over previous three and half decade.

Dadibhavi R.V. (1991), studied the growth of industry and industrial infrastructure at three point of time, 1970-71, 1980-81, and 1986-87. The infrastructure indicators are power supply, transport facility and industrial finance. The consumption of electricity in industry, measures the availability of power to the industry. The surface road length is the proxy for transport facility. The amount of credit advanced to the industries by the commercial banks in the measure of credit supply to the industries. On the industrial part manufacturing industrial output has been considered. On the basis of industrial growth the states are grouped into three categories. The first group consists of state in which industrial output grew at a uniform rate during both the period. Second group consists of states that experienced a significant deceleration in growth rate of industrial output, and finally the third group consists of remaining states, which experienced an increase in industrial growth. He concludes that for a few states, slow growth of industrial output is directly associated with slow growth in infrastructure.

Goldar's(1985) study estimated that the TFP grew at 1.3 per cent per annum during 1951-65. His estimation of productivity growth for the period 1959-79 as a whole and for three sub-periods relate to relatively large establishments in the registered sector. The rate of increase in capital intensity was the highest in the sub-period, 1959-65 & 1965-70. In spite of decline in capital productivity in these two-sum

periods, TFP growth was positive in these two sub-periods. According to him productivity performance in the 70s was better than in the 60s.

Goldar and Seth (1989) have attempted to study the trends industrial activities in major states for the period 1960-61 to 1985-86. Their objective was to analyse the industrial deceleration experienced after the mid-sixties at the all India level. In their study they found that industrially developed states of Maharashtra, Andhra Pradesh, Gujarat, Tamil Nadu and Karnataka maintained relatively stable growth rates throughout the period of the study, where as other remaining states either declined or continued to decline and recovered in the phases of deceleration and revival at the national level. They attribute this to fall in public investment during the deceleration phase as those states with high intensity of public investment revived and declined along with the national trend in industrial growth.

Krishna (1987) in his review of studies during the 1960s and 1970s observed that all studies agreed upon a deceleration in the TFP since 1960s. Ahluwalia(1991) observed a decline in TFP during the 1970s and a turnaround in the first half of the 1980s. Brahamananda's study covers all sectors in the Indian economy. He works out partial and total factor productivity ratios for the year 1960-61, 1970-71 and 1980-81 with 1950-51 as base. According to his estimate the productivity performance during 1971-81 was worse than in the earlier two decades in all sectors. Between 1950-51 and 1970-71, the productivity growth was 1.8 per cent per annum, the total growth rate being 3.7 per cent. The productivity growth rate declined to zero between 1970-71 and 1980-81.

Mohan Rao (1996) he attempted to study the factor productivity over the period of 1973-74 to 1992-93. He estimated the Total factor productivity at 2 per cent for the entire period. However it was estimated 5.5 percent during the period 1973-74 to 1980-81 and negative at 2.2 per cent over the period 1981-82 to 1992-93. Rao stated that if single deflator is used, the result of Ahluwalia finds support. The TFPSD (TFP based on single deflation) shows a negative growth of 0.2 per cent during 1973-74 to 1980-81 but a positive growth of 2.1 per cent during 1981-82 to 1992-93. They emphasised the turn around in early 1980's.

Pradhan and Barik (1998) have studied the Total factor productivity growth over the period 1963-64 to 1992-93. In their study the TFPG has estimated at 0.61 per cent per annum over the period 1963-64 to 1992-93. They have grouped the period into three. In the first period TFPG has recorded negative growth -2.09 per cent per annum during the sub-period 1963-71, 3.06 per cent, per annum during the second sub-period 1972-81 and during third sub-period 1982-92 has recorded negative i.e., -1.23 per cent per annum. According to these authors the TFPG have experienced a deceleration. Trivedi, Prakash and Sinate (RBI 2000), The study is based on five manufacturing industries for the period of (1973-74 to 1997-98). The study has taken into account the following five industries viz., textile & textile products, metal & metal products, machinery & transport equipment, chemical & chemical products, and leather & leather products. The period 1973-74 to 1997-98 has been divided into five sub-periods viz. 1973-80, 1980-85, 1985-90, 1990-95 and 1995-98. The calculations of the study are firstly, an increasing trend in labour productivity has been witnessed in the case of most of the industry groups across the five sub-periods of study. Secondly, the rates of growth of TFP (single deflation method) and TFP (double deflation method) in manufacturing sector were 1 per cent, 2.6 per cent and 4.4 per cent per annum respectively during the period 1973-74 to 1997-98.

Rakesh Mohan(1989) shows with the help of employment data from Annual Survey of Industries and Labour Bureau that the organised sector factory employment has shown high level of dispersal with the under developed states of Orissa and Rajasthan showing highest growth rates. The unorganised sector employment has shown almost the same picture with the industrialised states maintaining their position except for West Bengal between 1961 and 1981. Though the organised employment has shown dispersal, in terms of value added, Mohan points that the old industrialised states have continued to maintain their earlier position, according to him, the most dynamic states being Punjab and Haryana.

Thus it can be concluded that most of the studies have shown a decline in inter-regional industrial disparity. Since the inception of planning process, some of the studies, which have at all shown an increase, have reached during early 1960s and 70s of course till 1965 and there has been an observable decline in inter-regional industrial inequality. In fact, the conclusion depends more on the choice of the variables rather than the time period, since various authors are reaching different conclusions with different variables during the same period.

Rao and Anuradha (1990), studied the inter-regional industrial disparity for the period 1970-71 to 1985-86. They showed a decline in inter-regional industrial disparity with inequality indices as co-efficient of variation, Theils index and Hirschman-Hefubdahl index. Udai Sekher (1983) also found the decline in regional disparity for the period of 1961 and 1975. He has tested with net value added and employment by applying Theils index. He has also shown that the share of the too industrialised states in manufacturing employment and net value added in manufacturing have gone down.

Sarkar (1994) has undertaken an exercise on the Regional Imbalances in Indian Economy over Plan Periods. The uneven distribution of natural resources is an important factor for the under development of the regions. This problem is to tackle by well thought out strategies. Here the author has made an attempt to analyse the strategies to correct regional imbalances. He examined the impact of plan outlays on the development of states and also studied whether planning process led to reduction of imbalances.

He reached at the conclusion that influence of plan outlay on development is significant. Imbalances could be corrected by reduction of disparity in per capita cumulative plan outlays. Over the years the clusters of states according to different level of development have also changed their composition. It also makes a strong case for improvement in the plan expenditure to relatively less developed region.

Tewari(1988) has shown that despite unchanged inter-regional pattern of industrialisation, a decline in disparity is observed between 1970-71 and 1980-81 by a decline in the level of Co-efficient of Variation of the composite indices of industrialisation. Awasti(1991), by using six inequality indices, has shown that developed states have lost some of their shares in favour of industrially backward states and consequently the inequalities across states in the distribution of industry have declined between 1961 and 1978. However, he argues that this decline is more a result of deceleration of some industrially developed states than the gain by industrially backward states.

In contrast some authors do not agree with the above conclusions. According to them, the regional industrial disparity has gone up over time.

Objectives of the study

To examine the regional industrial structure of the various state economies with reference to the national economy,

To measure the extent and direction of inter-regional disparities in terms of some selected variables like fixed capital, employment and values added.

To study the trends in Factor Productivity of the various states during the period of 1980's and 1990's,

To study the relation between Infrastructure and Industrial output.

DATABASE

The analysis of industrial development is based on the data provided in the Annual Survey of Industries by the Central Statistical Organisation, Government of India. For making price corrections to the reported data, deflators have been constructed with the help of official series on Wholesale price indices (Index number of Wholesale Prices in India, prepared by the Office of the Economic Advisor, Ministry of Industry). The data considered 17 manufacturing industries at two-digit level for 17 major states. The 17 industries are clubbed to make 7 group of industries viz. Capital goods, Basic goods, Intermediate goods, Food nutrition related consumer goods, Clothing related consumer goods, Primary input based consumer goods, and Other consumer goods & Metallic mineral products. The variables such as Fixed Capita, Number of Employees, Net Value Added, Number of Workers, Total Emoluments, Value of Gross Output.

Manufacturing industries are clubbed into seven groups namely,

Capital Goods	- 35,36,37.,
Basic Goods	- 33,34.,
Intermediate Goods	- 30,31.,
Food-Nutrition related Consumer goods	- 20,21,22.,
Clothing related consumer Goods	- 23, 24, 25, 26.
Primary Input based consumer Goods	- 27,28,29.
Other consumer goods and Metallic mineral products	- 32,38

METHODOLOGY

1. Location Quotient

$$L.Q = (V_{ij}/V_j)/(V_i/V_n)$$

Where V = No. of Employmyees

i = ith industry

j = jth region

n = National Aggregate

The location quotient is most frequently used in economic geography and location analysis, but it has much wider applicability. The location quotient (LQ) is an index for comparing an area's share of a particular activity with the area's share of some basic or aggregate phenomenon. Is employment in manufacturing concentrated in some area (s), or is it evenly distributed across the regions. Location quotients compare the distribution of an activity to some base or standard, in this case to total employment.

There are three general outcomes are possible when calculating location quotients.

These outcomes are as follows.

$$LQ < 1, LQ = 1 \text{ and } LQ > 1$$

$LQ < 1$ = All employment is non-basic

A LQ that is less than one suggests that local employment is less than expected for a given industry. Therefore, that industry is not even meeting local demand for a given goods or service. Therefore all of this employment is considered non-basic.

A $LQ = 1$ = All Employment is Non-Basic

A LQ that is equal to zero suggests that the local employment is exactly sufficient to meet the local demand for a given goods or service. Therefore, all of this employment is also considered non-basic because none of these goods or services is exported to non-local areas.

A $LQ > 1$ = Some Employment is Basic

A LQ that is greater than one provides evidence of basic employment for a given industry. When an $LQ > 1$, one can conclude that local employment is greater than expected and it is therefore assumed that this “extra” employment is basic. These extra jobs then must export their goods and services to non-local areas which, by definition, makes them Basic sector employment.

2. Specialisation Coefficient (SQ)

$$S.Q = \sum (V_{ij}/V_j) - (V_i/V_n)$$

The Specialisation co-efficient (SQ) measured the extent to which a regional economy has a diversified pattern. The lower and upper limits of the specialisation coefficient are zero and one respectively. If a region’s industrial economy is as diversified as that of the nation, the specialisation co-efficient will be zero, while in turn is concentrated only in that region, the specialisation coefficient will be equal to one, reflecting complete lack of diversification. In other words SQ nearer to the zero more diversified will the state be and value approaching one will indicate relative lack of diversification.

Where V = No. of Employeeyes

i = ith industry

j = jth region

n = National Aggregate

3. Theils Index

The four properties (Axioms) of good inequality methods of measurement are (1) Additive Monotonicity (2) Redistributive Monotonicity (3) Directional sensitivity (4) Repetitive Redistributive.

The Gini coefficient, doesn't satisfy a substantial number of properties of a good indicator, whereas the co-efficient of variation satisfies three of the four properties. The Theils index on the other hand, satisfies all the four properties. So it is more reliable to apply Theils index to measure Disparity.

$$I = \log n - H$$

$$\text{Where } H = \sum x_i \log (1/x_i)$$

$$x_i = X_i / \sum X_i$$

4. Total Factor Productivity Growth

The basic assumption in the Solow model is the existence of an aggregate production function. In turn, this functional form is based on the following assumption:

- (i) 1. there are only two factors of production, labour and capital;
- (ii) 2. the production process exhibits constant returns to scale;
- (iii) 3. perfect competition exists in the factor markets;
- (iv) 4. factors are paid according to their marginal productivity;

$$\Delta \ln TFP(t) = \Delta \ln NVA(t) - S \cdot \Delta (\ln L(t)) - \Delta (1-S) \Delta (\ln K(t))$$

Where, TFP(t) = total factor productivity in year t.

NVA(t) = net valued added in year t.

K(t) = fixed capital in year t.

L(t) = no of employees in year t.

Sl = share of emoluments in net value added.

Δ = Change

$$\text{Labour Productivity} = \frac{\text{Net Value Added}}{\text{No. of Employees}}$$

$$\text{Capital Productivity} = \frac{\text{Net Value Added}}{\text{Fixed Capital}}$$

$$\text{Growth Rate} = \frac{(P_1 - P_0)}{P_0} \times 100$$

The yearly estimates have been averaged over the years to obtain the average total factor productivity growth for the above-mentioned periods.

5. Regression

The objective here is to arrive at the relevance of infrastructure on industrial activity.

For this multiple Regression is used. The equation is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \dots\dots\dots$$

Y is the dependent variable and X_1, X_2, X_3, \dots are the independent variables.

a = intercept

β = coefficients

r^2 = coefficient of determination.

Y = Dependent variable,

The Independent variables are

X_1 = Road length (per thousand square Kms)

X_2 = Rail route length (per thousand square Kms)

X_3 = Electricity consumption (crore Kwh per lakh population)

X_4 = Liability/Assets Rs. in lakhs (per lakh population)

X_5 = Literacy (per cent).

6. Correlation

The Correlation has been used to analyse the level of association between industrial variables and infrastructure variables. The Correlation matrix (table 3.4) explains the degree of relation between infrastructure indicators and industrial variables like,

$$r = \frac{\sum xy}{N \sigma_x \sigma_y}$$

Here $x = (X - \bar{X}); y = (Y - \bar{Y})$

σ_x = Standard deviation of series X

σ_y = Standard deviation of series Y

N = Number of pairs of observations

r = Correlation coefficient

7. Principal Component Analysis (PCA)

For the purpose of making a comparative assessment of the states performance in 1980's and 1990's a composite index has been constructed with the help of a set of performance indicators taking from the physical and social infrastructure variables for the infrastructure indicator and net value added, number of employees and fixed capital for the industrial indicator. PCA has become a special branch of multi-variant analysis of data. It is well known that the purpose of multivariate analysis is "to summarise a large body of data by means of relatively few parameters". A Composite index of a set of variables can be constructed by following a wide variety of multivariate techniques. A Composite index can be constructed by using similar technique like Ranking and Indexing these techniques however suffer from several drawbacks (Kundu, 1984) and (Sarkar, 1995). The main drawbacks relate to the arbitrariness involved in allocation of weights. The main objective to use this technique is to get an index, which explains the maximum variations in the original data set.

Steps involved in the calculation of the first Principal component analysis:

1. Make all original data set scale free so as that they all can have unit variance.
2. Standardisation of data matrix, the idle way is to get standardised is to abstract Mean and Devided by Standard deviation (Simple PCA), but in Modified PCA, it has to devide by Mean (instead of standard deviation)
3. After getting the standardisation, transpose the whole determinant (convert rows into column and the column into rows and then multiply), after that devide each element with the number of variables taken.

4. After deviding each element of the multiplied determinant, what we get is called the correlation matrix then we calculate the eigen values and the eigen vector. According to the vector associated with the highest eigen value gives us the weights of the variables.

5. This is the last step where we multiply the each row of the eigen vector associated with the highest eigen value to the original set column wise and then add it row wise this final determinants gives us the composite index.

$$PC_1 = a_{11}X_1 + a_{21}X_2 + \dots + a_{m1}X_m = X_{a1}$$

$$PC_2 = a_{12}X_1 + a_{22}X_2 + \dots + a_{m2}X_m = X_{a2}$$

.....

$$PC_m = a_{1m}X_1 + a_{2m}X_2 + \dots + a_{mm}X_m = X_{am}$$

The basic difference between Standard Principle Component Analysis and Modify Principle Component Analysis is, the standard PCA subtract \bar{X} by X and devide by Standard deviation.

$$PCA = \frac{X - \bar{X}}{\sigma_X}$$

The Modify PCA devides each observation by \bar{X} .

In this study the Modify Principal component analysis has bee used.

CHAPTER-II

In this chapter measuring the industrial diversity and industrial disparity carried out the analysis of the trend in the distribution of industries across states and over time. Here the study deals with the analysis of the industrial structure of various regional economies at inter-state level. It portrayed the industrial base of 17 major states of India, using employment data. The industrial base has been analysed at three point of time viz., 1981-82, 1991-92, and 1997-98.

Regional disparity in India is now a matter of serious concern. It is well known that in a large economy, different regions with different resource bases and endowments would have a dissimilar growth path over time. One of the reasons why centralised planning was advocated earlier was that it could restrain the regional disparity. In spite of centralised planning, however, regional disparity remained a serious problem in India. A new controversy in this respect is whether industrial development in different regions would eventually converging or diverging.

In India there are several determinants of regional inequalities. The labour cost becomes an influence on the location decisions because of spatial differences in the skill composition of work force, and due to lack of mobility of workers between different spatial units. The availability of raw materials determines the nature of industries in the region. The market orientation is also an important factor, which determines the industrial location, and thus the decision of location of an industry will be based not only on the current demand but also on forecast for the future demand.

Another crucial factor is human capital, particularly entrepreneurship along with labour supply. The traditional location theory postulates economic rationality of the entrepreneurs in terms of cost minimisation or profit maximisation. Of late, it has been realised that the 'profit maximisation is an unsatisfactory goal for location decision makers' and location decision, more than that most managerial decisions

has to take into account psychic income's influence and other personal factors, which are not easily compatible with narrow definition of economic rationality" (Richardson,1977: 108-109).³

The industrial history of various countries reveals that regional inequalities tend to decline as development proceeds⁴. Logically it would happen if (a) developed regions stop growing and backward regions grow; (b) developed regions grow at a slower pace than the backward regions; and (c) developed regions encounter a declining phase, whereas underdeveloped regions remain even stagnant.

There are varieties of causes for the industrial growth among the regions.

Some of them are as follows.

a) The industry mix of the regions, b) existing technological linkages and operation of some behavioral factors at regional levels. c) Diversity of infrastructure facility. Infrastructure (physical as well as social) is an important factor, which determines industrial establishment. Infrastructure facilities improve productivity. d) The government intervention with the market forces is also likely to influence the pattern of industrial diversity and growth. Due to higher land prices in main urban areas and land use regulations, the manufacturing activities are shifting to outside the city boundaries but in close distance.

The existing regional demand and invisible capital may not be sufficient to foster industrialisation if a critical minimum level of infrastructure is not available. The raw material can be imported even from distant places if infrastructure (transport, power, banking etc.) is sufficiently developed. Government is also playing the role of entrepreneur by establishing industries in stagnant region with a view to maintain balanced growth. The public sector investment is also play an

³ Richardson (1977): 108-109, Quoted by Seth V.K.(1987), 'Industrialisation in India: Spatial Perspective', Common Wealth Publishers.

⁴ Williamson, J.G. (1965), 'Regional Inequality and the Process of National Development: A Description of the Patterns', Economic Development and Cultural Change, Vol 13.

important role in providing infrastructure, which is another crucial factor in accelerating the industrial diversity.

Table (2.1) depicts the industrial base of different states in India in the year 1981-82, 1991-92, 1997-98. These industries are classified into seven group of industries viz. Capital goods, Basic goods, Intermediate goods, Food-Nutrition related consumer goods, Clothing related consumer goods, Primary input based consumer goods and other consumer goods and Metallic mineral products.

Capital goods Industry

The development of Capital goods industries is confined to some states like Punjab, Bihar, Karnataka, Madhya Pradesh, Kerala, Orissa etc. Among these top six states Punjab has decreasing its industrial base over the period. Punjab has recorded 5.32, 4.65, and 4.34 respectively, and Madhya Pradesh has estimated at 4.15, 4.22, and 3.79 respectively, where as Bihar and Kerala accelerated its industrial base over the different time period. The states like Madhya Pradesh, has experienced high industrial base in the year 1991-92 comparing to 1981-82, 1997-98, where as Orissa has recorded lower industrial base in 1991-92, comparing other two years. The states like Andhra Pradesh, Assam, Gujarat, Jammu & Kashmir, Maharashtra, have improved its industrial base over the different time period. Assam Location Quotient (L.Q.) was estimated 0.96 ($LQ < 1$) in 1981-82 (it depicts that it has less of a share of industrial activity than is more generally found) however latter, it has improved its industrial base.

Over all picture of capital goods industrial base of most of the states have improved substantially over the period. The Capital goods industries is probably confined to those states where natural resources are available and heavy public sector investment has been made (like Bihar, Madhya Pradesh, Karnataka, Orissa etc.,).

Table: 2.1 Location Quotient

STATE	Capital goods			Basic goods			Intermediate goods		
	1981-82	1991-92	1997-98	1981-82	1991-92	1997-98	1981-82	1991-92	1997-98
Andhra Pradesh	1.6588	1.6753	2.4900	1.1181	1.0392	1.9800	1.9400	1.0387	1.1524
Assam	0.9559	1.5932	3.3560	1.0700	0.7843	3.1129	1.2568	0.9369	1.3227
Bihar	3.5521	4.0860	4.4200	2.3942	2.5345	3.5720	2.0178	2.5335	2.1900
Gujarat	1.7794	2.0799	2.7600	1.1994	1.2902	1.1578	1.0108	1.2896	1.3590
Haryana	1.9261	1.9442	1.4482	1.7941	1.2029	3.4496	0.5127	1.3753	4.0489
Himachal Pradesh	2.2719	2.0455	1.7071	1.5447	1.4932	1.2810	1.4522	1.3411	1.1425
Jammu & Kashmir	1.3187	2.3447	4.0878	0.9511	2.2522	2.8500	0.8018	3.5350	1.3577
Karnataka	3.6063	3.4765	3.5000	2.4307	2.1564	1.9000	2.0486	2.1555	2.2301
Kerala	2.2800	3.2500	3.3200	2.8846	3.2573	2.8475	2.4312	1.2600	2.3400
Madhya Pradesh	3.1500	3.2200	2.7900	2.8002	2.6188	1.5000	2.3600	2.6177	1.9300
Maharashtra	1.9400	2.2400	3.0900	2.6400	2.7700	2.7200	1.5400	2.7700	3.8400
Orissa	2.6500	2.4513	3.3560	2.3091	0.9369	3.1129	5.3834	1.0932	1.3227
Punjab	5.3231	4.6496	4.3434	3.5879	2.8841	2.8641	3.0239	2.8829	3.3616
Rajasthan	1.0907	1.9187	1.8617	1.1978	1.5511	4.0261	0.9425	1.4018	4.7255
Tamil Nadu	2.5700	1.4603	2.2200	1.0568	2.9100	2.8000	1.8900	1.9100	2.3500
Uttar Pradesh	1.7565	2.0184	2.1659	1.1839	1.2520	1.4282	0.9978	1.2515	1.6763
West Bengal	1.3071	1.9012	1.8964	0.8810	1.1793	1.2505	0.7425	1.1788	1.4677

Continued.....

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STATE	Food-Nutrition			Clothing related consumer goods			Primary Input based consumer goods			Other Consumer goods & Metallic mineral products		
	1981-82	1991-92	1997-98	1981-82	1991-92	1997-98	1981-82	1991-92	1997-98	1981-82	1991-92	1997-98
Andhra Pradesh	2.5082	2.0590	2.0293	2.2787	2.8100	1.8617	0.5881	1.5600	1.5300	1.7100	0.6936	1.6100
Assam	1.0907	1.0932	1.4482	2.5708	1.7932	1.6839	2.3539	1.6411	0.8227	0.7559	3.0128	0.9482
Bihar	3.3700	3.0200	1.9012	4.8795	4.4075	1.1637	1.2593	1.3556	1.9409	1.5131	1.6917	2.2153
Gujarat	2.6906	2.5564	2.3931	3.4400	2.2436	2.1955	1.6300	1.6900	1.6300	0.7580	1.8800	1.7200
Haryana	0.6141	2.3479	1.4482	1.7941	2.1920	4.7255	1.5167	1.9530	1.8744	0.9626	2.4373	2.1394
Himachal Pradesh	2.7350	2.7128	2.3764	2.5439	2.6569	2.1955	0.8852	0.9843	0.8634	1.0222	1.1369	0.9568
Jammu & Kashmir	1.3789	3.3439	0.8400	1.6027	1.6852	0.9604	0.5637	1.8222	1.6396	0.6123	3.2395	2.0516
Karnataka	5.4529	4.2727	3.9272	4.9540	3.7500	3.6029	1.2785	1.1533	1.0324	1.5362	1.4393	2.1800
Kerala	5.5700	5.4500	5.8900	5.8790	5.6644	5.3995	1.5172	1.7421	1.5472	1.8230	2.1741	1.7659
Madhya Pradesh	4.2800	3.1900	3.1600	5.7070	4.5541	4.7378	1.4728	1.4006	1.3576	1.7697	1.7480	1.5495
Maharashtra	2.4200	3.5200	2.4800	3.2600	2.3400	3.3600	1.3300	1.4100	2.3900	1.4000	2.5100	1.4500
Orissa	5.2582	1.7932	1.4482	1.5094	1.6411	1.6839	1.8516	3.0128	0.8227	2.4500	2.9569	0.9482
Punjab	8.0489	5.7146	5.9199	7.3123	5.0155	5.4310	1.8871	1.5425	2.5600	2.2675	1.9250	1.7762
Rajasthan	2.3091	1.9789	2.3764	1.1411	2.2027	2.1955	3.8261	1.1637	2.1876	1.3435	1.2123	2.4968
Tamil Nadu	2.3708	2.7900	1.6688	2.1539	2.5800	5.5300	1.5600	1.4800	1.4400	1.6700	1.6000	1.5000
Uttar Pradesh	2.6560	2.4807	2.9521	2.4129	2.1772	2.7083	0.6227	0.6696	0.7760	0.7482	0.8356	0.8857
West Bengal	1.9764	2.3367	2.5847	3.8000	2.0508	2.3712	0.4634	0.6307	0.6795	0.5568	0.7871	0.7755

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Basic goods Industry

The higher the share of basic goods industrial activities over the different years have been recorded in the states of Punjab, Kerala, Bihar, Maharashtra, Madhya Pradesh. Bihar Location quotient for different years estimated at 2.39, 2.53 and 3.57 respectively. Punjab has shown declining trend over the period. Kerala and Maharashtra have shown higher industrial activities in the year 1991-92. Among the other states, industrial base of basic goods industries has improved in Jammu & Kashmir, Uttar Pradesh, West Bengal, whereas it has decreased in Himachal Pradesh. In 1991 the industrial base for Gujarat for basic goods recorded high as compared to the other two years, contrary to this Assam and Andhra Pradesh have recorded low in the same year. The performance of the states in basic goods over the decades has improved continuously.

It seems that there is sustained process of industrial concentration in these states over the period because of increase in the demand of metal products for the industrial activities that has accelerated due to liberalisation policy.

Intermediate goods

Industrial concentration of intermediate goods industries have observed over the period in the states of Punjab, Bihar, Maharashtra, Rajasthan, etc.. In the year 1981-82, industrial base has been maintained in the states of Orissa (5.38), Punjab (3.02), Kerala (2.43), Madhya Pradesh (2.36), Karnataka (2.05). In the next decade the industrial structure has changed slightly. Industrial concentration has been seen in the states of Jammu & Kashmir, Punjab, Maharashtra, Madhya Pradesh, Bihar. The drastic change has been taken place in the year 1997-98. Rajasthan has been estimated at 4.73 per cent followed by Haryana (4.05), Maharashtra (3.84), Tamil Nadu (2.35), Kerala (2.34). Among the top five states (intermediate industry), Maharashtra and Rajasthan have experienced continuous increase in industrial base. Bihar and Madhya Pradesh performance in 1991-92 is better comparing to other two years, where as Punjab has seen deterioration in the year 1991-92. It can be observe that many other states are also

improved their position over the period viz, Gujarat, Haryana, Karnataka, Tamil Nadu, Uttar Pradesh, West Bengal. In 1981-82, Location Quotient of Jammu & Kashmir and Rajasthan recorded at 0.8 and 0.94 respectively, which depicts that the share of industrial activity much lower but latter period it has improved substantially. These industrial location is probably based on either availability of raw materials or cheap labour cost.

Food-Nutrition related consumer goods.

The Food-Nutrition related consumer goods is mainly confined to Punjab, Kerala, Karnataka, Madhya Pradesh, Orissa. Among these states Kerala and Madhya Pradesh have expanded their industrial base over the period. Kerala has recorded L.Q. at 5.57, 5.47, and 5.89 respectively whereas Madhya Pradesh has estimated at 4.28, 3.19, and 3.16 for 1981-82, 1991-92, 1997-98 respectively. Comparatively Punjab and Kerala have shown less concentration in 1991, where as Maharashtra has estimated comparatively higher industrial base in the same period. Among the remaining states viz. Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, West Bengal, have shown decline in its industrial base over the period Maharashtra and Jammu and Kashmir have maintained higher industrial base comparing to other two years(1981-81, 1991-92). Overall picture of Food-Nutrition related industry shown that industrial base has declined for most of the states over the period.

The agro based states are probably having low labour cost and well integration of villages with market towns these states by increasing farm income generates demand for industrial consumer goods which leads to attract agro based industries.

Clothing related consumer goods

Industrial concentration over the period has been observed in the states of Punjab, Kerala, Madhya Pradesh, Karnataka, and Tamil Nadu. In 1981-82, Industrial base has been recorded high in the states of Punjab, Kerala, Madhya Pradesh, Karnataka, Tamil Nadu. In 1981-82, the states of Punjab (7.31), Kerala (5.88), Madhya

Pradesh (5.71), Karnataka (4.94) had higher industrial base. In the year 1991-92, Kerala recorded high (5.66), followed by Punjab, Bihar, Karnataka, where as in 1997-98, Tamil Nadu stood high by recording at 3.42 followed by Punjab, Kerala, Madhya Pradesh.

Among the top five states, Tamil Nadu has experienced an increase in its industrial base over the period (1981-82-1997-98), where as Karnataka and Kerala experienced a decline on their industrial base. Industrial base of Madhya Pradesh and Punjab has been recorded lower in 1991-92 comparing to other two years. Many states have experienced a decline in industrial base except Orissa and Tamil Nadu. The Andhra Pradesh and Himachal Pradesh's industrial base in 1991-92 was higher than other two years (1981-82, 1997-98). It can be observed that in the first year (1981-82), industrial base of Punjab was high (7.31), where as in the second (1991-92) and third (1997-98) year, Kerala and Tamil Nadu has recorded high respectively.

Many opine that the liberalisation policy led to the import of Textiles affected by reducing industrial base in most of the states, though the government policy through various incentives improved the industrial base.

Primary input based consumer goods.

Industrial base of Primary input based consumer goods industry over the period has been recorded high in the states of Rajasthan, Punjab, Orissa, Haryana, Maharashtra. In 1981, high industrial base has been confined to the Rajasthan (3.83), Bihar (2.35), Gujarat (1.63) Punjab (1.89), and Orissa (1.85). In 1991 industrial base shifted to Orissa (3.01), Haryana (1.95), Kerala (1.74), and Assam (1.64), whereas in 1997-98, the industrial base has almost completely shifted to different states viz. Punjab (2.56), Maharashtra (2.39), Rajasthan (2.19), Bihar (1.94). Among the states of higher industrial base, Maharashtra accelerated industrial base over the period (1981-82-1997-98). In 1991 the performance of the Haryana and Orissa comparatively better, contrary to this, the performance of Punjab and Rajasthan is bad comparing to other two years.

Industrial base of the remaining states are concern viz, Bihar, Maharashtra, Uttar Pradesh, West Bengal have improved over the period . Though Uttar Pradesh and West Bengal have improved its industrial base over a period, yet their share of industrial activity is very less comparing to other states. The over all picture of the PIBCG industrial base of states are not good for the years 1991-92 and 1997-98.

It can be postulated that the regional variations in industrial development may exist to the extent of government industrial policies, that had led to increase in the industrial base during 1991-92, where it remains unaffected in the latter year.

Other Consumer Goods & Metallic Mineral Products.

Industrial base of OCGMMP is mainly confined to the states of Orissa, Punjab, Jammu & Kashmir, Haryana. Among these states in 1981-82, Punjab industrial base has been recorded at 2.27, followed by Orissa (2.45), and Madhya Pradesh (1.77). In 1991-92, industrial base has shifted to Karnataka (3.24), Assam (3.01), Orissa (2.96) and Maharashtra (2.51), whereas in 1997, the industrial base has changed to Rajasthan (2.5), Bihar (2.22), Karnataka (2.18), Haryana (2.14). Among these states, industrial deceleration over the period is noticeable in the states of Orissa, Punjab, where as Jammu & Kashmir and Haryana have recorded higher Location Quotient in 1991 comparing to other two years. Industrial base has improved over the period (1981-82-1997-98) in the states like Bihar, Rajasthan, Uttar Pradesh, West Bengal. Though the industrial base of Uttar Pradesh and West Bengal have improved over the period, its share of industrial activity is low comparing to other states. The overall industrial activity of OCG&MMP slowed down during 1991-92 whereas it has picked up during 1997-98. The availability of raw materials and private participants has improved its industrial base over the period.

The overall picture of manufacturing industries shows that the Capital goods, Basic goods, Intermediate goods, and Food Nutrition related consumer goods have recorded continuous increase of industrial base over the period 1981-82-1997-98. Contrary to these The PIBCG industry has decreased the industrial base over the period

(1981-82-1997-98). The OCGMMP has recorded lower base in 1981-82 and improved during 1991-92 where as it again declined in 1997-98.

Industrial Diversity

The Specialisation co-efficient (SQ) measured the extent to which a regional economy has a diversified pattern. The lower and upper limits of the specialisation coefficient are zero and one respectively. If a region's industrial economy is as diversified as that of the nation, the specialisation co-efficient will be zero, while in turn is concentrated only in that region, the specialisation coefficient will be equal to one, reflecting complete lack of diversification. In other words SQ nearer to the zero more diversified will the state be and value approaching one will indicate relative lack of diversification.

Table: 2.2 Industrial Special Co-efficient for the States

	1981-82	1991-92	1997-98
Highly Diversified Regions			
Tamil Nadu	0.2220	0.0507	0.0264
Maharashtra	0.3075	0.0898	0.0264
West Bengal	0.0898	0.3123	0.4021
Andhra Pradesh	0.3651	0.3211	0.3075
Gujarat	0.3606	0.3523	0.2963
Moderately Diversified Regions			
Uttar Pradesh	0.3873	0.3543	0.4345
Karnataka	0.6614	0.6097	0.5768
Bihar	0.5661	0.6141	0.7120
Madhya Pradesh	0.7060	0.6701	0.6524
Kerala	0.7345	0.7529	0.7229
Less Diversified Regions			
Punjab	0.8007	0.7485	0.7468
Haryana	0.8147	0.7746	0.7652
Rajasthan	0.8453	0.8105	0.7903
Orissa	0.8458	0.8356	0.8471
Assam	0.8927	0.8768	0.8813
Himachal Pradesh	0.9867	0.9727	0.9660
Jammu and Kashmir	0.9839	0.9862	0.9775

With the help of above table (Table 2.2) the relative extent of industrial diversification of the various regions can be examined by estimating the region specific coefficient of specialisation. Table provides values of the coefficients for the year 1981-82, 1991-92, 1997-98. It has been classified in three broad groups, viz. highly diversified regions, moderately diversified regions, and less diversified regions. It is found that the Tamil Nadu, Maharashtra, West Bengal, Andhra Pradesh and Gujarat are industrially more diversified states; Karnataka, Bihar, Madhya Pradesh, Kerala, could be grouped in 'middle level' (moderate diversified) in terms of diversification; while Haryana, Rajasthan, Orissa, Assam, Himachal Pradesh, Jammu & Kashmir witnessed very less diversified in industrial structure.

In 1981-82, West Bengal (0.09) highly diversified region is, Bihar (0.57) moderately diversified region and Jammu & Kashmir (.98), Himachal Pradesh (0.99) less diversified region is. In 1991-92, Tamil Nadu (0.05), Karnataka/Bihar (0.61) and Jammu & Kashmir/Himachal Pradesh (0.98) were high, moderate and less diversified regions respectively.

On the whole a few states experienced less change in the diversification over the period, viz., Kerala, Orissa, Assam, Himachal Pradesh, and Jammu & Kashmir. Diversity has been increased continuously among all the classified groups. In the first group, all the regions experienced diversity except west Bengal.

The industrial history of various countries reveals that regional inequalities tend to decline as development proceeds⁵. Barro (1991) postulates that when the growth rate of an economy accelerates, initially some regions with better resources would grow faster than others. But after sometime, when the law of diminishing marginal returns set in, first growth rates would converge, due to differential marginal productivity of capital (higher in poorer regions and lower in richer regions, and this in turn would

⁵ Williamson, J.G. (1965), 'Regional Inequality and the Process of National Development: A Description of the Patterns', *Economic Development and Cultural Change*, Vol 13

bridge the gaps in the levels of income across regions.⁶ But In our study the time period is comparatively less i.e. only 17 years, which is not sufficient to explain the detailed regional behaviour.

However, the causes for high diversity are partly due to higher land price in class I towns and partly due to certain land use regulations and spread of infrastructure facilities, which has, reduce transportation cost. So the industrial activities can be spread across the regions.

In moderately diversified regions, Karnataka, Madhya Pradesh have become less experienced comparatively continuous increase of diversification probably because of above reasons. Whereas Uttar Pradesh and Bihar have become less diversified over the period because of dependency either on availability of raw material or locating near to market places. Generally, the raw-material availability and transport-cost were assumed to be the most important factors for attracting industries.

Many of these states have not been able to attract either foreign investment or private (domestic) investment because of inadequate infrastructure, poor governance (and terrorism in the case of Jammu & Kashmir and Assam) might have also restrained industrial diversity in thee states. Apart from the lack of investment, poor infrastructure combined with poor governance (and terrorism in the case of Assam) might have also restrained growth in these states. The poorer states with inadequate infrastructure have not been able to attract foreign investment.

Regional Disparity

There are several determinants of industrial regional inequality viz, The factors like availability of Raw materials, infrastructure in terms of transport, power and means of communications, agglomeration economies, size of the market, linkages-inter-

⁶ Barro, Robert J (1991): 'Economic growth in across section of countries', Quarterly journal of economics 106, May.

industry (technological) and marketing, availability of cheap and submissive labour, urbanisation, entrepreneurship, Government policies etc.,⁷

The availability of raw material is an important factor to determine the industrial establishment. The coal reserves are located in Bihar West Bengal, Orissa, Maharashtra and Andhra Pradesh. The Petroleum resources are located in Gujarat, Assam, Rajasthan and in the coastal Maharashtra. Most of the deposits of iron ore coal deposits are located in Bihar, Orissa, Madhya Pradesh, Karnataka and Tamil Nadu. Western ghats contains most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals. The resource based industries are located in these regions.

Table 2.3 Regional Disparity in Manufacturing industries

	1981-82to 1990-91		1991-92to 1997-98
High			
Jammu and Kashmir	0.0266	Jammu and Kashmir	0.0241
Punjab	0.0087	Himachal Pradesh	0.0075
Madhya Pradesh	0.0070	Karnataka	0.0074
Moderate			
West Bengal	0.0066	Haryana	0.0060
Himachal Pradesh	0.0064	Rajasthan	0.0045
Kerala	0.0036	Madhya Pradesh	0.0044
		Gujarat	0.0042
		Tamil Nadu	0.0038
		Kerala	0.0038
		Assam	0.0038
		Maharastra	0.0034
		Andhra Pradesh	0.0029
Low			
Andhra Pradesh	0.0028	Punjab	0.0026
Rajasthan	0.0027	Bihar	0.0021
Gujarat	0.0017	Orissa	0.0014
Uttar Pradesh	0.0016	West Bengal	0.0011
Orissa	0.0014	Uttar Pradesh	0.0004
Haryana	0.0013		
Tamil Nadu	0.0012		
Assam	0.0012		
Karnataka	0.0011		
Maharastra	0.0006		
Bihar	0.0005		

⁷ Dinesh N. Awasthi (1991), "Regional Patterns of industrial growth in India", Concept publishing company.

In the above table (2.3), states are classified into three broad groups viz. High disparity, moderate disparity, and low disparity. During the period 1981-82-90-91, Jammu & Kashmir, Punjab. and Madhya Pradesh comes under first group, while West Bengal, Himachal Pradesh and Kerala comes under second group and remaining states are comes under third group respectively.

ver the period 1991-92-97-98, it can be found that Jammu & Kashmir, Himachal Pradesh and Karnataka are grouped in high disparity. Haryana, Rajasthan, Madhya Pradesh, Gujarat, Tamil Nadu, Kerala, Assam, Maharashtra, Andhra Pradesh comes under moderate disparity respectively states. Remaining states grouped as low disparity states. Here it can be observed that substantial changes among the groups over the period has taken place, except states like Jammu & Kashmir, Kerala, Bihar, Orissa and Uttar Pradesh.

Table: 2.4 Regional Disparity.

	1981-82 to 1997-98
Andhra Pradesh	0.011
Assam	0.005
Bihar	0.002
Gujarat	0.004
Haryana	0.014
Himachal Pradesh	0.009
Jammu and Kashmir	0.026
Karnataka	0.012
Kerala	0.013
Madhya Pradesh	0.007
Maharashtra	0.003
Orissa	0.009
Punjab	0.013
Rajasthan	0.012
Tamil Nadu	0.013
Uttar Pradesh	0.002
West Bengal	0.006

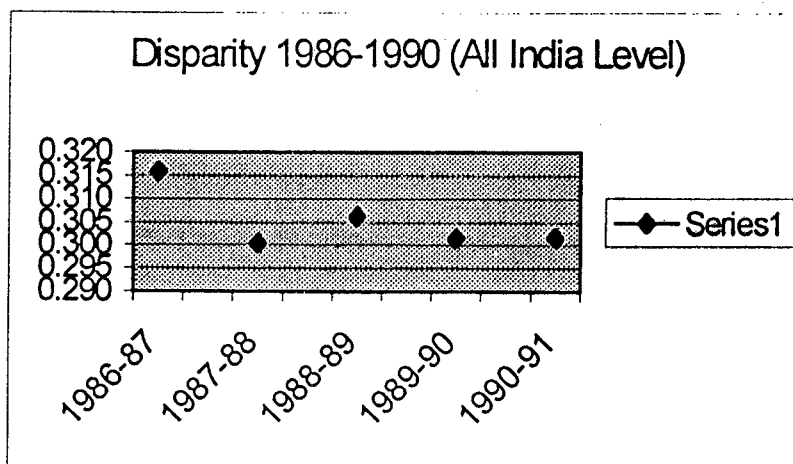
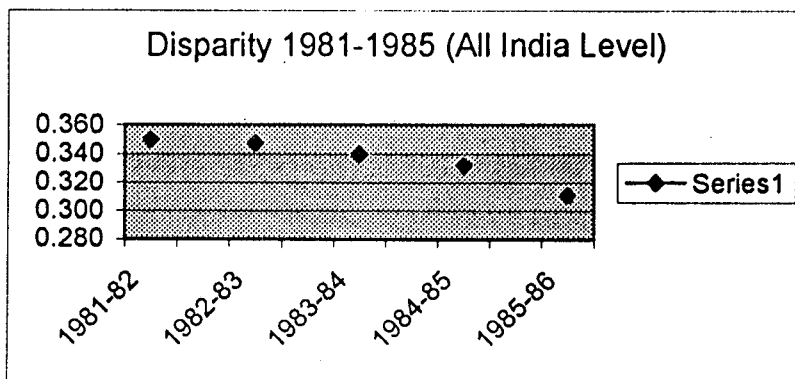
Disparity among the states over the period has widened except for Jammu & Kashmir, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal. The inequality over the period has been recorded high in the states of Karnataka, Maharashtra, Tamil Nadu, Haryana, Bihar, and Assam respectively. Whereas industrial diversification has been recorded high in the states of West Bengal, Uttar Pradesh, Punjab.

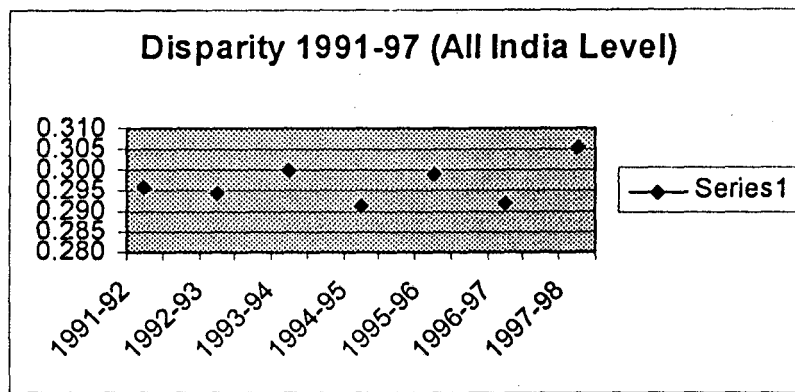
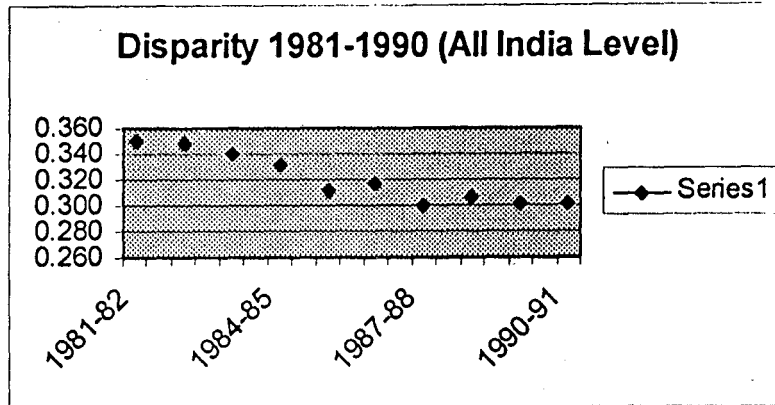
Table (2.5 a & b) Regional disparity

Table 2.5(a)	
1981-82	0.350
1982-83	0.348
1983-84	0.340
1984-85	0.332
1985-86	0.311
1986-87	0.316
1987-88	0.300
1988-89	0.306
1989-90	0.302
1990-91	0.302

Table: 2.5 (b)	
1991-92	0.296
1992-93	0.294
1993-94	0.300
1994-95	0.291
1995-96	0.299
1996-97	0.292
1997-98	0.305

Graphs: Regional disparity





The study of industrial disparity at all India level can be classified into three periods viz., 1981-82-1985-86, 1986-87-1990-91 and 1991-92-1997-98. The overall picture of 1980's depicts that the industrial diversity is low in the beginning of the 1980's whereas it is comparatively high latter part of the period. The disparity is more or less remains same in the year of 1987-88,1989-90,1990-91.

Ahluwalia and Sachs et al (2002)⁹ find that regional disparity rose in India during the 1990's. These studeis supports my study, in which I have observed, that the industrial disparity has experienced declining trend over the period of 1980's. Where as in 1990's, the industrial disparity has comparatively increased.

⁹ Sachs et al (2002): Understanding regional economic growth in India: A fresh look', EPW, Vol XXXVIII, No 11, March 15-21.

In the early theoretical explanations, raw-material availability and transport-cost were assumed to be the most important factors for attracting industries. But with successive technological innovations, these factors were relegated into the background. Researchers laid development, linking it with the level of economic development. This in turn focused on some other factors like export-base, inter-regional trade, inter-industry linkages, urbanisation, agglomeration economies, human capital and psychic cost of the entrepreneurs, market-size and the government policies. Though the research laid development has reduces the cost of production yet the differences prevails over the regions because of market orientated economy.

The overall picture of manufacturing industries shows that the capital goods, basic goods, intermediate goods, and food- nutrition related consumer goods have recorded continuous increase of industrial base over the period 1981-82-1997-98. Contrary to this the PIBCG industry has decreased the industrial base over the period (1981-82-1997-98).

It is found that Tamil Nadu, Maharashtra, West Bengal, Andhra Pradesh and Gujarat are industrially more diversified states; Karnataka, Bihar, Madhya Pradesh, Kerala, could be grouped in 'middle level' (moderate diversified) in terms of diversification; while Haryana, Rajasthan, Orissa, Assam, Himachal Pradesh, Jammu & Kashmir witnessed very less diversified in industrial structure. On the whole a few states experienced less change in the diversification over the period, viz., Kerala, Orissa, Assam. Himachal Pradesh, and Jammu & Kashmir. Diversity has been increased over the period continuously among highly diversified and low diversified (classified) groups.

Disparity among the states over the period has widened except for Jammu & Kashmir, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal. The inequality over the period has been recorded high in the states of Karnataka, Maharashtra, Tamil Nadu, Haryana, Bihar, and Assam respectively.

The overall picture of 1980's depicts that the industrial diversity is low in the beginning of the 1980's whereas it is comparatively high latter part of the period. The disparity is more or less remains same in the year of 1987-88,1989-90,1990-91. The less developed states are facing both low economic growth and high unproductive labour. These states have to focus on policies for increasing high productivity labour.

Our analysis on economic performance of states reveals that regional disparities have increased in the post-reform period. The disparity between the group of developed states and developing states has increased. The suitable measures to reduce regional disparity are as follows,

A multi-dimension strategy is needed to narrow down regional disparities. Firstly, the investment should be increased in less developed states for higher growth and reduction in poverty. Public investment is crucial for raising physical (irrigation, power, roads etc.) and human (health and education) infrastructure. The resources have to be used for infrastructure from central assistance, including externally aided projects and the state's own resources. The central government's role is important in allocating more resources to the less developed states. The role of private investment has become more important in the post-reform period. The private investment will increase if physical infrastructure and skilled labour are available.

Secondly, the fiscal management of states must improve in order to allocate more expenditure for physical infrastructure and health and education. Many state governments are facing severe fiscal problems, although there are signs of improvement in recent years. Thirdly, the less developed states are facing both low economic growth and high population growth. These states have to focus on policies for reducing population.

Fourthly, the agriculture sector problems have to be solved in backward states. Public investment has declined as have credit deposit ratios for rural areas. Similarly credit, research and extension have to be improved in backward regions.

Fifthly, the productive employment should be generated in order to reduce poverty in low-income states. Employment can be increased if economic growth is labour intensive.

Sixth, social sector performance should be improved in backward regions. It is necessary to ensure the expansion of public services for the poor at a low cost, effective public regulation of private services like health care, and accountability of these systems, public as well as private, to the local communities. Improvement in health and education in backward regions would improve economic growth and human development.

Seventh, Over time, decentralization would increase accountability. Governance has to be improved in less developed regions. Also, social inclusion has to be an important agenda for governments. There is a need to garner support for the reform process from wider sections of the population by encouraging participatory models of development.

The above analysis clearly shows that the inter-state variations in the industrial structure do not provide clear picture of industrial structure unless we cover the productivity at the regional level. In the next chapter we are interested to study Productivity (labour, capital and total factor productivity growth) at regional level.

CHAPTER-III

In the previous chapter we have analysed the industrial structure of various regional economies at inter-state level. The present chapter seeks to analyse the industrial productivity of manufacturing industries (use based classification) affected by capital intensity.

Productivity is an important source of growth and it is the most important source in developing countries. A productive economy has comparatively a high ratio of surplus to capital, high levels of labour productivity, low level of capital-output ratio and high levels of profit rate. If the productivity growth rate is high and rising, such a country has large surplus and can achieve both full employment and self-reliance in the balance of payments.

Studies of productivity acquire great significance in the context of growth in developing economies as these economies are characterised by acute shortage of capital resources and must use all available resources in prudent way. It is essentially due to sustained productivity growth, that the developing countries could succeed in alleviating poverty. Such productivity growth could make these countries less and less dependent upon capital accumulation.

A key feature of economic dynamism today is productivity growth along with capital accumulation, though the initial emphasis was only on capital accumulation as the central driving force of the process of development. Productivity growth is crucial in both classical and structural forms of development. The classical form of development maintains that the growth takes place as a result of the long term effects of capital accumulation, labour force expansion and total factor productivity including technological change under conditions of competitive equilibrium. The structural form of development maintains that a shift of labour and capital from less productive sectors that can accelerate growth.

The development and structural transformation of the new developed economies was due to the substantial contribution made by the growth of productivity¹⁰. The demand-side factors reinforced the growth process in industry because the income-elasticity of demand for industrial goods was higher than that for agricultural produce. Because of competitive pricing, productivity increase led to a decline in the price of industrial goods relative to that of agriculture. The price elasticity of demand for industrial goods has also accelerated the demand for industrial goods and facilitated the shift of factors from agriculture to industry.

The most important factor influencing productivity growth is found to be the output growth. It permits an industry to gain from economies of scale, internal and external, technological progress and learning by doing. The other key factor is technology advancement. Technological change decides, by its pace, the nature of restructuring inevitable in industry along with how fast will it grow as well as the productivity of industrial production. The faster an industry grows the more it has the opportunity to exploit the benefits of economies of scale. These are often stated as specialization and division of labour in production, the existence of indivisibility, the economies of increased physical dimension of some plant and economies of massed resources.¹¹

3.1 Labour Productivity

Labour productivity may be defined as the output per unit of labour. Starting with output of manufacturing, for the economy as a whole, we may choose net value added. With respect to the labour input we may use number of employees. The alternative measures of the labour input would on occasion yield very different results. For instance, an economy where the labour force remains of the same quality in terms of performance levels, may yet record a rise in labour productivity because of technical change enhancing the quality of capital or simply because of an increase

¹⁰ Kuznets, s. (1966), *Modern Economic Growth*, New Haven: Yale University Press.

¹¹ Anita Kumari (2001), *Productivity growth in Indian engineering industries during pre-reform and post-reform period-An analysis at company level*.

in the number of machines. In such a circumstances, it would be wrong to interpret the increase in labour productivity as labour's contribution to the expansion in output as almost all of it has come about due to the expanded input of capital.

However, for a sustained increase in the standard of living of a population a steady rise in the productivity of labour is essential. The most acceptable interpretation of labour productivity is that it is a measure of potential consumption¹². It would seem reasonable to argue that the interpretation of labour productivity as potential consumption retains it as perhaps the indicator deserving of utmost interest in the evaluation of a production process or, at a broader level, of an economic arrangement such as an economy, where each must ultimately be judged in terms of what they have managed to accomplish for human participants. If the ratio between the population and the labour force is constant, the rate of growth of per capita income will equal the rate of growth of labour productivity. Surely, per capita income is a claimant as a leading indicator of the standard of living. This is a matter of some relevance to any program of poverty alleviation. A steady rise in the population of labour is necessary for a sustained increase in the standard of living of the population.

3.1.1 Labour Productivity (Manufacturing industry)

The Labour productivity over the period (1981-82 to 1997-98) has recorded Rs. 1.65 lakhs per labour. Maharashtra has shown highest labour productivity (Rs. 2.31 lakhs per labour) followed by Rajasthan (Rs. 2.14 lakhs per labour), Gujarat (Rs. 2.03 lakhs per labour), and Haryana (Rs. 2 lakhs per labour). Assam (Rs. 0.09 lakhs per labour) has observed comparatively lower Labour productivity, followed by Tamil Nadu, (Rs. 1.6 lakhs per labour), Punjab (Rs. 1.9 lakhs per labour), Madhya Pradesh (Rs. 1.9 lakhs per labour), Uttar Pradesh (Rs. 1.84 lakhs per labour). Five states have maintained their position above national average namely, Maharashtra,

¹² Balakrishnan. P (2004), "Measuring Productivity in Manufacturing Sector", EPW, April 3-10, 2004.

Rajasthan, Gujarat, Haryana and Himachal Pradesh respectively. The Labour productivity has continuously increased over the period (1981-82-1997-98). It has recorded Rs. 1.12 lakhs per labour, Rs. 1.59 lakhs per labour and Rs. 2.24 lakhs per labour respectively.

Table: 3.1 Labour Productivity (Aggregate Manufacturing industry)

	1981-82 to 85-86	1986-87 to 90-91	1991-92 to 97-98	1981-82 to 1997-98
Andhra Pradesh	1.05	1.45	2.04	1.51
Assam	0.07	0.09	0.11	0.09
Bihar	1.17	1.43	1.77	1.45
Gujarat	1.42	1.91	2.75	2.03
Haryana	1.38	1.95	2.67	2.00
Himachal Pradesh	1.11	1.69	2.84	1.88
Jammu and Kashmir	0.98	1.33	2.17	1.49
Karnataka	1.00	1.43	2.16	1.53
Kerala	1.20	1.66	1.91	1.59
Madhya Pradesh	1.26	1.81	2.63	1.90
Maharashtra	1.50	2.20	3.24	2.31
Orissa	1.02	1.65	2.00	1.56
Punjab	1.35	1.82	2.54	1.90
Rajasthan	1.35	2.05	3.00	2.14
Tamil Nadu	1.15	1.52	2.13	1.60
Uttar Pradesh	1.11	1.79	2.62	1.84
West Bengal	0.94	1.27	1.60	1.27
all India Average	1.12	1.59	2.24	1.65

Over the first period (1981-82 to 1985-86) Maharashtra (Rs. 1.5 lakhs per labour) attained highest Labour productivity followed by Haryana, Punjab and Rajasthan, where as Assam (Rs. 0.07 lakhs per labour) has comparatively low productivity which is followed by West Bengal, Jammu & Kashmir and Karnataka. There are eight states recorded above average.

Over the Second period (1986-87 to 1990-91) Maharashtra has maintained its earlier position by recording Rs. 2.2 lakhs per labour, followed by Rajasthan, Haryana, Gujarat respectively. Assam (Rs. 0.09 lakhs per labour) has remained in the lower position followed by West Bengal, Bihar, Andhra Pradesh.

In the third period (1990-91 to 1997-98) Maharashtra has again maintained its position by recording at Rs. 3.24 lakhs per labour followed by Rajasthan, Himachal Pradesh, Gujarat. Assam have remained in the same position as it was in

the previous period. Assam followed by West Bengal, Bihar have remained in the same position as they were in the previous period. There are seven states above national average. The over all picture of the table shows that the labour productivity has continuously improved throughout the period.

Most of the states except Madhya Pradesh have tended gain substantially over time. Four states maintained above all India level over the period. The position of three states remains unaltered throughout the period viz. Maharashtra, Assam, and West Bengal.

Ahluwalia(1991) estimates of labour productivity which showed that the first half of the eighties made a decisive break with the past had a strong acceleration in latter¹³. In our studies it shows that the labour productivity has continuously increased over the sub-periods. It has recorded Rs. 1.12 lakhs per labour, Rs. 1.59 lakhs per labour and Rs. 2.24 lakhs per labour respectively.

3.1.2 Labour Productivity (use based classification)

For the aggregate manufacturing industry labour productivity at the national level is estimated at Rs.1.12 lakhs per labour (per annum) over the period 1981-82-1985-86. It is mainly contributed by intermediate goods (Rs.2.46 lakhs per labour), basic goods (Rs.1.37 lakhs per labour). The labour productivity of intermediate goods in many of the states higher than the remaining industries. Contrary to this, clothing related consumer goods labour productivity is comparatively lower to other industrial groups. At state level is concern Gujarat (Rs.1.42 lakhs per labour) emerges as a leading state in labour productivity followed by Haryana, Punjab, and Rajasthan respectively. Assam has recorded lower growth (Rs.0.07 lakhs per labour), followed by West Bengal, Jammu & Kashmir, Karnataka. (See. Appendix Tab. 3.1)

¹³ Ahluwalia I.J. (1991), "Productivity and Growth in Indian Manufacturing", Oxford University Press, New Delhi.

During the second period, manufacturing industries labour productivity has increased to Rs.1.59 lakhs per labour. The Maharashtra's performance is noteworthy followed by Rajasthan (Rs.2.05 lakhs per labour), Haryana (Rs.1.95 lakhs per labour). Low productivity has recorded in Assam, West Bengal, and Madhya Pradesh. In Assam all the industrial groups have maintained lower productivity. (Appendix Tab. 3.2)

In the all India level the average intermediate goods & basic goods have recorded high labour productivity over the period (1991-92 to 1997-98). The labour productivity (Rs.2.24 lakhs per labour), has been depicted high over the period. The state of Maharashtra (Rs.3.24 lakhs per labour) emerges at the top followed by Himachal Pradesh, Gujarat, Haryana, whereas Assam (Rs.0.11 lakhs per labour) maintains the same (lower) position followed by West Bengal, Bihar. The states have performed well in the intermediate goods and basic goods industries over a period. (Appendix Tab. 3.3)

3.1.3 Labour Productivity growth

The overall picture of the labour productivity growth at the national level, during the period of 1981-82 to 1997-98 has recorded 9.23 per cent. The growth rate has improved substantially over the period. The growth rate has recorded, 9.47 per cent, 8.89 per cent and 9.33 per cent respectively over the period. Coming to the state level picture, Himachal Pradesh (16.58 per cent) recorded highest growth rate followed by Jammu & Kashmir, Rajasthan, Karnataka, and Tamilnadu. Growth of Assam emerges to be negative and other states, which figure quite poorly, viz, Gujarat, Kerala, and Orissa.

During the 1981-82 to 1985-86, Himachal Pradesh emerges to be the highest labour productivity growth followed by Karnataka, and Andhra Pradesh. Whereas Assam, depicts lowest growth followed by Gujarat, and Kerala.

Over the second period (1986-87 to 1990-91), the highest growth rate is maintained by the same state i.e. Himachal Pradesh followed by Jammu & Kashmir,

and Rajasthan. The labour productivity is comparatively low in Assam, West Bengal, Andhra Pradesh.

Table: 3.2 Labour Productivity Growth (Aggregate Manufacturing)

	1981-82 to 85-86	1986-87 to 90-91	1991-92 to 97-98	1981-82 to 1997-98
Andhra Pradesh	11.52	6.05	8.85	8.81
Assam	2.12	4.30	4.89	3.77
Bihar	8.99	6.82	11.17	8.99
Gujarat	3.72	9.60	6.29	6.54
Haryana	6.69	9.92	6.39	7.67
Himachal Pradesh	19.12	14.23	16.39	16.58
Jammu and Kashmir	9.98	12.41	18.61	13.66
Karnataka	11.65	9.41	8.61	9.89
Kerala	6.34	7.06	7.53	6.98
Madhya Pradesh	9.62	9.92	8.65	9.40
Maharashtra	10.68	8.92	6.80	8.80
Orissa	10.31	10.09	2.12	7.51
Punjab	7.92	8.22	8.03	8.06
Rajasthan	11.00	12.11	6.95	10.02
Tamil Nadu	8.18	6.46	14.20	9.61
Uttar Pradesh	13.28	10.82	13.37	12.49
West Bengal	9.88	4.85	9.75	8.16
All India Average	9.47	8.89	9.33	9.23

In the third period (1991-92 to 197-98) Jammu & Kashmir, Himachal Pradesh, Tamilnadu and Andhra Pradesh have maintained higher growth respectively. Whereas Assam, Maharashtra, has shown poor growth in labour productivity. Continuous growth has been recorded in the states of Assam, Jammu & Kashmir, and Kerala. Whereas Maharashtra and Orissa, have experienced continuous deceleration over the period.

At the overall picture of the state level, Himachal Pradesh emerges as a leading region in terms of labour productivity growth by recording 19.12 per cent, 14.23 per cent, 16.39 per cent, respectively. Assam has shown lower growth rate by recording at 2.12.

Labour Productivity Growth (Summary table 3 A)

G.R. >10	G.R. 10-5	G.R. <5
Ori, Mah, Raj, A.P., Kar, U.P., H.P.	Ker, Har, Pun, T.N., M.P., W.B., J&K.	Ass, Guj.
Ori, U.P., Raj, J&K., H.P.	A.P., T.N., Bih, Ker, Pun, Mah, Kar, Guj, M.P., Har.	Ass, W.B.
Bih, U.P., T.N., J&K., H.P.	Guj, Har, Mah, Raj, Ker, Pun, Kar, M.P., A.P., W.B.	Ori, Ass
Raj, U.P., J&K., H.P.	Guj, Ker, Ori, Mah, A.P., Bih, M.P., T.N., Kar.	Ass

The labour productivity growth has maintained high in the states of Uttal Pradesh and Haryana over the period (1981-85 to 1991-97). Rajasthan has recorded high in 1981-85 and 1986-90. Jammu & Kashmir has maintained high labour productivity growth during 1986-90 and 1991-97. The states of Punjab, Kerala, Madhya Pradesh and Haryana have maintained labour productivity growth in moderate level throughout the period.

The labour productivity growth of Maharastra, Karnataka and Gujarat, have maintained in moderate level during 1986-87 to 1990-91 and 1991-92 to 1997-98. Assam is the only state, where labour productivity has recorded low over the period (1981-81-1991-97).

3.1.4 Labour Productivity Growth (Use based classification)

The state wise labour productivity growth rate during 1981-82 to 1985-86, has reported that Himachal Pradesh (19.12%), Uttar Pradesh (13.28%) and Andhra Pradesh (11.52%) have recorded high where as Assam, Gujarat, Kerala have recorded lower growth rate. In the all India average, food nutrition related (16.44%), other consumer goods (9.72%), metallic mineral products recorded comparatively higher growth rate. Assam is the only state, which has experienced negative growth rate. Primary input based consumer goods, basic goods have recorded comparatively

lower growth rate. The overall growth rate of all India level for the manufacturing industry has recorded at 9.47 per cent.

Among the states which are fastest growing during the period I (1981-82 to 1985-86) is Himachal Pradesh (14.23%) followed by Jammu & Kashmir, Rajasthan, where as slower growth rate have been experienced by Assam (4.3%), followed by West Bengal (4.85%), Andhra Pradesh (6.05%). Among the industry with fastest Labour productivity growth rates recorded are primary input based consumer goods, other consumer goods and metallic mineral products. (Appendix Tab. 3.4)

Even in period II (1986-87 to 1990-91) negative growth rate has been continued in Assam for the following industries viz. capital goods, basic goods, food-Nutrition related consumer goods and clothing related consumer goods. The all India level growth rate has increased to 8.89 per cent. (Appendix Tab. 3.5)

During the III period states like Jammu and Kashmir, Himachal Pradesh, Tamil Nadu, Uttar Pradesh, have experienced high growth rate in Labour Productivity (corresponding to their manufacturing industries) and low growth rate have been experienced by states like Orissa, Assam, Gujarat, etc. In all India level some industry performed well namely, primary input based consumer goods (20.02%), intermediate goods industry (13.13%), etc. Lower growth rate has been recorded by clothing related consumer goods 4.39 per cent, followed by food-Nutrition related, basic goods etc. Some of the industries have experienced negative growth rate states of Orissa, Jammu and Kashmir and West Bengal. The over all growth rate of all India level has been recorded 9.33 per cent. (Appendix Tab. 3.6)

3.2 Capital productivity

The 1980's and 1990's have seen several developing economies make a radical shift towards a market economy after years of pursuing import substituting policy regimes. Several of them have experienced higher economic growth after implementing the market reforms. In case of India the reforms on the internal front

were initiated in the mid-1980's and larger-scale reforms on the internal and external fronts were initiated in the early-1990's [The Economist, 2001].

The neo-classical growth theory postulates that GDP grows as a consequence of capital accumulation, population growth and technological change. The growth rate in GDP per capita can be attributed to higher growth in capital accumulation and technological progress than population growth. Capital accumulation and technological progress make workers more productive which leads to increase in marginal productivity of labour and wage rate and a decline in product prices and consequent increase in real incomes.¹⁴

The link can be seen between economic growth and market mechanism. There has been close relation between economic growth and market mechanism, government has to provide an incentives to private agents for investing in research and development and human capital accumulation in a free market mechanism in which technological change is not purely public good. The technological change is partially a public good causing spillover effects, which increase aggregate and cumulative stock of knowledge. The non-rivalries nature of technological change is a source of increasing returns to scale and sustained long-run growth.¹⁵

3.2.1 Capital productivity (Manufacturing industry)

For the aggregate organised industrial sector at the national level is estimated at 0.67, over the period 1981-82 through 1997-98. The average Capital productivity for the period (1981-82 to 1997-98) has been declining across the large number of industries. The capital productivity of manufacturing industry over a period has recorded the state of West Bengal at 0.94, followed by Kerala, Jammu & Kashmir, and Assam. Capital productivity has been recorded comparatively low in the following states viz. Himachal Pradesh, Orissa, Rajasthan, and Gujarat. There are seven states above or equal to national average. During the first period West Bengal

¹⁴ Murali Patibandla & Phani B V (2002), Market reforms and industrial productivity, EPW, January 5, 2002.

(1.14) emerges top followed by Assam, Kerala. In the second period Bihar (0.91) records high Capital productivity, followed by Kerala, Maharashtra, whereas Himachal Pradesh (0.36) shows lower productivity. During the third period, Jammu & Kashmir recorded 1.24 emerging to the first position followed by Bihar, Kerala, where as Himachal Pradesh has declined its capital productivity over the period.

Table: 3.3 Capital Productivity (Aggregate Manufacturing)

	1981-82 to 85-86	1986-87 to 90-91	1991-92 to 97-98	1981-82 to 1997-98
Andhra Pradesh	0.64	0.53	0.55	0.57
Assam	1.07	0.74	0.66	0.83
Bihar	0.65	0.91	0.88	0.81
Gujarat	0.62	0.58	0.44	0.55
Haryana	0.81	0.73	0.59	0.71
Himachal Pradesh	0.47	0.36	0.18	0.34
Jammu and Kashmir	0.65	0.66	1.24	0.85
Karnataka	0.64	0.60	0.70	0.65
Kerala	0.93	0.90	0.79	0.87
Madhya Pradesh	0.67	0.64	0.46	0.59
Maharashtra	0.90	0.74	0.64	0.76
Orissa	0.50	0.41	0.35	0.42
Punjab	0.68	0.63	0.69	0.67
Rajasthan	0.49	0.56	0.49	0.51
Tamil Nadu	0.76	0.71	0.64	0.70
Uttar Pradesh	0.60	0.59	0.51	0.57
West Bengal	1.14	0.90	0.80	0.94
All India Average	0.72	0.66	0.62	0.67

Over all picture of the table shows that Kerala is the only state that has maintained its productivity above average. Majority of the states is decelerated the capital productivity, over the period 1981-82 through 1997-98. Tamilnadu is the only state, which has improved its capital productivity over the period.

3.2.2 Capital Productivity (used based)

For the period 1981-85, aggregate organised industrial sector at the national level capital productivity estimated at 0.72. The state of West Bengal has experienced high capital productivity followed by Assam, Kerala, and Haryana. Himachal Pradesh recorded comparatively lower capital productivity followed by Rajasthan, and Orissa. The capital productivity at all India level food & nutrition related

¹⁵ Romer. P M (1990), 'Endogenous technological change,' Journal of Political Economy.

consumer goods recorded high (1.01%), followed by capital goods (0.92%), and other consumer goods (0.8%). (Appendix 3.7)

During (1986-87 to 1990-91) Bihar emerges at top (0.91%) followed by West Bengal, Kerala, and there are two states at the bottom end namely Himachal Pradesh and Orissa. The all India level of the manufacture industry as a whole, food & nutrition related industry recorded high (0.98%) followed by capital goods, clothing related consumer goods. National average of manufacturing industry has recorded at 0.66 per cent. (Appendix 3.8)

Over the period of (1991-92 to 1997-98), the aggregate organised industry sector at the national level capital productivity is estimated at 0.62 per cent. Capital productivity experienced high in the states of Jammu & Kashmir (1.24%), Kerala, Punjab and low growth rate recorded in the states of Madhya Pradesh, Orissa, and Gujarat. At all India level manufacturing industries performance is high in capital goods (0.9%) and food nutrition related industry. (Appendix 3.9)

3.2.3 Capital Productivity Growth (Aggregate Manufacturing)

Table: 3.4 Capital Productivity Growth (Aggregate Manufacturing)

	1981-82 to 85-86	1986-87 to 90-91	1991-92 to 97-98	1981-82 to 1997-98
Andhra Pradesh	4.84	3.62	5.03	4.49
Assam	52.39	59.46	12.10	41.32
Bihar	19.23	48.00	20.32	29.19
Gujarat	-0.30	3.95	-6.65	-1.00
Haryana	-0.73	9.04	-5.51	0.93
Himachal Pradesh	14.66	24.80	2.49	13.98
Jammu and Kashmir	-18.32	156.92	84.90	74.50
Karnataka	12.55	8.70	-2.13	6.37
Kerala	-0.02	10.67	-0.21	3.48
Madhya Pradesh	6.81	9.14	8.34	8.10
Maharashtra	1.26	-1.04	-1.15	-0.31
Orissa	10.33	-12.90	12.35	3.26
Punjab	7.66	7.82	5.56	7.01
Rajasthan	-13.06	31.11	41.35	19.80
Tamil Nadu	1.19	5.41	2.38	3.00
Uttar Pradesh	-7.04	4.40	-0.69	-1.11
West Bengal	13.83	2.00	8.85	8.22
All India Average	6.19	21.83	11.02	13.01

At state level, there are four states wherein capital productivity growth rate has been recorded above average viz., Jammu & Kashmir, Assam, Bihar and Rajasthan. Uttar Pradesh has experienced lower C.P.G.R. followed by Gujarat, and Maharashtra. All India manufacturing industries of C.P.G.R are recorded 6.19 per cent, 21.83 per cent and 11.02 per cent respectively over the period. Assam has emerged at the top during the first period, followed by Bihar and Himachal Pradesh. There are four states which are at the bottom end namely Haryana, Rajasthan, Uttar Pradesh, and Gujarat, which figure quite poorly during the period. There are five states above average. Jammu & Kashmir emerged as higher growth rate over the second period followed by Assam, Rajasthan, whereas Orissa and Rajasthan recorded negative growth rate in Capital productivity during the same period. Five states are emerged above average over the period. Jammu & Kashmir maintains its earlier position followed by Rajasthan, Bihar, where as Gujarat goes back to bottom (negative) position followed by Haryana, Karnataka, Maharashtra, Kerala.

Summary Table (3 B)

Capital Productivity Growth			
	G.R. >10	G.R. 10-5	G.R. <5
81-85	Ori, Kar, W.B., H.P., Bih, Ass.	M.P., Pun, Ori.	J&K., Raj, U.P., Guj, Ker, T.N.
86-90	Ker, H.P., Raj, Bih, Ass, J&K.	T.N., Pun, Har, Kar, M.P.	Ori, Mah, W.B., A.P., Guj, U.P.,
91-97	Ass, Ori, Bih, Raj, J&K.	A.P., Pun, M.P., W.B.	Guj, Har, Kar, Mah, U.P., Ker, T.N., H.P.
81-97	H.P., Raj, Bih, Ass, J&K.	Kar, M.P., Pun, W.B.	U.P., Guj, Mah, Har, T.N., Ori, Ker, A.P.

The capital productivity growth has maintained high in the states of Himachal Pradesh, Rajasthan, Bihar, Assam, and Jammu & Kashmir over the period (1981-82 to 1997-98). Madhya Pradesh and Punjab remains in moderate level. The states of Uttar Pradesh and Gujarat have recorded low in capital productivity growth over the period.

3.2.4 Capital Productivity Growth (used based)

Aggregate organised industry groups at the all India level Capital productivity growth rate is estimated at 6.19 per cent, over the I (1981-82-1985-86) period. The states like Assam (52.39%), Bihar (19.23%), West Bengal (13.83%), has recorded high capital productivity growth rate whereas Jammu & Kashmir, Rajasthan, Haryana, Gujarat, and Uttar Pradesh, have recorded negative growth rate. In all India level average other consumer goods & metallic mineral products have recorded high growth rate (13.19%), whereas clothing related industry has shown negative growth rate. Rajasthan and Haryana recorded five out of seven industries as negative growth rate. (Appendix Tab. 3.10)

Over the II (1986-87 to 1990-91) period, C.P.G.R. in organised industry groups at all India level recorded at 21.83 per cent. Jammu & Kashmir has emerged at the top followed by Assam, and Rajasthan. Orissa and Maharashtra have shown negative growth. The capital goods, primary input based, clothing related consumer goods industries emerged to high growth. States like Bihar, Jammu & Kashmir, Kerala, Madhya Pradesh and Rajasthan recorded positive growth. (Appendix Tab. 3.11)

The aggregate manufacturing industries, all India average in the period 1991-92 to 1997-98, C.P.G.R. has recorded at 11.02 per cent, which is mainly contributed by basic goods (41.59%) and other consumer goods & metallic mineral products (13.02%). Clothing related consumer goods has shown negative i.e. many of the states performance in this industry (CRCGI) are negative, comparative high growth rate have been recorded in the states of Jammu & Kashmir (84.9%), Rajasthan (41.31%), and Bihar (20.32%). Many of the industry groups are recorded negative growth in Gujarat and Haryana. (Appendix Tab. 3.12)

Productivity & Capital Intensity

There is a secular increase in capital intensity right from second five-year plan. It is this trend in capital intensity that has restricted the share of industrial employment in total employment from growing with that of industrial output in total output (Mookherjee. 1997).

Table: 3.4(a) Capital intensity, capital productivity and labour productivity

	Cap. Int.		Labour Prod.		Cap. Prod.		TFPG	
	1981 to 90	1991 to 97	1981 to 90	1991 to 97	1981 to 90	1991 to 97	1981 to 90	1991 to 97
Andhra Pradesh	0.58	1.29	1.25	2.04	0.59	0.55	3.7	6.8
Assam	0.61	0.65	0.08	0.11	0.91	0.66	5.0	0.5
Bihar	0.52	0.66	1.30	1.77	0.78	0.88	-2.4	1.4
Gujarat	0.49	1.26	1.67	2.75	0.60	0.44	4.4	8.0
Haryana	0.42	0.76	1.66	2.67	0.77	0.59	2.9	3.9
Himachal Pradesh	0.88	1.50	1.40	2.84	0.42	0.18	2.7	6.1
Jammu and Kashmir	0.32	0.32	1.15	2.17	0.66	1.24	-2.9	-0.1
Karnataka	0.48	0.85	1.22	2.16	0.62	0.70	5.2	4.5
Kerala	0.48	0.57	1.43	1.91	0.91	0.79	2.3	4.1
Madhya Pradesh	0.79	1.28	1.54	2.63	0.66	0.46	3.2	4.6
Maharashtra	0.45	1.11	1.85	3.24	0.82	0.64	6.1	8.1
Orissa	0.80	1.33	1.34	2.00	0.46	0.35	1.3	0.7
Punjab	0.43	0.62	1.59	2.54	0.66	0.69	9.0	6.6
Rajasthan	0.62	1.42	1.70	3.00	0.53	0.49	2.2	3.8
Tamil Nadu	0.37	0.72	1.33	2.13	0.73	0.64	10.0	6.2
Uttar Pradesh	1.03	1.11	1.45	2.62	0.59	0.51	5.6	1.5
West Bengal	0.29	0.61	1.10	1.60	1.02	0.80	5.8	3.2
All India Level	0.56	1.09	1.36	2.24	0.69	0.62	3.8	4.1

The Table 3.4(a) shows the capital intensity, labour productivity and capital productivity for the manufacturing industries of Indian states for the period of 1981-82 to 1990-91 and 1991-92 to 1997-98.

The capital intensity has increased in most of the states except Himachal Pradesh, which remains stagnant in both the period. Ahluwalia (1991) lists four probable reasons for an increase in capital intensity, i.e., distortions in labour market, high protective trade regime which moved the structure of production away

form considerations of comparative advantage, low interest rates and tax benefits on investment which reduced effective tax rate of more capital intensive project.

The strong upward trend of capital-labour ratio would be expected to increase in labour productivity to reflect the 'more machines to work with' effect together with the 'pure increase labour productivity. Observation of table 3.4 (a) reveals that the increase in capital intensity has resulted increase in labour productivity across the states, but contrary to this the capital productivity has also increased in some states despite the increase in capital intensity, viz. Bihar, Karnataka and Punjab where public sector industries are dominating.

In the nineties, the real interest rate has grown to unprecedented levels and degree of protection from trade has been reduced significantly. Therefore, according to Ahluwalia argument, these developments should have led to decline in capital intensity in the nineties, but that has not occurred.

Use based classification (Cap. Int., cap prod., lab. Prod.)

The detailed estimates of capital intensity, capital productivity and labour productivity of manufacturing industries (use based classification) for the period of 1980's and 1990's are presented in the table (Appendix table 3.13 & 3.14).

Since trends in the partial factor productivities are dominantly affected by the trends in capital intensity, i.e. capital-labour ratio. It is important to note that in a situation where capital-labour ratio is increasing over time, the analysis of partial productivity changes would overstate the increase in labour productivity and under state the increase in capital productivity. Here, our analysis also extended to analyse the Total factor productivity growth affected by capital intensity.

The capital intensity has increasing over the period. The increase in capital intensity is comparatively high in other consumer goods & metallic mineral products, which is accompanied by sharp decline in capital productivity and moderately rising in labour productivity.

The marginal rise in capital intensity in the primary input based consumer goods, has led to the increase in not only labour productivity but also capital productivity. The increase in capital intensity has shown to increase in capital productivity in primary input based consumer goods industry and the capital goods industry.

The Total factor productivity growth is also affected by the increase in capital intensity in some industries viz. basic goods, food-nutrition related consumer goods and clothing related consumer goods.

3.3 Total Factor Productivity Growth (TFPG)

Total factor productivity growth (TFPG) is of crucial significance in the context of economic growth in developing countries as these economies are often faced with an acute shortage of productive resources. During the initial phases of industrialisation in the developed countries, the prices of industrial goods relative to those of agriculture declined under a situation of competitive pricing, mainly because of productivity increase. The high price elasticity of demand for industrial goods coupled with the high-income elasticity of demand thus provided an impetus (from the demand side) to industrial growth in these countries. On the other hand, industrial growth in developing countries particularly in India is seldom accompanied by rapid productivity growth.¹⁷

Evidence on total factor productivity growth (TFPG) in India as brought out by a number of studies has been quite varied. For the period 1960 to 1980, Goldar's (1986) estimate of total factor productivity growth turned out to be 1.2 per cent per annum. Ahluwalia (1991), however, observed a decline in total factor productivity at the rate of 0.3 per cent per annum over the period 1965-6 to 1979-80 although, according to her, there has been a turnaround in TFPG since 1980: TFP is said to have grown at a rate of 3.4 per cent per annum in the first half of the eighties. The rising fiscal deficit in the eighties, as she holds, created resurgent demand conditions in response to which supply could be enhanced through productivity improvement

resulting from the reorientation of the policy framework and the toning-up of the infrastructure sectors. The study carried out by the Industrial Credit and Investment Corporation of India [ICICI 1994] for companies to which it provided assistance, estimated the growth rate of TFP at -2.7 per cent per annum in the 1970's, -0.9 per cent per annum for the period 1982-83 to 1986-87 and 2.1 per cent per annum for the period 1987-88 to 1991-92. An increase in the productivity growth during the 1980's, according to Goldar (1995), was mainly due to an increased inflow of advanced technology and import of capital goods.

The state-wise Total Factor Productivity Growth during 1981-82 to 1997-98 in Organised Industry for 7 groups of industry is reported in the Table.

Table 3.6 Total Factor Productivity Growth (Aggregate Manufacturing)

	1981-82 to 1990-91	1991-92 to 1997-98	1981-82 to 1997-98
Andhra Pradesh	3.7	6.8	5.2
Assam	5.0	0.5	2.8
Bihar	-2.4	1.4	-0.5
Gujarat	4.4	8.0	6.2
Haryana	2.9	3.9	3.4
Himachal Pradesh	2.7	6.1	4.4
Jammu and Kashmir	-2.9	-0.1	-1.5
Karnataka	5.2	4.5	4.9
Kerala	2.3	4.1	3.2
Madhya Pradesh	3.2	4.6	3.9
Maharashtra	6.1	8.1	7.1
Orissa	1.3	0.7	1.0
Punjab	9.0	6.6	7.8
Rajasthan	2.2	3.8	3.0
Tamil Nadu	10.0	6.2	8.1
Uttar Pradesh	5.6	1.5	3.5
West Bengal	5.8	3.2	4.5
All India average	3.8	4.1	3.9

At all India level TFPG of manufacture industry as a whole (1981-82-1997-98), has exceeded the all India average in the states of of Tamil Nadu, Punjab, Maharashtra, Gujarat, Andhra Pradesh, Karnataka, West Bengal and Himachal Pradesh, the remaining states have recorded below average. The TFPG is high in the states of

¹⁷ Goldar B, TFP Growth in Indian manufacturing in 1980's, EPW, Dec 7, 2002.

Tamilnadu, Punjab, Maharashtra, recorded at 8.1 per cent, 7.8 per cent, and 7.1 per cent respectively. The total factor productivity growth is low in Jammu & Kashmir, Bihar, Orissa, in fact Jammu & Kashmir and Bihar have recorded negative growth.

It depicts that the organised industry as a whole recorded TFPG at 3.9 per cent over the period (1981-82 to 1997-98). The TFPG during 1981-82-1990-91, recorded at 3.8 per cent and at 1991-92 to 1997-98 is recorded at 4.1 per cent. It shows that the recent reforms are working and Indian industry is actually making progress.(Sumik. K. Mujumdar).

During 1980's higher growth rate is recorded in the states of Tamil Nadu, Punjab, and Maharashtra recording at 10 per cent, 9 per cent and 6.1 per cent respectively. Along with these states West Bengal, Uttar Pradesh, Karnataka have recorded above average and the remaining states shown less than average. Jammu & Kashmir and Bihar have recorded negative growth. During 1990's Maharashtra has recorded high at 8.1 per cent followed by Gujarat (8 per cent), Andhra Pradesh (6.8 per cent), Punjab (6.6 per cent), etc, Along with these states, the states like Tamil Nadu, Himachal Pradesh, Karnataka, Madhya Pradesh have recorded above average. Kerala has recorded at 4.1 per cent that is equal to all India average and the remaining states have recorded below average.

The TFPG of the manufacturing industry over the period has drastically increased in the states of Bihar, Gujarat, Himachal Pradesh, Andhra Pradesh etc. On the contrary to this TFPG has decreased in the states of Assam, Uttar Pradesh, Tamil Nadu, Punjab, Orissa and Karnataka. Jammu & Kashmir is the only state which has continued negative growth rate during 1980's and 1990's. Though Bihar has relatively performed well during 90's, the growth rate has recorded negative over the period (1981-82-1997-98), because of worst performance during 1980's.

Ahluwalia [1991] argues that the revival of the 80's was because of productivity growth, which in turn was caused by increased investment in infrastructure and

better efficiency in its use, industrial and trade policy reorientation and supportive role played by agriculture.¹⁸

TFPG of Manufacturing Industry (State-wise Use based classification)

During 1980's many of the states have performed better in the clothing related consumer goods, other consumer and metallic mineral products, capital goods industry, where as the states performance in TFPG is poor in intermediate goods industry. In 1990's states are performed well in clothing related consumer goods, food-nutrition related consumer goods, basic goods industry, where as intermediate goods and primary input based consumer goods performance is comparatively low.

Capital goods industry.

During 1981-82 to 1990-91, TFPG has recorded high in the state of Tamil Nadu at 12.1 per cent followed by Punjab, Karnataka and negative growth has been recorded in the states of Andhra Pradesh, Assam, Bihar and Kerala. There are nine states above average and remaining states are either equal or below average. During (1991-92 to 1997-98), Tamil Nadu maintained the same position recording at 13.5 per cent followed by Assam, Rajasthan, Haryana and negative growth has recorded in the states of Orissa, Uttar Pradesh, Karnataka and Jammu & Kashmir. The TFPG has accelerated in the states of Assam, Andhra Pradesh, Kerala. It has decelerated in the states of Karnataka, Orissa, Uttar Pradesh etc. The over all picture of the capital goods industry shows that the performance of 1990's is much lower to 1980's.

¹⁸ Ahluwalia I J (1991), Productivity and growth in Indian manufacturing, Oxford university press, Delhi.

Table:3.6 Total Factor Productivity Growth (1981-82 to 1990-91)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	-0.1	10.2	-0.7	3.0	8.7	-7.5	12.0
Assam	-0.9	6.2	7.9	9.6	1.7	11.3	-0.8
Bihar	-0.8	-6.6	-1.2	4.9	-0.9	-8.4	-3.5
Gujarat	5.2	-0.8	5.3	0.8	7.6	2.6	10.3
Haryana	8.0	5.0	-2.0	3.0	-1.0	6.0	1.0
Him. Pradesh	7.2	2.5	-8.4	-2.1	3.6	9.3	6.5
J & K	3.2	5.1	-9.3	-2.4	0.7	-14.0	-3.4
Karnataka	10.5	-1.4	2.8	6.7	11.0	-2.3	9.1
Kerala	-3.5	-0.6	7.6	1.3	1.0	0.1	10.4
Madhya Pradesh	4.8	-4.9	6.0	8.7	6.4	-2.3	3.7
Maharashtra	5.0	7.8	6.6	3.9	5.5	7.8	5.7
Orissa	3.2	0.8	11.4	-3.8	-8.9	6.5	0.1
Punjab	10.5	6.4	-0.3	9.4	13.2	11.2	12.4
Rajasthan	9.3	-4.8	-2.5	2.1	5.7	1.7	3.6
Tamil Nadu	12.1	10.5	11.2	-2.7	13.7	12.8	12.6
Uttar Pradesh	2.5	1.3	5.1	7.5	11.3	4.9	6.7
West Bengal	5.6	9.4	0.2	3.9	12.6	5.4	3.3
All India avg.	4.8	2.7	2.3	3.2	5.4	2.7	5.3

Table: 3.7 Total Factor Productivity Growth (1991-92 to 1997-98)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	4.0	6.0	8.1	11.4	7.5	11.1	-0.6
Assam	9.2	-0.9	-7.3	7.3	3.9	0.2	-8.6
Bihar	1.3	-0.6	2.9	2.1	1.9	-9.2	11.5
Gujarat	7.3	12.2	3.1	6.9	9.4	8.0	8.9
Haryana	9.0	3.0	-1.0	3.0	6.0	4.0	3.0
Him. Pradesh	3.3	11.7	1.6	11.4	10.9	-7.3	11.2
J & K	-1.4	-10.1	-4.9	9.0	4.1	-9.5	11.8
Karnataka	-4.6	12.8	7.5	1.0	3.2	8.2	3.5
Kerala	0.6	5.7	-3.2	8.7	7.1	3.7	6.3
Madhya Pradesh	0.4	8.8	4.1	4.4	10.9	1.0	2.7
Maharashtra	7.3	8.2	5.6	6.7	11.2	9.7	7.8
Orissa	-5.7	-9.7	-8.6	10.4	-1.5	9.0	11.3
Punjab	8.9	7.6	-0.2	9.7	13.0	7.3	-0.3
Rajasthan	9.0	-11.2	7.7	6.4	5.1	6.3	3.2
Tamil Nadu	13.5	12.5	9.3	11.7	11.8	-10.2	-4.9
Uttar Pradesh	-5.6	11.5	-1.0	0.3	7.8	0.5	-3.1
West Bengal	2.2	4.4	3.7	6.2	7.4	-3.6	2.0
All India avg.	3.5	4.2	1.6	6.9	7.0	1.7	3.9

Basic goods:

The basic goods industry during the first period has performed well in the states of Tamil Nadu, Andhra Pradesh, Maharashtra, etc. TFPG has recorded negative in Bihar, Madhya Pradesh, Tamil Nadu, etc. whereas in 1990's, Karnataka has recorded high (12.8 per cent) followed by Tamil Nadu, Gujarat, and Uttar Pradesh, whereas Rajasthan, Orissa, Jammu & Kashmir, etc. have recorded negative growth. TFPG has been accelerated in the states of Karnataka, Madhya Pradesh, Gujarat and decelerated in the states of Jammu & Kashmir, Orissa, Assam, etc. The over all performance of the states during 1990's shows that the basic goods industry performance is better.

Intermediate goods industry:

In the first period TFPG has shown high in Orissa recording at 11.4 per cent followed by Tamil Nadu, Assam, whereas Jammu & Kashmir, Himachal Pradesh have recorded low (negative). During 1990's Tamil Nadu recorded at 9.3 per cent followed by Andhra Pradesh, Rajasthan, and Karnataka. The TFPG has accelerated in the states of Rajasthan, Himachal Pradesh, Andhra Pradesh whereas it has decelerated in the states of Orissa, Assam, Kerala etc. The performance of states in intermediate goods industry during 1990,s has decelerated.

Food Nutrition related Consumer Goods Industry:

During the first period Assam has recorded highest growth i.e. 9.6 per cent followed by Madhya Pradesh, Uttar Pradesh, Karnataka, whereas the states like Orissa, Tamil Nadu, Jammu & Kashmir and Himachal Pradesh have recorded negative growth. During 1990's Tamil Nadu has recorded high 11.7 per cent followed by Andhra Pradesh, Himachal Pradesh, Orissa. The TFPG has accelerated in the states of Tamil Nadu, Orissa, and Himachal Pradesh, whereas it has decelerated in the states of Uttar Pradesh, Karnataka, Bihar etc. The overall

performance of states in Food & Nutrition related consumer goods industry during 1990's is noteworthy.

Clothing related consumer goods industry:

During 1980's Tamil Nadu has recorded high 13.7 per cent followed by Punjab, West Bengal, Uttar Pradesh. It has recorded negative in the states of Orissa, Haryana, and Bihar. During 90's Punjab has recorded high 13 per cent followed by Tamil Nadu, Maharashtra etc, whereas it has recorded negative in the state of Tamil Nadu. The over all performance of this industry over the period has improved.

Primary input based consumer goods industry:

During the first period the TFPG in Tamil Nadu has recorded high (12.8 per cent) followed by Assam, Punjab, where as Jammu & Kashmir, Bihar, Andhra Pradesh recorded low. In the second period Andhra Pradesh has recorded high (11.1 per cent) followed by Maharashtra, Orissa, Gujarat. The TFPG has accelerated in the states of Andhra Pradesh, Gujarat, Rajasthan, and it has decelerated in the states of Tamil Nadu, Himachal Pradesh and Assam. The overall picture of the states in PIBCGI has decelerated its performance over the period (1981-82 to 1997-98).

Other consumer goods and metallic mineral products:

During 1980's the TFPG has recorded high in the state of Tamil Nadu (12.6 per cent) followed by Andhra Pradesh, Kerala, Gujarat, etc. It is recorded low (negative) in the states of Bihar, Jammu & Kashmir, and Assam.

In the second period the TFPG has recorded high in Jammu & Kashmir, Bihar, Orissa, Himachal Pradesh, where as it has recorded low in Assam, Tamil Nadu, Uttar Pradesh, and Andhra Pradesh. The TFPG has accelerated in Jammu & Kashmir, Bihar, Orissa etc, where as it has decelerate in Tamil Nadu, Andhra Pradesh, Assam, etc.,

During 1980's many of the states have performed well in the clothing related consumer goods, other consumer and metallic mineral products, capital goods industry, whereas the states performance in TFPG is poor in intermediate goods industry. In 1990's states have performed well in clothing related consumer goods, food-nutrition related consumer goods, basic goods industry, whereas intermediate goods and primary input based consumer goods performance is comparatively low.

Basic goods, food nutrition consumer goods, clothing related consumer goods, have performed well over the period. The liberalisation policy has not only imported capital but also technology, which have led to increase the productivity in this industry. With deregulation, acquisition of technological capabilities leading to better utilisation of resources may be said to have enhanced productivity growth in the 1980's and the early 1990's.²⁰

Capital goods industry, intermediate goods industry, primary input based consumer goods industry, and other consumer goods and metallic mineral products industry, have performed well during 80's rather than 1990's.

There was significant growth in total factor productivity in Indian manufacturing in the 1980'. In the post-reform period, there has been a notable decrease in the growth of TFP in manufacturing industries like capital goods, intermediate goods, primary input based consumer goods and other consumer goods & metallic mineral products. The deceleration in productivity growth in manufacturing in the 1990's does not seem to have been caused by import liberalization. However, the reduction in effective protection to industries appears to have had a favourable effect on productivity growth in Indian industries.²¹ (Goldar and Kumari. A)

²⁰ Arup Mitra (1999), Total factor productivity growth and technical efficiency in Indian industries, EPW, July 31.

²¹ Goldar B and Anita Kumari (2002), "Import liberalization and productivity growth in India manufacturing industries in the 1990's, Working paper series no. E/219/2002, Institute of Economic Growth.

Summary table (3 C & 3 D)

Total Factor Productivity Growth 1981-90			
	G.R. >8	G.R. 8-3	G.R. <3
Capital Goods	Har, Raj, Kar, Pun, T.N.	Ori, J&K, M.P., Mah, Guj, W.B., H.P.,	Kar, Ass, Bih, A.P., U.P.
Basic Goods	W.B., A.P., T.N.,	Har, J&K., Ass, Pun, Mah,	Bih, M.P., Raj, Kar, Guj, Ker, Ori, U.P., H.P.
Intermediate goods	T.N., Ori,	U.P., Guj, M.P., Mah, Ker, Ass	J&K, H.P., Raj, Har, Bih, A.P., Pun, W.B., Kar.
F & N related consumer goods	M.P., Pun, Ass.	Har, A.P., W.B., Mah, Bih, Kar, U.P.	Ori, T.N., J&K, H.P., Guj, Ker, Raj.
Clothing related consumer goods	A.P., Kar, U.P., W.B., T.N.	H.P., Raj, Mah, M.P., Guj.	Ori, Har, Bih, J&K., Ker, Ass.
PIBCGI	H.P., Pun, Ass, T.N.	U.P., W.B., Har, Ori, Mah.	J&K., Bih, A.P., Kar, M.P., Ker, Raj, Guj.
OCG&MMPI	Kar, Guj, Ker, A.P., Pun, T.N.	W.B., Raj, M.P., Mah, H.P., U.P.	Bih, J&K, Ass, Ori, Har,
Total Factor Productivity Growth 1991-97			
	G.R. >8	G.R. 8-3	G.R. <3
Capital Goods	Pun, Raj, Har, Ass, T.N.	H.P., A.P., Mah, Guj.	Ori, U.P., Kar, J&K., M.P., Ker, Bih, W.B.
Basic Goods	Mah, M.P., Guj, H.P., Guj, T.N., Kar.	Har, W.B., Ker, A.P., Pun,	Raj, J&K, Ori, Ass, Bih.
Intermediate goods	A.P., T.N.	Guj, W.B., M.P., Mah, Kar, Raj.	Ori, Ass, J&K, Ker, Har, U.P., Pun, H.P., Bih.
F & N related consumer goods	Ker, J&K, Pun, Ori, A.P., H.P., T.N.	Har, M.P., W.B., Raj, Mah, Guj, Ass.	U.P., Kar, Bih.
Clothing related consumer goods	Guj, M.P., H.P., Mah, T.N., Pun.	Kar, Ass, J&K., Raj, Har, Ker, W.B., A.P., U.P.	Ori, Bih.
PIBCGI	Guj, Kar, Ori, Mah, A.P.	Ker, Har, Raj, Pun.	T.N., J&K., Bih, H.P., W.B., Ass, U.P., M.P.
OCG&MMPI	Guj, H.P., Ori, Bih, J&K.	Har, Raj, Kar, Ker, Mah.	Ass, T.N., U.P., A.P., Pun, W.B., M.P.

Summary table (3 E)
Total Factor Productivity Growth

	G.R. >6	G.R. 6-3	G.R. <3
1981-90	Mah, Pun, T.N.	M.P., A.P., Guj, Ass, Kar, U.P., W.B.	J&k, Bih, Ori, Raj, Kar, H.P., Har, M.P., A.P.,Guj.
1991-98	H.P., T.N., Pun, A.P., Guj, Mah.	W.B., Raj, Har, Ker, Kar, M.P.	J&K., Bih, Ori, Ass.
1981-98	Guj, Mah, Pun, T.N.	Ker, Har, U.P.,M.P., H.P., W.B., Kar, Raj.	J&K, Bih, Ori, Ass.

In capital goods industry Haryana, Rajasthan, Punjab, have maintained high growth in the period of 1980's and 1990's. Maharashtra, Gujarat, Himachal Pradesh remains in moderate level and Karnataka, Bihar, Uttar Pradesh remains in the group of low growth in the period of 1980's and 1990's. Assam is recorded low during 1980's but it has accelerated during 1990's. In basic goods industry there has been major change in Madhya Pradesh, Gujarat, Karnataka, Himachal Pradesh, which were in low group of Total factor productivity growth during 1990's.

The Total factor productivity growth of intermediate goods industry in Andhra Pradesh was low during 1980's whereas it has joined to the group of high growth during 1990's. In the intermediate goods industry Andhra Pradesh is recorded low growth during 1980's but it has recorded high during 1990's. In food and nutrition related consumer goods industry Punjab maintained High TFPG and Haryana, West Bengal Maharashtra remains in the moderate Total factor productivity growth in 1980's as well as 1990's.

Many states are experienced major change in their position in clothing related consumer goods industry except Tamil Nadu, Rajasthan, Orissa and Bihar.

In Primary input based consumer goods industry Haryana has maintained its position in moderate group whereas Jammu & Kashmir, Bihar, and Madhya Pradesh have remained in the groups of low growth over the period (1980's and 1990's).

In Other consumer goods and metallic mineral products industry, Rajasthan and Maharashtra have maintained its position in the group of moderate states, whereas Assam has remains in the group of low growth over the period (1980's and 1990's).

Conclusion

The major findings of the study are summarised below.

In this study the capital productivity growth is comparatively higher than the labour productivity growth over the period (1981-82 to 1997-98). The labour productivity growth has continuously improved over the period (1981-82 to 1997-98). The labour productivity has recorded much higher compared to the capital productivity. The labour productivity has increased continuously over the period, contrary to this the capital productivity decreased continuously over the period. Even the industrial growth of TFP during the 1990's is recorded comparatively higher to the 1980's

The capital intensity has increased in most of the states except Himachal Pradesh, which remains stagnant in both the period. The increase in capital intensity has resulted the increase in labour productivity across the states, but contrary to this the capital productivity has increased in some states despite the increase in capital intensity, viz. Bihar, Karnataka and Punjab where public sector industries are dominating. The capital intensity has increasing over the period. The increase in capital intensity is comparatively high in other consumer goods & metallic mineral

products, which is accompanied by sharp decline in capital productivity and is moderately rising in labour productivity.

The marginal rise in capital intensity in the primary input based consumer goods has led to the increase in both labour productivity as well as capital productivity. The increase in capital intensity has shown to increase capital productivity in primary input based consumer goods industry and the capital goods industry.

We have seen that the inequality in industrial development (productivity) among the regions slightly increasing over the period. The factor productivity has been increasing in the developed states, where as it has been declining in backward states.

There are many causes for this, perhaps the massive arrival of foreign institutional investment (FII) in India's share markets, which are attracted by developed regions, is the primary cause of regional inequality. As banks pursue their own profitability over any broader economic goal, bank finance shifts to the most profitable activities and inevitably, to the regions already most developed. This increases the existing inequality between different regions: banks suck up deposits in backward regions and provides the funds to activities in relatively developed areas. The Government, through its pattern of taxation and expenditure, sharpens these inequalities. It is the overall economic policy that has slashed public sector investment drastically as well as directed the banks to pursue profit at the cost of economic development, that inturn is responsible for worsening regional inequalities.

Productive employment should be generated in order to increase the factor productivity not only in developed regions but also in developing regions. Employment can be increased if economic growth is labour

intensive. Private investment can be increase if physical infrastructure and skilled labour are available. Infrastructure is the foundation of economic, and industrial development. The multiplier effect of infrastructure development on the economy is significant and it's role as a stimulator of economic growth is indisputable. The inequality in industrial development may be resulted by infrastructure disparity. So it is very essential to continue our study the relation between infrastructure and industrial development.

Chapter-IV

A preliminary idea about the regional industrial development is given in the previous chapter. However, we are not sure about the extent to which industrial development is depends on infrastructure. Therefore it leaves a major proportion of industrial activity unexplained. Given this backdrop, we shall be exploring the relation between infrastructure and industry.

The industrial development of a region is guided by various factors of which infrastructure facilities play a key role in the industrial development and performance of a region. Growth of infrastructure is a prime mover in the process of economic development. Infrastructure development generates impulses of growth and creates conditions for investment across industries and regions. A balanced regional growth alongwith a steady growth over time contingent upon widespread and steady development of infrastructure.

Generation and transmission of energy, expansion of transportation network like railway and road network, banking facilities, research and development institutions and the network of telecommunication is vital for the growth of industries, integration of various markets and creating economic environment conducive for steady and sustained development. These services are characterised by huge initial investment with a long gestation period. Due to these characteristics, government has to take primarily the initiative and shouldered the responsibility and burden of providing these services. The government participation leads to infrastructure spread across the regions. The doctrines of balanced growth imply simultaneous development of all the sectors or balance between demand and supply and balance between social and economic over heads²². This doctrine has been developed by a number of economists like Nurkse, Rosenstein Rodan, Arthur Lewis. So the concern to reduce regional imbalances has to reflect in increased efforts by

²² Patil S.Y. Trends of urbanisation and regional development in India, Indian Journal or Regional Science Vol. XXX. Nov. 1. 1998.

both the union government and the respective state governments to extend infrastructure facilities to comparatively less developed regions so that the industrial activities can be balanced in these regions. Since it is characterised by huge initial investment with a long gestation period it is essential for private participation along with government participation.

A study of Industry and Infrastructure at all India level and also at state level has made here. This study has made at two periods, 1980's and 1990's at all India level with net value added. It is also tested at two points of time, 1981-82 and 1991-92 with fixed capital, employment and net value added at all India level as well as at state level.

The Infrastructure variables are Road length (Rdl) (per thousand square Kms), Rail route length (Rrl)(per thousand square Kms), Electricity consumption (EIC) (crore Kwh per lakh population), Liability/Assets Rs. in lakhs (LbAs) (per lakh population), Literacy (Lit) (per cent). Net Value Added is taken as dependent variable. The co-efficient of correlation and determination has expressed in per centage.

In the regression equations (4.1) shows, that Capital goods industry's coefficient determination (R^2) is estimated at 0.6, i.e. 60 per cent of the variation in the Capital goods industry is explained by the infrastructure variables. The infrastructure variables like literacy, and rail route length are positively related. The rail route length coefficient is estimated at 0.96 per cent and it is significant at 5 per cent level.

Regression equations (4.1)

1980's

$$\text{Cap.goods} = -58.07 - .05\text{Rdl} + .96\text{Rrl} - 2.74\text{EIC} - .65\text{LbAs} + 2.31\text{Lit} \quad \text{R square } (.59)$$

(.19) (-.23) (.49)** (-.94) (.61) (.24)

$$\text{Bas.goods} = 1.13 - .07\text{Rdl} - .11\text{Rrl} - 10.18\text{EIC} - 3.35\text{LbAs} + 2.77\text{Lit} \quad .27$$

(.98) (-.30) (.94) (.86) (.14)*** (.39)

$$\text{Int.goods} = -40.73 - .02\text{Rdl} - .13\text{Rrl} + 4.66\text{EIC} - .87\text{LbAs} + 1.63\text{Lit}$$

	(.24)	(.50)	(.86)	(.87)	(.41)	(.30)	(.60)
Food-Nut.=	.49	+ .01Rdl	+ .03Rrl	+ .49EIC	- .50LbAs	+ .01Lit	
	.96)	(.89)	(.90)	(.74)	(.13)***	(.99)	(.73)
Cloth.Rel.=	-47.54	- .06Rdl	- .50Rrl	+ 11.89EIC	- .88LbAs	+ 1.64Lit	
	(.15)	(.24)	(.48)	(.65)	(.36)	(.02)**	(.60)
Pri.Inp.goods=	-1.66	- .01Rdl	- .01Rrl	- 5.13EIC	- .16LbAs	+ .48Lit	
	(.84)	(.30)	(.98)	(.46)	(.54)	(.22)	(.26)
Oth.Con&Met=	10.73	.01Rdl	- .14Rrl	+ 12.22EIC	- .09LbAs	- 0.15Lit	
	(.56)	(.79)	(.71)	(.41)	(.86)	(.85)	(.18)

The Basic goods industries coefficient of determination (R^2) is recorded only at 26 per cent. Four out of the six infrastructure variables are negatively related with Basic goods industries. The literacy rate (2.77%) is positively related. The liability/assets is significant at 10 percent level.

The intermediate goods industries regression values with infrastructure indicators shows that two out of the six variables are positively related viz. electricity consumption and literacy rate. The above infrastructure as an independent variable explains 60 per cent of the value added.

The food and nutrition related industry has recorded positive coefficient with the infrastructure indicators except liabilities/assets. The electricity generated recorded high coefficient. The explanatory variables explains 73 per cent of food-nutrition related industries. Liability/Assets significant at 10 per cent level.

The clothing related consumer goods industries R^2 has been estimated at 71 per cent, i.e., 71 per cent of the value added is explained by the given infrastructure. The four of six variables are positively related where as remaining two are negatively related. The road length and liabilities/assets are recorded negative. The literacy rate is significant at 5 per cent level.

The primary input based consumer goods industries poorly related with infrastructure by recording only 26 per cent. Except literacy, all other variables are recorded negative coefficient values. The literacy recorded 10 per cent level of significant. The relation between the value added of other consumer goods and metallic mineral products and infrastructure is recorded poor.

In the regression equations (4.2) explains that during 90's, there has been change in the relation between the infrastructure and industry. The capital goods industry's coefficient of determination is recorded at 42 per cent i.e. only 42 per cent of variation in value added has been explained by explanatory variables. The electricity consumption, road length, rail length recorded positive coefficient and remaining variables are shown negative coefficient. One unit increase in rail route length lead to the 1.04 per cent increase in capital goods industry. This relationship is significant at 10 per cent level.

Regression equations (4.2)

1990's

$$\text{Cap.goods} = -24.88 - .01\text{Rdl} - 1.04\text{Rrl} + 23.80\text{EIC} - .20\text{LbAs} + 0.01\text{Lit} \quad \text{R square} \\ (.46) \quad (.85) \quad (.09)^{***} (.33) \quad (.60) \quad (.98) \quad (.42)$$

$$\text{Bas.goods} = -20.74 + .01\text{Rdl} + 1.44\text{Rrl} + 42.33\text{EIC} - .05\text{LbAs} - 0.29\text{Lit} \\ (.55) \quad (.86) \quad (.08)^{***} (.11) \quad (.91) \quad (.71) \quad (.41)$$

$$\text{Int.goods} = -72.29 - .02\text{Rdl} - 0.39\text{Rrl} + 11.98\text{EIC} + .35\text{LbAs} + 1.89\text{Lit} \\ (.18) \quad (.48) \quad (.75) \quad (.75) \quad (.56) \quad (.12) \quad (.51)$$

$$\text{Food-Nut} = 4.01 + .01\text{Rdl} + .52\text{Rrl} - 14.21\text{EIC} + .16\text{LbAs} + 0.09\text{Lit} \\ (.90) \quad (.55) \quad (.51) \quad (.55) \quad (.66) \quad (.90) \quad (.50)$$

$$\text{Cl.rel} = -49.58 - .01\text{Rdl} + .95\text{Rrl} + 30.94\text{EIC} - .08\text{LbAs} + .46\text{Lit} \\ (.24) \quad (.63) \quad (.34) \quad (.30) \quad (.86) \quad (.60) \quad (.65)$$

$$\text{Pr.Inp} = 2.53 + .01\text{Rdl} + .09\text{Rrl} + 14.67\text{EIC} - .13\text{LbAs} - .05\text{Lit} \\ (.83) \quad (.27) \quad (.76) \quad (.11) \quad (.36) \quad (.85) \quad (.39)$$

$$\text{Oth.Con.} = -8.53 - .01\text{Rdl} - .14\text{Rrl} + 18.67\text{EIC} + 0.15\text{LbAs} + .20\text{Lit} \\ (.62) \quad (.83) \quad (.73) \quad (.05)^{**} \quad (.45) \quad (.59) \quad (.39)$$

The basic goods industry has recorded R^2 at 40 per cent. The independent variables explain only 40 percent variation of dependent variable. This industry is positively related with infrastructure like electricity consumption, rail route length and road length. The electricity consumption of one unit leads to increase of basic goods industry by 42 per cent. The rail route length coefficient has recorded 1.44 per cent and significant at 10 per cent level. The electricity consumption also significant at 10 per cent level. The value added of intermediate goods industry's coefficient of determinants has been recorded at 52 per cent, i.e., only 52 per cent of variation of the dependent variable have been explained by independent variables. Except transportation all other variables has been recorded positive coefficient.

The food-nutrition related consumer goods industry has also recorded 50 per cent as coefficient of determination. It means that only 50 per cent of variation in Value added of food-nutrition related consumer goods industry is explained by explanatory variables. The rail route length recorded 0.52 per cent, liability/assets 0.16 per cent, literacy 0.09 per cent and Road length 0.01 percent. The intercept is positive sign recording at 4.01 per cent.

The clothing related consumer goods industry has recorded comparatively high coefficient of determination in 1990's. The 65 per cent of variation in value added has been explained by the explanatory variables. The 50 per cent of infrastructure indicators are positively related to the value added viz. electricity consumption, rail route length and literacy, where as remaining variables are negatively related to the value added.

The primary input based consumer goods industry has recorded very poor coefficient of determination i.e. (R^2) 40 per cent. It indicates that only 40 per cent of the variation of this industry have been explained by explanatory variables. The electricity consumption has recorded coefficient at 15 per cent, followed by rail route length and road length. The remaining indicators have recorded negative coefficient.

The other consumer goods & metallic mineral products have also estimated poor coefficient of determination, i.e. 40 per cent. It means only 40 per cent of variation of value added has been explained by independent variables.

There are three variables recorded positive coefficient, viz. electricity consumption, liability/assets, literacy rate. The coefficient of electricity consumption recorded high, at 5 per cent level of significance.

The overall picture of industrial dependency on infrastructure is as follows.

In 1980's the coefficient of determination (R^2), has recorded high in food-nutrition related (73 per cent) and clothing related consumer goods (70 per cent), where as in 90's the clothing related consumer goods has recorded R^2 at 65 per cent. It indicates that the relation between the above industry and infrastructure is comparatively high.

In 1980's electricity consumption and literacy have mainly explained the variation in the manufacturing industry. The manufacturing industry in 1980's is positively related with these infrastructure indicators. The literacy has shown 5 per cent and 10 per cent significant with clothing related consumer goods industry and PIBCG (Primary input based consumer goods) industry respectively. The former indicator have shown 10 per cent significance in food and nutrition related industry, whereas latter indicator has shown 5 per cent significant in clothing related consumer goods industry.

In 1990's the indicators like electricity consumption and rail route length have mainly explained the variation in industrial development. The manufacturing industry (except food-nutrition related) have been recorded positive relation with electricity consumption. The basic goods, PIBCG (Primary input based consumer goods) industry is significant at 10 per cent level. The literacy level is also significant at 10 per cent level with capital and basic goods industry. The rail route length has also maintains positive relation with manufacturing industry except

intermediate and other consumer goods industry. The rail route length has not only shows positive coefficient but also significant at 10 per cent level with capital and basic goods industry.

Manufacturing Industry (Fix.Cap, Emp, NVA)

The following regression equations have shown the relation between manufacturing industry and infrastructure at two points of time. Using different indicators of manufacturing industry viz. fixed capital, employment and net value added with infrastructure has tested this relation. The relation between infrastructure with fixed capital and employment has been declined over the period, on contrary to this the relation with net value added has accelerated over the period.

1981-82

$$\text{Fix.Cap.} = 110.98 + .03\text{Rdl} + 2.70\text{Rrl} + 190.06\text{EIC} + 0.54\text{LbAs} - 2.18\text{Lit} \quad \text{R square}$$

(.45) (.80) (.41) (.04)** (.90) (.74) (.61)

1991-92

$$\text{Fix.Cap.} = -221.01 - .11\text{Rdl} + 1.96\text{Rrl} + 149.19\text{EIC} + 3.45\text{LbAs} + 7.17\text{Lit}$$

(.40) (.37) (.75) (.43) (.26) (.23) (.58)

1981-82

$$\text{No.of emp} = -572.78 - .50\text{Rdl} + 17.54\text{Rrl} + 70.56\text{EIC} - 17.08\text{LbAs} + 30.54\text{Lit}$$

(.26) (.30) (.14) (.87) (.28) (.20) (.71)

1991-92

$$\text{No.of emp} = -218.51 - .01\text{Rdl} + 7.04\text{Rrl} + 85.68\text{EIC} + 1.77\text{LbAs} + 4.02\text{Lit}$$

.33) (.85) (.20) (.59) (.48) (.41) (.62)

1981-82

$$\text{NVA} = -136.23 - .18\text{Rdl} + 1.10\text{Rrl} + 13.52\text{EIC} - 6.49\text{LbAs} + 8.71\text{Lit}$$

(.27) (.14) (.68) (.89) (.10) (.14) (.68)

1991-92

$$\text{NVA} = -173.44 - .01\text{Rdl} + 3.69\text{Rrl} + 137.34\text{EIC} + 0.02\text{LbAs} + 2.23\text{Lit}$$

(.07) (.78) (.06)*** (.05) (.98) (.27) (.82)

The coefficient of determination is estimated at 67 per cent during 1981-82 where as it has accelerated to 82 per cent during 1991-92. It indicates that about 82 per cent of variation in net value added is explained by infrastructure.

Among the various infrastructure indicators electricity consumption and rail route length have been recorded positive coefficients. It depicts that over the period, these indicators are very important for industrial development. The literacy rate has also shows positive relation with manufacturing industry (except during 1981-82 in Fixed capital). The electricity consumption is significant at 5 per cent level during 1981-82 with fixed capital and during 91-92 with net value added. The literacy rate is also significance at 10 per cent during 1981-82 with net value added. Employment in 1981-82 and Net value added in 1991-92 are also significant at 10 per cent level.

The industrial activity mainly depends upon the adequate availability of energy. Improvement in infrastructure facilities exerts its positive impact on the production process through indirect cost reduction or output expansion.²³ The advance technology in electricity generation and distribution not only leads to optimum utilisation of energy but also reduces the electricity generating and distribution losses. The oil-shocks during the seventies have further reinforced the significance of issues relating to sources and utilisation of energy. The sharp increase in oil-prices, which affects national exchequer, has necessitated a review of the energy policy in India. A second look at the mix of the sources of energy, with a tilt in favour of the domestic sources, had become necessary.

The table (4.1) depicts the level of association (*correlation*) between manufacturing industry and infrastructure indicators at 1981-82 and 1991-92. Here, the industrial variables are analysed with different infrastructure indicators with the help of correlation matrix. The industrial variables are fixed capital, employment

²³ Budhadcb Ghosh, 'Role of infrastructure in Regional Development' EPW Nov 21, 1998.

and net value added. Whereas, the infrastructure indicators are road length, rail route length, electricity consumption. liability/assets Rs. in lakhs, literacy. It has been tested with 1 per cent, 5 per cent and 10 per cent level of significance.

Table: 4.1 Correlation between Infrastructure and Fixed capital 1981-82

	Fix. Cap	Road Len.	Route Len	Ele. Con.	Liab/Ass.	Literacy
Fix. Cap	1					
Road Len.	0.048	1				
Route Len	0.478	0.285	1			
Ele. Con.	0.695*	0.124	0.436	1		
Liab/Ass.	0.32	0.044	0.083	0.643*	1	
Literacy	0.352	0.646*	0.081	0.489**	0.382	1

1991-92

	Fix. Cap	Road Len.	Route Len	Ele. Con.	Liab/Ass.	Literacy
Fix. Cap	1					
Road Len.	0.012	1				
Route Len	0.256	0.233	1			
Ele. Con.	0.63	0.009	0.224	1		
Liab/Ass.	0.299	-0.091	-0.01	0.026	1	
Literacy	0.381	0.709	0.362	0.28	-0.061	1

* = Correlation is significant at the 0.01 level (2-tailed).

** = Correlation is significant at the 0.05 level (2-tailed).

During 1981-82, the level of association of fixed capital with electricity consumption is comparatively high, i.e. 69 per cent, significance at 1 per cent level. In 1991-92 the level of association maintains 63 percent with the same variable but not significance.

In 1981-82, Table (4.2) the degree of relationship between the employment and infrastructure is not only high but also significance with many variables. The employment's degree of relationship is high (76 %) with electricity consumption, significance at 1 per cent level. It also explains 55 per cent and 53 per cent with rail route length and electricity generated respectively at 1 per cent level of significance.

**Table: 4.2 Correlation between Infrastructure and No. of employees
1981-82**

	No. of Emp.	Road Len.	Route Len	Ele. Con.	Liab/Ass.	Literacy
No. of Emp.	1					
Road Len.	0.237	1				
Route Len	0.554**	0.285	1			
Ele. Con.	0.762*	0.124	0.436	1		
Liab/Ass.	0.365	0.044	0.083	0.643*	1	
Literacy	0.475	0.646*	0.081	0.489**	0.382	1

1991-92

	No. of Emp.	Road Len.	Route Len	Ele. Con.	Liab/Ass.	Literacy
No. of Emp.	1					
Road Len.	0.204	1				
Route Len	0.517**	0.233	1			
Ele. Con.	0.643*	0.009	0.224	1		
Liab/Ass.	0.145	-0.091	-0.01	0.026	1	
Literacy	0.476	0.709*	0.362	0.28	-0.061	1

During 1991-92, the employment continuous correlation with the same variables but the degree of association and the level of significance partially changes. Employment maintains 64 per cent with electricity consumption at 1 per cent level of significance, where as rail route length reduces to 51 per cent at 5 per cent level of significance.

Table (4.3) shows that the net value added is more associated with electricity consumption In 1981-82, the net value added explains 74 per cent level of association with electricity consumption at 1 per cent level of significance. During 1991-92, the degree of relationship has increased to 81 per cent and 75 per cent with electricity consumption and electricity generation respectively at 1 per cent level of significance. The net value added is also associated with literacy (52 per cent) at 5 per cent level of significance.

Table: 4.3 Correlation between Infrastructure and Net Value Added**1981-82**

	N.V.A	Road Len.	Route Len	Ele. Con.	Liab/Ass.	Literacy
N.V.A	1					
Road Len.	0.045	1				
Route Len	0.303	0.285	1			
Ele. Con.	0.74*	0.124	0.436	1		
Liab/Ass.	0.338	0.044	0.083	0.643*	1	
Literacy	0.395	0.646*	0.081	0.489*	0.382	1

1991-92

	N.V.A	Road Len.	Route Len	Ele. Con.	Liab/Ass.	Literacy
N.V.A	1					
Road Len.	0.189	1				
Route Len	0.464	0.233	1			
Ele. Con.	0.812*	0.009	0.224	1		
Liab/Ass.	0.066	-0.091	-0.01	0.026	1	
Literacy	0.521**	0.709*	0.362	0.28	-0.061	1

The over all picture of the correlation matrix depicts that the degree of relation of employment and net value added in 1991 has increased with electricity consumption over a period of time. The net value added in 1991 has also increased the level of association with the literacy rate (52 per cent) at 5 per cent level of significance, though it was poorly related during 1981-82. The employment with rail route length has shown the level of significance at 5 per cent level. The fixed capital with electricity consumption has declined the level of association over the period of time.

The results of the study show that the employment as an industrial indicator closely associated with Railway, because it plays a major role in the industrial development of the region. Railways are one of the main means to transport raw material as well as the finished products from one region to the other. Goods traffic by railways especially for long distance is generally more economical compared to the other means of transport. Since railways is connected to the industrial areas it is an important means for labour movements from distant places to the industrial areas

that helps to balance the demand and supply of labour. In the absence of adequate railway facilities goods and labour movement suffers to a great extent. Hence the eight five-year plan emphasis, the need for additional capacity in the railways to carry the additional traffic that is expected to increase the industrial activities or industrial base increases.

Industrial development is closely associated with education level. As research and development improves the productivity of labour and capital also increases.

Quality of human effort can be greatly improved and its productivity enhanced by investment in human resources, particularly in education. The human resource-development is a key factor in the process of economic growth and development. The success of industrial development strategy depends largely on the extent to which human resources are developed in the forms of skills and education. Large stock of population in India can be a precious asset on the provision that it possesses reasonable levels of health and is trained and educated on sound lines. Education develops basic skills and abilities and thereby boosts productivity. It also fosters a value-system conducive to the national development-goals and preserves and promotes the cultural ethos of the country. Levels of health are an equally vital input for economic development and a pre-requisite for making it desirable. One of the resolutions on national policy of education is to give a special emphasis on the development of science and technology. In the present competitive world skilled or efficient labour is an important source of the economy.

Principal Component Analysis

(Table 3.7),

Infrastructure index with Fixed capital, Employment, Net value added

**Table: 4.4 Infrastructure & Industry (Correlation)
1981-82**

	Infrastructure	Fix.Cap	Emp	N.V.A
Infrastructure	1			
Fix.Cap	0.49**	1		
Emp	0.676*	0.71	1	
N.V.A	0.513**	0.772	0.817	1

1991-92

	Infrastructure	Fix.Cap	Emp	N.V.A
Infrastructure	1			
Fix.Cap	0.555**	1		
Emp	0.713*	0.747	1	
N.V.A	0.768*	0.679	0.844	1
*	Correlation is significant at the 0.01 level (2-tailed).			
**	Correlation is significant at the 0.05 level (2-tailed).			

The table (4.4), correlation matrix depicts that the degree of relation between infrastructure index and industrial variables viz. fixed capital, employment, net value added. A study on industrial potential in Karnataka which was undertaken the Institute for social and economic change. Bangalore (1994) has revealed that one of the most important factors guiding industrial development in the state has been the infrastructure. The others such as tax incentives. Concessions, backward area development incentives etc., have played a secondary and marginal role in the industrial development.²⁴

During the 1981-82, the infrastructure index is more associated with employment, which explains about 68 per cent, significance at 1 per cent level. Whereas the Net value added and fixed capital explains 51 per cent and 50 per cent respectively, at 5 per cent level of significance. In 1991-92, the infrastructure index increases its degree of relation with industry to 71 per cent, significant at 1 per cent level. The net value added has shown tremendous increase recording at 77 per cent significance at 1 per cent level. The fixed capital also increased its level of association to 55 per cent at 5 per cent level of significance.

²⁴ Gayithri K, Role of Infrastructure in Industrial Development, Artha Vijnana, Vol. XXXIX No.2 June.

The over all picture of the table depicts that the degree of relation between infrastructure and industry has increased over a period of time. The net value added has accelerated the level of association with infrastructure recording at 77 per cent, at 1 per cent level of significance. The Infrastructure has also increased its degree of relation with fixed capital over a period of time.

Industries and bankings are like two faces of the same coin. Though the banks are meant for over all development of economic activities but shifts its objective for profit making by investing in those regions which are already developed. This increases the inequality across the regions. One of the reasons for regional disparity is credit-deposit ratio. The credit deposit ratio of less developed states like Orissa, Uttar Pradesh, Bihar, Rajasthan are steeply falling (RBI Trends and Progress of Banking in India). Where as the credit deposit ratio increasing in the developed states, particularly in Maharashtra. The capital is also moving from under developed states to developed states. Though the overall economic policy has improved infrastructure facilities which has facilitated for industrial activities in India but it is concentrated in some regions resulted on which increase in regional inequality. The per capita total credit utilization in Maharashtra was more than 20 times that of Bihar and nine times of U.P. Shetty's study (2003a) shows that the credit-deposit ratios have fallen in all regions of the country in the 1990s – the decline being much steeper in backward states and regions.

Alongwith infrastructure employment also plays important role for the development of the region. The infusion of a patronage system into employment, leading to low labour productivity and high labour costs. The costly policy in most developing countries in which neither the scale of production nor technical know-how were sufficient to produce anything remotely resembling reliable equipment at

reasonable cost.²⁵ The government policy has to be impartial and the productive employment should be generated in order to increase the income level and to reduce poverty in low-income states. Employment can be increased if economic growth is labour intensive. The capital-intensive industry requires efficient and skilled employees, which can be improved by providing required training. These employees migrate to the developed regions. Development of manufacturing industry and rural non-farm sector will improve employment and wages in rural areas. Direct employment programs such as wage and self-employment schemes have to be effectively implemented in less developed areas, so that regional disparity can be reduce.

The under utilisation of resources available in the country has also responsible for the backward regions to remain backward. The fiscal management of states must improve in order to allocate more expenditure for physical infrastructure, health, education, employment etc. Improvement in physical as well as social infrastructure in backward Regions would improve industrial as well as economic growth. The qualitative education and employment can be possible if the focus has made to reduce population growth.

Table:4.5 Industry and Infrastructure Development
Industrial Development

	High	Medium	Low
1981-82	Guj, Pun, Mah, Har, Ker, T.N.	W.B., Kar, A.P., M.P., Bih,	Ori, Ass, U.P., Raj, H.P., J&k.,
1991-92	Pun, Guj, T.N., Mah, Ker, Har.	A.P., Ori, W.B., Kar, U.P.,	M.P., Raj, Bih, Ass, H.P., J&k.,

Infrastructure Development

	High	Medium	Low
1981-82	Pun, Ker, Har, Guj, W.B., T.N.,	Mah, Kar, Ass, Ori, A.P.,	U.P., H.P., Bih, Raj, M.P., J&k.,
1991-92	Pun, Ker, Guj, T.N., Mah, Har,	U.P., Ori, Kar, A.P., W.B.,	M.P., Bih, Raj, Ass, H.P., J&k.,

TFRG & Infrastructure

²⁵ Canning David, A datable of wold stocks of Infrastructure, 1950-95

Reviews of the infrastructure development in India and its relation with industrial development are as follows. (Table (4.5))

The state-wise analysis of infrastructure development and industrial development reveals that there is considerable level of association between infrastructure and industrial development. During 1980's Punjab, Tamil Nadu and west Bengal are comes under the group of high development, whereas the states like Himachal Pradesh, Bihar, Jammu & Kashmir and Rajasthan are occupies in the group of low developed states. The above description clearly depicts that the states, which are developed in infrastructure, are also developed in industry. The implication and immediate usefulness of infrastructure development for the industrial development in particular is worth debating.

The infrastructure development is very essential for industry to produce at lower cost. The high development of industry in developed states, despite the continued measures of government to disperse industrial development across states also speaks of importance infrastructure facilities. The various incentives tax holidays, subsidies etc to disperse industry to backward areas is not considered serious while investment proposals on infrastructure is most accepted for industrial diversity. On the other hand it is the infrastructure diversity leads to the industrial diversity.

In the context of new economic policy wherein the industry in the liberalised regime has to sustain global competition. Hence, the focus has to be more on enhancing the efficiency of the industry by giving adequate infrastructure support rather than spread industry to nooks and corners of the country.

Conclusion

The main findings in this chapter are as follow.

The relation between manufacturing industry at disaggregated level and infrastructure is comparatively low in 1990's. The relation has declined

infrastructure with the following industries, viz., food nutrition related consumer goods, capital goods, intermediate goods and clothing related consumer goods industry, whereas the coefficient of determination has increased with the remaining industries, viz., the other consumer goods & metallic mineral products, basic goods and primary input based consumer goods industries.

In 1980's the Coefficient of determination (R^2), has recorded high in Food-nutrition related and clothing related consumer goods, whereas in 90's the clothing related consumer goods has maintained high. It indicates that the relation between the above industry and infrastructure is comparatively high. In 1980's electricity consumption and literacy have mainly explained the variation in the manufacturing industry.

In 1990's the indicators like electricity consumption and rail route length have mainly explained the variation in industrial development. The manufacturing industry (except Food-nutrition related) has been recorded positive relation with electricity consumption. The rail route length has also maintains positive relation with manufacturing industry except intermediate and other consumer goods industry.

The relation between infrastructure with fixed capital and employment has been declined over the period, on contrary to this the relation with Net value added has accelerated over the period. Among the various infrastructure indicators electricity consumption and rail route length have been recorded positive coefficients. It depicts that over the period, these indicators are very important for industrial development.

Conclusion

The main purpose of this study is to analyse the industrial development in India at state level during the period of 1981-82-1990-91 and 1991-91-1997-98. An attempt is made to analyse industrial diversity and the role of infrastructure in industrial development. Major findings of the study are summarised below.

The overall picture of manufacturing industries shows that the most of the states have relatively more diversified industrial base. The diversified industries are capital goods, basic goods, intermediate goods, and food nutrition related consumer goods. These industries recorded high industrial base over the period 1981-82-1997-98. Contrary to this, the PIBCG (primary input based consumer goods) industry has decreased the industrial base over the period (1981-82-1997-98). Comparatively a few states experienced less change in the diversification over the period. Diversity has increased continuously over the period among highly diversified and low diversified (classified) groups.

It is found that Tamil Nadu, Maharashtra, West Bengal, Andhra Pradesh and Gujarat are industrially more diversified states; Karnataka, Bihar, Madhya Pradesh, Kerala, could be grouped in 'middle level' (moderate) in terms of diversification; while Haryana, Rajasthan, Orissa, Assam, Himachal Pradesh, Jammu & Kashmir witnessed very less diversification in industrial structure. Disparity among the states over the period has widened. except for Jammu & Kashmir, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal have more or less retained their position.

Among the factors considered to be affecting the rate of investment in different states, level of infrastructure is found to be the most significant factor before liberalisation. In the nineties, probably profitability was the single most important factor that explained the variation in rate of investment across the states.

The overall picture of 1980's depicts that the industrial diversity is low in the beginning of the 1980's whereas it is comparatively high latter part of the period. The disparity is more or less remains same in the year of 1987-88,1989-90,1990-91.

In this study the growth of capital productivity is recorded high compared to the growth of labour productivity. The labour productivity growth has been continuously improved over the period (1981-82 to 1997-98). The capital productivity growth recorded high in the period 1986-87-1990-91. The labour productivity has recorded high compared to capital productivity. The labour productivity has increased continuously, contrary to this the capital productivity decreased continuously over the period 1981-82-1997-98. The Total factor productivity growth of manufacturing industry is recorded high during 1990's compared to the 1980's.

This suggests that the liberalised economic environment has increased the labour productivity and total factor productivity growth At least for the period under study, reforms have had positive influence on efficiency in production.

It is found that the capital intensity has increased in most of the states except Himachal Pradesh that remained stagnant in both the periods. The increase in capital intensity has resulted to the increase in labour productivity across the states, but contrary to this the capital productivity has also increased in some states viz. Bihar, Karnataka and Punjab where public sector industries are dominating. The study shows that capital intensity has been increasing over the period. The increase in capital intensity is comparatively high in other consumer goods & metallic mineral products, which is accompanied by sharp decline in capital productivity and moderately rise in labour productivity.

The results of the study show that the marginal increase in capital intensity in the primary input based consumer goods, has led to increase in not only labour

productivity but also capital productivity. This increase in capital intensity has been accompanied by an increase in capital productivity of the capital goods industry.

The extent of relationship between manufacturing industry (use based classification) and infrastructure is comparatively low in 1990's. It is observed that the infrastructure is the most significant factor to explain the industrial development before liberalisation, where as it has lost explaining power after liberalisation. Probably profitability is the other criteria that could explain industrial development. The explaining power (coefficient of determination) of the infrastructure has declined over the period of 1981-82 to 1997-98 in the following industries, namely, food nutrition related consumer goods, capital goods, intermediate goods and clothing related consumer goods industry. On the other hand the coefficient of determination has increased with the remaining industries, viz., the other consumer goods & metallic mineral products, basic goods and primary input based consumer goods industries.

In 1980's the Coefficient of determination (R^2), has been high in Food-nutrition related and clothing related consumer goods, whereas in the 90's the clothing related consumer goods has high R^2 in the regressions. It indicates that the relation between these two industries and infrastructure is relatively high. In 1980's, the infrastructure indicators like, electricity consumption and literacy have mainly explained the variation in the manufacturing industry.

In 1990's the infrastructure indicators like electricity consumption and rail route length have mainly explained the variation in industrial development. The manufacturing industry (except Food-nutrition related) a positive relation with electricity consumption. The rail route length has also maintained positive relation with manufacturing industry except intermediate and other consumer goods industry during 1991-92 to 1997-98.

The relation between infrastructure, with fixed capital, and employment, has weakened over the period. Contrary to this the relation between infrastructure and net value added has improved over the period. Among the various infrastructure indicators electricity consumption and rail route length have been found to have positive coefficients in the regression. It implies that over the period, these indicators were very important for industrial development.

Policy suggestion

In this study the analysis of economic performance of states reveals that regional disparities have increased in the post-reform period. There are bound to be disparities across regions in a vast country like India. However, a reduction in regional disparities is important not only for raising industrial productivity but also economic growth. On the basis of this study the following measures can be suggested in order to reduce regional disparities in economic development

First, investment should be increased in less developed states for higher industrial activities and to improve labour skill. Public investment is crucial for raising physical (power, roads, banking etc.) and human (health and education) infrastructure. Resources have to be used for infrastructure from central assistance, including externally aided projects and the state's own resources. The central government's role is important in allocating more resources to the less developed states. The role of private investment has become more important in the post-reform period. Private investment will be increased if physical infrastructure and availability of skilled labour are increased.

Second, fiscal management of states must be improved in order to allocate more funds for investment in physical infrastructure, health and education.

Third, the less developed states are facing both low economic growth and high unemployment rate. The governments have to focus on policies for reducing population in order to increase the employment opportunity.

Fourth, since the industry and agriculture activities are inter-related, the agriculture sector problems have to be solved, particularly in backward states. The reduction in the cost of production of agriculture products is directly related to reduce the cost of production of manufacturing industries like food & nutrition related goods, consumer goods etc., and indirectly affects other manufacturing industries. Because of credit deposit ratio has declined in backward areas the investment also declines. The governments not only should encourage banking activities but also make sure that the credit is available at lesser interest rate.

Fifth, productive employment should be generated in order to increase labour productivity.

Sixth, the availability of educational, management and training institutions will improve the efficiency of workers/employees, which will increase the labour productivity. Therefore research and development institutions have to be established in different regions of the country.

Seventh, for the balanced regional development infrastructure and industries have to be diversified, so that the available resources can be utilised to the optimum level.

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Table: 3.1 Labour Productivity (1981-82 to 1985-86)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	1.23	1.34	2.10	0.43	0.55	0.75	0.95
Assam	0.10	0.06	0.16	0.04	0.07	0.04	0.03
Bihar	1.18	1.80	3.07	0.75	0.31	0.52	0.53
Gujarat	0.94	1.25	4.21	1.43	0.85	0.80	0.49
Haryana	1.47	1.85	2.31	1.33	0.87	1.16	0.65
Himachal Pradesh	1.70	1.56	0.93	1.42	0.69	0.25	1.21
Jammu and Kashmir	0.03	0.83	3.42	1.16	0.33	0.44	0.64
Karnataka	0.98	1.25	1.65	1.09	0.49	0.77	0.76
Kerala	1.00	1.31	4.15	0.41	0.65	0.55	0.36
Madhya Pradesh	1.06	2.00	2.23	0.89	0.53	0.88	1.27
Maharashtra	1.47	1.56	3.54	1.35	0.82	0.83	0.91
Orissa	1.17	1.70	1.41	0.97	0.42	0.59	0.90
Punjab	1.07	1.61	2.43	1.87	1.13	0.68	0.69
Rajasthan	0.84	1.68	2.72	1.77	1.10	0.42	0.90
Tamil Nadu	1.16	1.05	2.26	0.84	0.74	0.90	1.06
Uttar Pradesh	0.94	1.44	3.07	0.69	0.61	0.62	0.42
West Bengal	0.70	1.00	2.13	1.06	0.40	0.60	0.69
All India Level	1.00	1.37	2.46	1.03	0.62	0.64	0.73

Table: 3.2 Labour Productivity (1986-87 to 1990-91)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	1.62	1.56	3.56	0.56	0.81	0.98	1.07
Assam	0.10	0.07	0.24	0.04	0.07	0.05	0.03
Bihar	1.60	1.87	3.74	1.14	0.38	0.73	0.53
Gujarat	1.60	1.62	4.69	2.39	1.16	1.11	0.80
Haryana	2.47	2.25	3.27	1.98	1.30	1.56	0.82
Himachal Pradesh	1.94	2.33	1.15	2.59	1.54	0.70	1.60
Jammu and Kashmir	0.02	1.94	3.26	2.18	0.71	0.53	0.64
Karnataka	1.46	1.69	2.35	1.55	0.68	1.10	1.21
Kerala	1.36	1.53	5.92	0.58	0.84	0.74	0.65
Madhya Pradesh	1.79	2.28	3.14	1.64	0.88	1.05	1.90
Maharastra	2.26	2.29	5.25	1.82	1.11	1.15	1.50
Orissa	1.97	2.57	3.15	1.31	0.53	0.78	1.24
Punjab	1.52	2.25	3.17	2.20	1.52	0.93	1.17
Rajasthan	1.28	2.24	4.14	2.89	1.58	0.70	1.53
Tamil Nadu	1.61	1.54	2.55	1.29	1.08	1.06	1.53
Uttar Pradesh	1.51	2.09	5.15	1.23	0.81	0.95	0.80
West Bengal	0.98	1.13	3.10	1.51	0.48	0.84	0.82
All India Level	1.47	1.84	3.40	1.58	0.91	0.88	1.05

Table: 3.3 Labour Productivity (1991-92 to 1997-98)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	1.77	2.70	4.90	0.71	1.30	1.27	1.61
Assam	0.15	0.06	0.32	0.04	0.09	0.06	0.05
Bihar	2.18	2.85	3.62	1.62	0.42	1.07	0.60
Gujarat	2.22	2.86	6.70	3.18	1.51	1.46	1.28
Haryana	3.93	2.80	4.20	2.50	1.82	2.06	1.35
Himachal Pradesh	2.97	2.52	4.43	3.32	2.28	1.53	2.81
Jammu and Kashmir	0.98	2.36	6.46	2.95	1.07	0.39	0.99
Karnataka	2.49	2.24	3.73	2.21	0.92	1.63	1.91
Kerala	1.68	1.81	6.43	0.68	1.08	0.92	0.78
Madhya Pradesh	2.31	2.89	4.59	3.02	1.67	1.50	2.39
Maharashtra	3.56	3.16	7.23	2.30	1.50	1.70	3.21
Orissa	1.76	2.94	4.73	1.85	0.46	0.85	1.41
Punjab	2.00	2.83	4.16	2.67	2.09	1.62	2.39
Rajasthan	2.02	3.05	6.47	4.13	2.24	1.09	2.03
Tamil Nadu	2.20	2.07	3.01	1.65	1.49	2.21	2.28
Uttar Pradesh	2.35	3.14	6.22	1.81	1.36	1.91	1.54
West Bengal	1.19	1.44	3.83	1.45	0.57	1.39	1.35
All India Level	2.10	2.45	4.77	2.12	1.29	1.33	1.65

Table: 3.4 Labour Productivity Growth (1981-82 to 1985-86)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	10.31	14.97	10.95	16.16	9.71	7.32	11.25
Assam	2.80	-1.29	5.97	13.06	-6.84	-2.43	3.59
Bihar	11.58	12.96	-2.54	39.81	-6.26	0.35	7.01
Gujarat	2.30	0.98	0.91	2.04	10.03	5.00	4.80
Haryana	10.66	4.58	13.09	13.36	8.92	0.78	-4.56
Himachal Pradesh	29.02	31.60	0.52	23.74	20.91	15.16	12.89
Jammu and Kashmir	-20.03	17.05	2.74	13.22	15.39	26.09	15.37
Karnataka	4.71	1.99	13.54	28.28	8.66	14.29	10.11
Kerala	3.75	6.85	3.37	17.49	1.26	4.41	7.27
Madhya Pradesh	6.75	9.93	10.27	13.06	9.00	5.73	12.60
Maharashtra	9.39	5.45	13.28	20.85	10.58	2.00	13.22
Orissa	2.48	4.41	13.02	18.08	15.30	5.52	13.38
Punjab	4.70	5.79	8.25	9.18	5.56	12.32	9.61
Rajasthan	6.68	5.70	20.73	16.95	7.99	6.08	12.86
Tamil Nadu	6.70	8.43	6.30	17.06	6.61	1.92	10.23
Uttar Pradesh	6.93	8.51	25.78	21.59	8.25	5.96	15.92
West Bengal	7.55	5.20	8.74	14.97	8.67	3.00	21.03
All India average	6.25	7.80	8.35	16.44	7.85	5.66	9.72

Table: 3.5 Labour Productivity Growth Rate (1986-87 to 1990-91)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	7.13	3.24	8.92	2.97	7.83	6.68	5.55
Assam	-1.16	-1.54	6.24	-2.78	-0.62	17.32	12.62
Bihar	3.69	7.45	2.92	4.54	14.64	10.04	4.44
Gujarat	11.08	10.34	5.31	10.00	5.23	11.22	14.00
Haryana	9.97	9.02	8.14	7.79	8.00	11.80	14.72
Himachal Pradesh	8.79	1.16	9.24	4.66	15.66	24.87	35.22
Jammu and Kashmir	2.79	23.17	5.01	12.06	22.50	20.27	1.07
Karnataka	10.90	11.78	8.03	5.45	10.59	6.31	12.82
Kerala	7.46	2.68	8.61	1.40	6.70	2.63	19.93
Madhya Pradesh	11.42	1.56	5.86	20.02	14.76	6.76	9.04
Maharashtra	10.99	9.62	12.92	3.90	3.89	9.64	11.50
Orissa	11.00	11.01	22.78	5.78	6.17	8.95	4.95
Punjab	8.75	9.10	7.90	3.98	7.19	10.11	10.52
Rajasthan	8.08	7.42	9.12	13.29	13.49	20.37	13.03
Tamil Nadu	8.20	6.51	4.92	4.94	7.83	3.91	8.93
Uttar Pradesh	13.86	11.18	7.15	10.94	9.69	10.10	12.80
West Bengal	5.59	2.71	9.30	4.69	2.49	10.67	-1.52
All India average	8.15	7.44	8.38	6.68	9.18	11.27	11.15

Table: 3.6 Labour Productivity Growth Rate (1991-92 to 1997-98)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	3.77	25.50	2.31	3.07	11.56	6.33	9.40
Assam	12.45	3.52	5.98	1.21	5.58	4.18	1.30
Bihar	11.46	9.15	2.05	20.30	5.72	24.40	5.09
Gujarat	6.03	9.75	6.34	6.76	5.84	1.37	7.96
Haryana	10.51	5.15	2.56	6.78	3.07	8.85	7.84
Himachal Pradesh	11.20	5.01	31.26	0.61	3.02	47.53	16.07
Jammu and Kashmir	7.59	0.15	102.57	3.69	-1.07	8.74	8.58
Karnataka	9.26	8.71	7.35	5.20	5.37	17.82	6.53
Kerala	10.20	14.36	8.46	8.75	2.41	6.46	2.09
Madhya Pradesh	3.58	7.63	11.18	4.73	12.90	18.11	2.45
Maharashtra	6.86	4.84	2.51	4.80	5.67	7.61	15.29
Orissa	-2.43	-1.29	13.06	5.97	-6.84	2.80	3.59
Punjab	5.43	2.55	3.80	4.55	5.27	21.66	12.99
Rajasthan	9.46	7.49	11.77	5.56	0.65	6.12	7.62
Tamil Nadu	4.47	5.38	1.38	6.36	5.49	73.84	2.46
Uttar Pradesh	8.41	6.39	6.79	5.25	6.05	48.02	12.65
West Bengal	4.71	7.74	3.85	-5.72	3.95	36.26	17.46
All India average	7.23	7.18	13.13	5.17	4.39	20.01	8.20

Table: 3.7 Capital Productivity (1981-82 to 1985-86)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	1.16	0.37	0.28	0.95	0.69	0.26	0.79
Assam	1.99	0.73	0.47	1.63	0.74	0.93	1.03
Bihar	0.78	0.21	0.28	1.14	0.62	0.62	0.93
Gujarat	0.94	0.63	0.47	0.58	0.69	0.47	0.54
Haryana	0.99	0.77	0.45	1.00	0.63	0.66	1.16
Himachal Pradesh	0.55	0.34	0.90	0.79	0.08	0.43	0.17
Jammu and Kashmir	0.02	0.57	1.97	0.40	0.72	0.58	0.30
Karnataka	1.15	0.31	0.44	1.05	0.80	0.28	0.48
Kerala	0.35	0.72	0.62	2.49	0.89	0.26	1.20
Madhya Pradesh	1.09	0.25	0.34	1.36	0.94	0.41	0.31
Maharashtra	0.97	0.91	0.96	0.69	0.93	0.81	1.04
Orissa	0.58	0.18	0.14	0.75	0.53	0.61	0.73
Punjab	0.85	0.85	0.27	1.07	0.75	0.15	0.82
Rajasthan	1.10	0.33	0.32	0.36	0.62	0.36	0.35
Tamil Nadu	1.02	0.40	0.66	1.06	0.67	0.65	0.86
Uttar Pradesh	0.75	0.80	0.17	0.88	0.67	0.42	0.49
West Bengal	1.29	0.43	0.40	1.01	1.47	0.98	2.36
All India average	0.92	0.52	0.54	1.01	0.73	0.52	0.80

Table: 3.8 Capital Productivity (1986-87 to 1990-91)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	0.79	0.31	0.30	1.20	0.56	0.43	0.14
Assam	1.47	0.64	0.53	1.26	0.39	0.47	0.44
Bihar	0.68	0.31	0.73	1.31	1.08	1.28	0.98
Gujarat	0.82	0.68	0.43	0.71	0.57	0.51	0.35
Haryana	0.72	0.67	0.52	1.18	0.68	0.51	0.79
Himachal Pradesh	0.47	0.15	0.59	0.57	0.29	0.24	0.24
Jammu and Kashmir	0.03	0.37	1.42	0.68	0.52	0.95	0.70
Karnataka	0.75	0.72	0.49	0.71	0.74	0.38	0.42
Kerala	0.49	0.52	0.64	2.55	0.98	0.53	0.56
Madhya Pradesh	1.06	0.24	0.36	1.13	0.87	0.60	0.23
Maharashtra	0.90	0.76	0.73	0.65	0.88	0.63	0.65
Orissa	0.42	0.26	0.00	0.67	0.55	0.43	0.51
Punjab	0.65	0.93	0.40	0.80	0.74	0.33	0.59
Rajasthan	0.90	0.49	0.35	0.48	0.44	1.02	0.23
Tamil Nadu	0.99	0.41	0.51	1.08	0.82	0.58	0.56
Uttar Pradesh	0.80	0.63	0.35	0.84	0.46	0.51	0.55
West Bengal	1.36	0.24	0.64	0.88	1.11	0.77	1.28
All India average	0.78	0.49	0.53	0.98	0.69	0.60	0.54

Table: 3.9 Capital Productivity (1991-92 to 1997-98)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	1.02	0.18	0.43	0.92	0.41	0.50	0.35
Assam	1.31	0.67	0.65	0.62	0.43	0.26	0.69
Bihar	0.73	0.35	0.62	1.16	1.17	1.70	0.43
Gujarat	0.69	0.31	0.41	0.54	0.38	0.41	0.36
Haryana	0.71	0.47	0.47	0.80	0.51	0.60	0.54
Himachal Pradesh	0.18	0.12	0.31	0.21	0.16	0.10	0.14
Jammu and Kashmir	2.63	0.60	1.11	1.33	0.69	0.71	1.58
Karnataka	0.85	0.58	0.54	0.73	1.05	0.79	0.34
Kerala	0.75	0.59	0.54	1.40	0.61	0.80	0.82
Madhya Pradesh	0.76	0.41	0.34	0.51	0.59	0.41	0.22
Maharastra	0.89	0.37	0.58	0.65	0.56	0.61	0.85
Orissa	0.48	0.19	0.13	0.55	0.44	0.27	0.38
Punjab	0.54	0.97	0.59	0.82	0.51	0.52	0.90
Rajasthan	0.80	0.14	0.32	0.56	0.40	0.98	0.25
Tamil Nadu	0.93	0.37	0.38	0.79	0.61	0.69	0.68
Uttar Pradesh	0.83	0.40	0.39	0.67	0.28	0.46	0.54
West Bengal	1.17	0.14	0.54	0.69	0.85	0.79	1.38
All India average	0.90	0.40	0.49	0.76	0.57	0.62	0.61

Table: 3.10 Capital Productivity Growth Rate (1981-82 to 1985-86)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	11.23	6.10	11.52	7.92	-15.21	15.61	-3.31
Assam	65.16	18.60	44.14	16.49	-18.07	182.27	58.16
Bihar	-8.47	-6.40	99.78	11.80	-7.86	43.16	2.62
Gujarat	-1.08	-2.51	4.36	6.83	-8.66	0.99	-2.05
Haryana	-12.75	-5.05	43.90	7.77	-8.18	-27.60	-3.23
Himachal Pradesh	45.57	-16.78	0.23	3.51	-15.06	-19.18	104.36
Jammu and Kashmir	-125.79	-15.54	14.71	0.11	21.20	-8.95	-13.95
Karnataka	-4.37	12.44	5.50	44.07	-21.94	52.75	-0.63
Kerala	5.61	6.66	-2.98	5.78	3.16	-2.36	-16.03
Madhya Pradesh	2.23	-6.79	8.07	4.27	-7.22	37.95	9.19
Maharashtra	-7.82	-2.60	10.95	17.76	0.61	-10.51	0.45
Orissa	-3.35	0.86	21.06	7.70	47.70	-13.29	11.64
Punjab	-3.69	-0.31	51.81	5.18	-10.20	3.10	7.73
Rajasthan	-10.89	-9.83	-66.99	8.82	-3.95	-19.75	11.14
Tamil Nadu	-2.13	5.12	-6.80	7.92	-9.09	0.33	13.00
Uttar Pradesh	1.25	15.64	-63.94	1.72	-11.60	-15.49	23.17
West Bengal	69.20	-5.89	0.60	11.40	-10.74	-1.98	34.20
All India average	1.17	-0.37	10.35	9.94	-4.42	12.77	13.91

Table: 3.11 Capital Productivity Growth Rate (1986-87 to 1990-91)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	5.72	-18.91	7.22	4.92	6.38	17.78	2.21
Assam	2.25	-3.04	19.91	3.04	43.57	344.98	5.54
Bihar	40.38	11.93	34.19	36.74	183.51	13.28	15.99
Gujarat	-2.08	7.77	-2.84	12.67	0.76	5.39	5.99
Haryana	4.06	-1.72	-1.62	7.18	10.13	48.25	-2.97
Himachal Pradesh	-20.32	19.47	45.69	9.98	43.32	23.73	51.72
Jammu and Kashmir	743.04	79.45	106.68	29.21	3.00	58.68	78.36
Karnataka	-4.52	28.64	16.32	-5.74	28.02	-3.04	1.24
Kerala	11.38	4.51	11.35	8.89	4.02	20.73	13.82
Madhya Pradesh	1.88	25.74	4.87	12.49	5.97	2.72	10.34
Maharashtra	4.61	-10.06	-11.97	3.55	2.41	1.95	2.23
Orissa	2.40	34.76	-158.76	7.30	25.63	-1.41	-0.19
Punjab	-1.22	6.36	4.91	-6.77	13.09	36.44	1.91
Rajasthan	10.11	30.30	54.91	15.90	0.00	97.24	9.32
Tamil Nadu	4.65	9.46	11.04	-5.26	7.72	8.24	2.04
Uttar Pradesh	5.03	-6.03	20.99	-6.66	-0.72	16.93	1.25
West Bengal	4.68	1.69	16.95	16.79	-2.25	1.93	-25.80
All India average	47.77	12.96	10.58	8.48	22.03	40.81	10.18

Table: 3.12 Capital Productivity Growth Rate (1991-92 to 1997-98)

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition related	Clothing related Consumer goods	Primary Input based Consumer goods	Other Consumer goods & Metallic mineral products
Andhra Pradesh	3.91	11.53	5.12	-6.38	-0.50	6.18	15.37
Assam	66.77	9.02	3.98	-8.00	0.78	-28.69	40.85
Bihar	17.62	12.05	-2.04	11.59	-11.22	10.70	103.58
Gujarat	-5.76	-19.23	5.06	-4.46	-12.40	-8.38	-1.39
Haryana	1.48	-12.16	3.22	-11.71	-9.94	-0.49	-8.95
Himachal Pradesh	6.45	1.07	3.29	1.59	-19.87	40.51	-15.63
Jammu and Kashmir	62.13	432.17	10.59	76.50	-0.69	3.57	10.01
Karnataka	2.32	-20.25	-8.94	5.00	2.31	5.39	-0.78
Kerala	1.48	3.35	5.71	-4.25	0.84	-4.05	-4.54
Madhya Pradesh	-2.39	20.23	14.76	-14.55	-0.39	29.46	11.26
Maharashtra	-5.04	14.63	5.46	1.49	-16.58	-4.18	-3.81
Orissa	20.51	7.43	61.62	12.53	-4.80	-7.00	-3.84
Punjab	6.14	12.08	14.33	2.29	-5.66	4.42	5.33
Rajasthan	-1.66	248.81	-4.50	18.29	-9.73	32.25	5.99
Tamil Nadu	-5.14	3.96	-7.72	8.03	-7.94	20.74	4.74
Uttar Pradesh	5.05	-9.02	4.85	-0.89	-7.36	-0.85	3.37
West Bengal	1.32	-8.60	-1.11	-9.13	-0.56	20.25	59.78
All India average	10.31	41.59	6.69	4.58	-6.10	7.05	13.02

Table 3.13 Capital Intensity 1981-82 to 1990-91

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition	Clothing related consumer	Primary Input based	Other consumer goods & Metallic mineral products
Andhra Pradesh	0.39	1.00	1.10	0.06	0.19	0.53	0.82
Assam	0.13	0.23	2.92	0.17	0.26	0.45	0.13
Bihar	0.51	1.76	0.76	0.15	0.11	0.18	0.14
Gujarat	0.30	0.28	1.66	0.23	0.28	0.31	0.34
Haryana	0.46	0.34	1.06	0.16	0.23	0.48	0.20
Himachal Pradesh	0.76	0.95	0.36	0.32	0.90	0.49	2.41
Jammu and Kashmir	0.38	0.30	0.47	0.21	0.19	0.14	0.54
Karnataka	0.41	0.40	0.78	0.25	0.18	0.64	0.67
Kerala	0.76	0.44	1.28	0.03	0.21	0.42	0.23
Madhya Pradesh	0.37	2.03	1.11	0.13	0.17	0.44	1.29
Maharashtra	0.50	0.44	0.97	0.30	0.23	0.34	0.39
Orissa	0.59	1.77	2.14	0.16	0.20	0.38	0.40
Punjab	0.29	0.19	1.26	0.22	0.27	0.53	0.26
Rajasthan	0.31	0.66	1.48	0.30	0.38	0.19	1.03
Tamil Nadu	0.32	0.47	0.64	0.16	0.23	0.29	0.50
Uttar Pradesh	0.73	0.72	1.31	1.54	0.89	0.82	1.19
West Bengal	0.22	0.52	0.70	0.16	0.11	0.17	0.15
All India Level	0.44	0.74	1.18	0.27	0.30	0.40	0.63

Table 3.14 Capital Intensity 1991-92 to 1997-98

	Capital goods	Basic goods	Intermediate goods	Food-Nutrition	Clothing related consumer	Primary Input based	Other consumer goods & Metallic mineral products
Andhra Pradesh	0.45	3.82	2.39	0.11	0.43	0.60	1.19
Assam	0.27	0.31	2.62	0.34	0.25	0.54	0.24
Bihar	0.68	2.33	0.76	0.33	0.08	0.12	0.32
Gujarat	0.59	1.81	3.89	0.44	0.59	0.60	0.89
Haryana	1.00	0.74	1.36	0.35	0.50	0.63	0.72
Himachal Pradesh	4.71	2.23	4.06	1.40	3.54	2.20	9.85
Jammu and Kashmir	0.14	0.28	0.93	0.29	0.28	0.09	0.23
Karnataka	0.71	1.04	1.65	0.45	0.22	0.53	1.32
Kerala	0.62	0.61	1.71	0.08	0.37	0.30	0.33
Madhya Pradesh	0.68	1.68	2.49	0.58	0.64	0.73	2.19
Maharastra	0.97	1.42	2.75	0.48	0.60	0.74	0.80
Orissa	0.92	3.13	3.03	0.39	0.21	0.81	0.85
Punjab	0.62	0.37	1.11	0.45	0.66	0.61	0.53
Rajasthan	0.68	1.45	4.05	0.67	0.89	0.32	1.84
Tamil Nadu	0.55	0.82	1.36	0.32	0.44	0.62	0.92
Uttar Pradesh	0.72	1.47	3.10	0.41	0.84	0.70	0.55
West Bengal	0.29	1.72	1.18	0.23	0.19	0.30	0.39
All India Level	0.86	1.48	2.26	0.43	0.63	0.62	1.36

