ECONOMIC EFFICIENCY OF LABOUR IN INDIAN MANUFACTURING UNDER VARIOUS POLICY REGIMES: 1980-13

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Abstract

The utilization performance of labour in Indian manufacturing has been analyzed through the discrepancy between potential and actual labour productivity for the period 1980-13. It has been observed that impressive enhancement in labour productivity growth has been taken place in some of the states in Indian manufacturing during the period of consolidation of economic reforms 2001-13. Remarkable enrichment in capital productivity growth has been taken place in most of the states in Indian manufacturing during the period of consolidation of economic reforms 2001-13. The comparative analysis of growth pattern of capital intensity between a phase of major changes in economic policy 1991-01 and a period of consolidation of economic reforms 2001-13 highlights that the a greater labour absorption during the period of consolidation of economic reforms 2001-13. On the whole, the industrially developed states performed much better in the use of labour input in recent years. Labour efficiency index has been positive at aggregate manufacturing during 1991-01 and 2001-13 whereas it has been negative during 1980-91. It indicates that the impressive enhancement in labour utilization performance has taken place in Indian manufacturing at aggregate level on account of industrial reforms since 1991.
Key words: Labour productivity, Capital productivity, Capital intensity and Labour efficiency index

Introduction

Industrial sector plays a major role in the development and growth of an economy. India adopted a development strategy based on central planning soon after independence. Industrial sector was highly controlled and regulated through licensing mechanism. While the country achieved considerable progress creating a sound and broad based industrial structure, its growth has been modest. Indian manufacturing sector has experienced higher growth during 1980s. While eighties depicted industrial growth recovery, nineties showed lower rate. However, to study overall performance of the manufacturing sector, it is not sufficient to analyze growth of output and growth of inputs. It is necessary to examine the trends in industrial productivity. Scarcity of resources has been recognized as a limiting factor for the process of economic growth. The scope for output expansion based on proper use of scarce resources is the subject matter of economics. Therefore, the productivity of resources becomes a crucial factor in process of growth. The measures of productivity that are generally discussed in economic literature are labour productivity, capital productivity and total factor productivity. Gains in productivity are the most crucial source of economic growth of developing countries like India. In the empirical literature, labour productivity is often taken as an index of efficiency of a firm. Overall Labor Effectiveness (OLE) is a Key Performance Indicator (KPI)

that measures the utilization, performance, and quality of the workforce and its impact on productivity. Behaviour of the partial productivity growth like labour and capital productivity growth reflect the efficiency with which a single factor is utilized.

Economic activities have been partially liberalized in the 1980s, and concrete shift in the policy towards liberalization, privatization and globalization has been introduced in 1991 purports to raise industrial efficiency to the international level and accelerate the pace of industrial growth. A number of changes have taken place in industrial licensing policy, foreign investment, foreign technology agreements and MRTP act. Import has provided industrial firms greater and cheaper access to imported capital goods and intermediate goods to make possible for the firms to improve production and technical efficiency. Increased competitive pressure on industrial units in a liberalized import climate may lead to better organization of production, improved managerial efficiency, more effective utilization of labour and better capacity utilization. Greater access to imported inputs and a more feasible exchange rate may enable industrial firms to become more-competitive export markets.

Policy changes in Public sector may enhance allocative efficiency of private sector with subsequent stock market discipline. Removal of earlier MRTP act may stimulate competitive behaviour of firms in monopolistic and oligopolistic markets and would promote competition and efficiency. Foreign investment policy of India has undergone far-reaching changes in recent years. Inflows of FDI could be viewed through the trade intensity of economy. It is argued that opening up of the economy would increase Indian firm's access to better technical knowhow, machinery and equipment, management techniques and export demand leading to better managerial practices and production efficiency. The actual performance of manufacturing industry across States in India since the introduction of New Economic Policy of 1991, subsequent policies of further and globalization through the compass of technical efficiency and productivity are important questions in the minds of all researchers in the realm of Industrial Economics. Out of sheer curiosity one may like to know, what is the efficiency with which labour input is utilized in a labour surplus economy during the intensive liberalization period? The difference between actual and desired labour productivity growth rates may be considered as an indicator of the efficiency with which labour input is utilized in production process. So, this paper has been made an attempt to study the inter-temporal and inter-state variations in discrepancy between potential and actual labour productivity in Indian manufacturing sector examined for the period 1980-13.

Methodology of the Study

Sources of Data

The data of the present study have been collected from the various volumes of Annual Survey of Industries (ASI) published by Central Statistical Organization (CSO),

Government of India. This study has used gross value added at constant prices (2004-05=100) as a measure of output and total number of persons engaged as a measure of labour input. Based on the study of India KLEMS Research Team (2014), the study period (1980-81 to 2012-13) has been trifurcated into such as sub-periods a phase of piecemeal and ad hoc policy changes 1980-81 to 1990-91) , a phase of major changes in economic policy (1991-92 to 2000-01) and a period of consolidation of economic reforms (2001-02 to 2012-13).

Besides the ASI data, the required data have been procured from the other secondary sources. In this context, for making price corrections to the reported data on output, whole sale price index for manufactured products collected from the Office of the Economic Advisor, Ministry of Industry, and Government of India. For constructing the capital input series, whole sale price index of machine and machine tool industry has been collected from various issues of Economic Survey of India.

To study regional imbalance, the fifteen major states of India namely Maharashtra, Gujarat, Tamil Nadu, West Bengal, Uttar Pradesh, Karnataka, Andhra Pradesh, Bihar, Assam, Haryana, Kerala, Madhya Pradesh, Orissa, Punjab and Rajasthan have been selected for the study. Such selected states which together have contributed more than 80 per cent of Indian registered manufacturing gross value added in every year of the study period. The fifteen major states of India have been selected since state level aggregation is considered as a meaningful level of regional aggregation.

Inter-Temporal Variations in Relevant Variables

Growth rates are perhaps the most commonly used measure in economic profession. This part presents the method of measuring growth rates of important variables in the present study. The sub-period growth rates could be measured usually by running regressions separately for each period. However, in the case of independent estimation, the trend line is likely to be discontinuous and hence, some time-disparity may arise in between the sub-periods and whole period growth rates. Recently Boyce (1986) has suggested a method of kinked exponential model for removing the inconsistency in the case of exponential trend equations. This method is based on the elimination of the discontinuity between sub-periods by imposing linear restriction.

For the three sub-periods by adding the three separate linear trends
$Y_1 = a_1 D_1 + b_1 D_1 t$, $Y2 = a_2 D_2 + b_2 D_2 t$ and $Y_3 = a_3 D_3 + b_3 D_3 t$, one can obtain a discontinuous linear model as indicated below:

$$Y_t = a_1 D_1 + b_1 D_1 t + a_2 D_2 + b_2 D_2 t + a_3 D_3 + b_3 D_3 t + u_t \quad \text{--------------- (1), where}$$

$D_1 = 1$ for the first period
$\quad = 0$ otherwise
$D_2 = 1$ for the second period
$\quad = 0$ otherwise

D_3 = 1 for the third period

= 0 otherwise

This possibility of discontinuity could be eliminated by two linear restrictions such that the first two lines intersect at the break point K_1 and second and third lines intersect at the second break point K_2. In mathematical terminology it is like

$a_1 + b_1K_1 = a_2 + b2K_1$ ------------------------------- (2) and

$a_2 + b_2K_2 = a_3 + b_3K_2$ ------------------------------- (3)

After solving equation (1) with these restrictions (2) and (3), one can easily get the restricted model as

$Y_t = a_1 + b_1 (D_1t + D_2K_1 + D_3K_1) + b_2 (D_2t + K_2D_3 - K_1D_2 - K_1D_3) + b_3 (D_3t - K_2D_3) + u_t$

For the present study, double kink exponential model has been used. This model is

$LnY_t = a_1 + b_1 (D_1t + D_2K_1 + D_3K_1) + b_2 (D_2t + K_2D_3 - K_1D_2 - K_1D_3) + b_3 (D_3t - K_2D_3) + u_t$

Here, the breaks in the year 1991-92 and 2000-01, and the three sub-periods 1980-81 to 1990-91, 1991-92 to 2000-01 and 2001-02 to 2012-13. K_1 and K_2 are the two break points, hence t = 9 at K_1 and t = 19 at K_2 and t is time period and b_1, b_2 and b_3 are the parameters to be estimated on the basis of observed data. Growth rate for the sub-period has been calculated by [exp (b_i) -1].

In the present study, labour productivity (LP) has been measured as gross value added per employee, capital productivity has been measured as the ratio of gross value added to gross fixed capital stock at constant prices and Capital intensity has been measured as capital per worker.

Labour Efficiency Index

Labour efficiency has been measured in the following way (Ahmed: 1981). Labour productivity $\frac{Q}{L}$ could be written as;

$$\frac{Q(t)}{L(t)} = \frac{K(t) Q(t)}{L(t) K(t)}$$

Totally differentiate, ignoring time 't' (for simplicity), we have;

$$d(\tfrac{Q}{L}) = d\left(\frac{K}{L}\right)\frac{Q}{K} + d\left(\frac{Q}{K}\right)\frac{K}{L}$$

Dividing the whole equation by $\frac{Q}{L}$, we obtain;

$$\frac{d(\tfrac{Q}{L})}{\tfrac{Q}{L}} = \frac{d(\tfrac{K}{L})}{\tfrac{K}{L}} + \frac{d(\tfrac{Q}{K})}{\tfrac{Q}{K}}$$, where $\frac{d\tfrac{Q}{L}}{\tfrac{Q}{L}}$ gives actual labour productivity growth at

time t and potential labour productivity growth rate is given by $\frac{d\tfrac{K}{L}}{\tfrac{K}{L}} + \frac{d\tfrac{Q}{K}}{\tfrac{Q}{K}}$. Therefore

potential labour productivity growth rate at time t is given by the sum of growth rate of capital productivity and growth rate of capital intensity.

Thus labour efficiency (LE) growth rate has been measured as the difference between actual and potential (desired) labour productivity growth rates. That is, the difference between actual labour productivity growth and potential labour productivity growth gives the efficiency with which labour input is utilized. If the growth rate of actual labour productivity exceeds that of desired labour productivity, then the indicator of efficiency is positive and the firm to maintain that level of efficiency has to encourage the employees by adequate compensation. If the growth rate of actual labour productivity is less than growth rate of desired labour productivity, it shows the inefficiency with which labour is employed.

Variable Construction
Measure of Output

In the empirical literature on manufacturing industry, output is measured in terms of either value of gross output or value added. In the present study, the measure of output is gross value added is more relevant, however net value added figure as given in ASI has the limitation to the extent that the depreciation figures do not reflect the actual capital consumption. Gross value added at current price is the increment to the value of goods and services contributed by deflating (single deflation) gross value added at current prices by the general wholesale product price index (with 2004- 05 as the base). At the disaggregate level in the six two digit industries, gross value added at current prices have been deflated by the respective wholesale product price indices (with 2004-05 as the base).

Measure of Labour

Labour input is generally measured in terms of the total number of man- hours worked or the average number of persons employed. 'The use of man- hours worked' is often regarded as a better measure as it includes number of workers as well as the working hours in a day. However, it has been pointed out that the consumption of man – hours in ASI is carried out by multiplying the number of workers in a shift by eight and both by the actual duration of the shift and then aggregating such products across factories. So, the resultant series do not measure the actual man hours worked. Therefore, total number of employees has been taken as the measure of labour input.

Measurement of Capital

The measurement of capital stock is inherently difficult and has been controversial in the literature. Capital is made up of productive equipment, machinery, rolling stock, tools, buildings and other structure. The heterogeneous nature of the variables creates

the difficulty of finding a common measurement. An important question is whether to use gross or net capital stock or services rendered by gross fixed capital stock in production.

Perpetual inventory method has been used for measuring capital stock. For the construction of capital stock series, the bench mark year has been taken as 1973-74. In order to construct the time series of gross fixed capital stock, the study assume that the value of finished equipment of a balanced age composition would be exactly half the value of equipment when it was new. Hence, in the present analysis, twice the book value of the base year has taken as a rough estimate of the replacement value of fixed capital. For obtaining estimate of fixed capital, bench mark year of fixed capital has been deflated by gross fixed capital formation index and gross investment at constant prices have been added cumulatively. This has been computed in the following way.

$K_t = K_{t-1} + I_t - d.K_{t-1}$, where

K_t = Gross fixed capital at 2004-05 prices by the end of year t;

I_t = Gross real investment in fixed capital during the year t; and

d = Annual rate of discard of capital.

Following Neetu Bala and C.S.Ceema (2001), five per cent has been taken as nnual rate of discard of capital in the present study.

The gross real investment I_t is computed by following expression:

$I_t = (B_t – B_{t-1} + D_t) / P_t$ where

B_t = Book value of fixed capital in the year t;

D_t = Depreciation in the year t; and

P_t = Price index of machine and machine tool industry at 2004-05 prices.

Results and Discussion
Growth of Labour Productivity in Indian Manufacturing Sector across States

In the present analysis, labour productivity has been defined as value added per employee. Table 1 exhibits the average annual growth rate of labour productivity in Indian manufacturing sector at national and state levels. During 1980-13, labour productivity growth rate has been 6.14 per cent in aggregate Indian manufacturing. All the fifteen major states have shown positive growth of labour productivity during the entire period of study. However, across the states there has been a substantial variation. For the seven States namely Maharashtra, Gujarat, Uttar Pradesh, Andhra Pradesh, Karnataka and Orissa realized the growth rate of labour productivity have been found to be higher than that of national growth rate during entire period of study and for the rest of the eight States it has been the reverse

Table 1 Growth Rate of Labour productivity across states in Indian Manufacturing

(Per cent per annum)

Period / State	1980-91 (a phase of piecemeal and ad hoc policy changes)	1991-01 (a phase of major changes in economic policy)	2001-13 (a period of consolidation of economic reforms)	1980-13 (entire period)
All –India	6.99	5.41	6.32	6.14
Maharashtra	8.11	4.90	7.25	6.53
Gujarat	7.50	9.18	4.68	7.34
Tamil Nadu	6.68	2.19	4.78	4.25
Uttar Pradesh	11.16	5.45	2.59	6.24
Andhra Pradesh	7.08	4.01	9.89	6.61
Karnataka	7.21	5.01	8.20	6.59
Madhya Pradesh	6.78	5.70	4.75	5.73
Haryana	3.30	9.02	3.06	5.55
Punjab	5.24	4.40	4.08	4.55
West Bengal	4.64	4.85	7.00	5.42
Rajasthan	6.58	6.25	4.20	5.87
Bihar	6.57	4.04	-3.79	2.39
Kerala	5.07	1.78	1.70	2.71
Orissa	10.13	4.78	9.17	7.62
Assam	10.89	1.34	4.62	5.04

Source: Computed using ASI data

Note: Growth rate for the sub-periods given above are calculated form kinked exponential model where as growth rate for 1980-13 is calculated from the semi-log trend equation.

Labour productivity growth across states and across time periods an interesting picture. During pre-liberalization period, average annual growth of labour productivity has been the least at the aggregate level. The aggregate Indian manufacturing sector recorded the growth rate of 6.99 per cent per annum during a phase of piecemeal and ad hoc policy changes 1980-91. The labour productivity followed a positive growth pattern in all the states during the period 1980-91 The labour productivity grew at the rate above 3 per cent per annum in all the states but substantial variations have been also observed. The labour productivity has been highest in the of state of Uttar Pradesh (11.16 per cent per annum) followed by Assam (10.89 per cent per annum) and Orissa (10.13 per cent per annum) during a phase of piecemeal and ad hoc policy changes 1980-91. As far as the labour productivity growth is concerned, the Indian manufacturing sector responded glowing during 1980s. The labour productivity growth recorded a growth rate of 5.41 per cent per annum during a phase of major changes in economic policy 1991-01. A significant U-turn has been noticed in the growth pattern of labour productivity in all the states except Gujarat and Haryana since the manufacturing sector of the states achieved the lower growth rate during a phase of major changes in economic policy 1991-01 in comparison of growth rate during a phase of piecemeal and ad hoc policy changes 1980-91. The growth rate of labour productivity in the states of Kerala, Orissa and Assam has been 1.78, 4.78 and 1.34 per cent per annum respectively during a phase of major changes in economic policy

1991-01 where as it has been 15.07, 10.13 and 10.89 per cent per annum during a phase of piecemeal and ad hoc policy changes 1980-91. In nut shell, the Indian manufacturing sector at aggregate and disaggregate levels registered lower growth rate in labour productivity during a phase of major changes in economic policy 1991-01 in comparison of a phase of piecemeal and ad hoc policy changes 1980-91with only exception of manufacturing sectors of Gujarat and Haryana.

The relative analysis of growth pattern of labour productivity between a phase of major changes in economic policy 1991-01 and a period of consolidation of economic reforms 2001-13 emphasizes that the labour productivity performance for aggregate Indian manufacturing has been increased during a period of consolidation of economic reforms 2001-13. In Bihar, labour productivity declined at the alarming rate of 3.79 per cent per annum. A significant acceleration in the labour productivity growth has been noticed in the states of Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka, West Bengal, Orissa and Assam during the period of consolidation of economic reforms 2001-13. For the remaining states, the growth rate of labour productivity has been found to be lower during period of consolidation of economic reforms 2001-13 than that of the period of major changes in economic policy 1991-01. On the whole, it has been observed that impressive enhancement in labour productivity growth has been taken place in some of the states in Indian manufacturing during the period of consolidation of economic reforms 2001-13.

Growth of Capital Productivity

In the present analysis, capital productivity has been measured as the ratio of gross value added to fixed capital stock. Table 2 presents the average annual growth rate of capital productivity in Indian manufacturing sector at national and state levels. During 1980-13, capital productivity growth rate has been positive but less than one (0.99 per cent per annum) per cent in aggregate Indian manufacturing. The manufacturing sector of states of Maharashtra, Gujarat, Tamil Nadu, West Bengal, Bihar and Assam followed negative growth path as for as the performance of capital input in terms of its productivity is concerned. In the remaining states, the capital productivity grew at modest rate although Andhra Pradesh, Karnataka, Haryana and Orissa realized the growth rate of capital productivity have been found to be less than one per cent per annum during entire period of study.

The aggregate Indian manufacturing sector recorded the growth rate of 0.62per cent per annum during a phase of piecemeal and ad hoc policy changes 1980-91. The Capital productivity has been highest in the of state of Assam (7.84 per cent per annum) followed by Uttar Pradesh (2.56 per cent per annum), Rajasthan(2.24 per cent per annum), Karnataka(2.03 per cent per annum) and Madhya Pradesh (1.72 per cent per annum) during a phase of piecemeal and ad hoc policy changes 1980-91. The Capital productivity growth recorded a growth rate of -2.54 per cent per annum during a phase of major changes in economic policy 1991-01. The capital productivity followed a positive growth pattern in six

states only during the period 1991-01. The capital productivity has been either negative or sluggish growth in Indian manufacturing states except Assam (14.49 per cent per annum) and Andhra Pradesh (2.08 per cent per annum) during the phase of major changes in economic policy 1991-01. A significant U-turn has been noticed in the growth pattern of capital productivity in the states of Andhra Pradesh, Haryana and west Bengal since the manufacturing sector of the states achieved the higher growth rate during a phase of major changes in economic policy 1991-01 in comparison of growth rate during a phase of piecemeal and ad hoc policy changes 1980-91. On the whole, the gloomy picture has been found in the performance of Indian manufacturing in terms of capital productivity during a phase of major changes in economic policy 1991-01.

The comparative analysis of growth pattern of capital productivity between a phase of major changes in economic policy 1991-01 and a period of consolidation of economic reforms 2001-13 emphasizes that the capital productivity performance for aggregate Indian manufacturing has been increased tremendously during a period of consolidation of economic reforms 2001-13. A significant stepping up in the capital productivity growth has been noticed in all the states except Andhra Pradesh and Assam during the period of consolidation of economic reforms 2001-13. On the whole, it has been observed that impressive enhancement in capital productivity growth has been taken place in most of the states in Indian manufacturing during the period of consolidation of economic reforms 2001-13.

Table 2 Growth Rate of Capital Productivity across States in Indian Manufacturing

(Per cent per annum)

Period \ State	1980-91 (a phase of piecemeal and ad hoc policy changes)	1991-01 (a phase of major changes in economic policy)	2001-13 (a period of consolidation of economic reforms)	1980-13 (entire period)
All –India	0.62	-2.52	6.64	0.99
Maharashtra	-0.42	-1.93	3.55	-0.10
Gujarat	-1.05	-2.08	1.63	-0.70
Tamil Nadu	-0.05	-3.13	2.35	-0.64
Uttar Pradesh	2.56	-1.52	4.23	1.34
Andhra Pradesh	-3.12	2.08	0.80	0.15
Karnataka	2.03	-4.11	4.69	0.21
Madhya Pradesh	1.72	-2.29	10.92	2.63
Haryana	-3.15	1.71	2.04	0.35
Punjab	1.49	1.17	3.78	2.02
West Bengal	-4.43	0.33	0.59	-1.02
Rajasthan	2.27	-0.60	4.52	1.73
Bihar	7.84	-14.49	4.06	-2.99
Kerala	1.05	0.47	5.18	2.01
Orissa	0.59	0.51	0.65	0.57
Assam	1.50	-4.44	2.78	0.62

Source: Computed using ASI data

Note: Growth rate for the sub-periods given above are calculated form kinked exponential model where as growth rate for 1980-13 is calculated from the semi-log trend equation.

Growth of Capital Intensity

Capital intensity has been measured as gross fixed capital stock per worker. It helps to analyze gross fixed capital stock in relation to employment across the fifteen states and across time periods. Capital intensity has increased at the rate of 3.22 per cent per annum at aggregate level during the entire study period 1980-13. Also considerable variations have been observed the growth behaviour of capital intensity at state level during the study period. All the states registered hastening in the capital deepening process during 1980-13.

Table 3 Growth Rate of Capital Intensity Across States and Time Periods

(Per cent per annum)

Period / State	1980-91 (a phase of piecemeal and ad hoc policy changes)	1991-01 (a phase of major changes in economic policy)	2001-13 (a period of consolidation of economic reforms)	1980-13 (entire period)
All –India	7.39	3.73	-1.46	3.26
Maharashtra	8.57	6.97	3.57	6.43
Gujarat	8.65	11.50	2.99	8.10
Tamil Nadu	6.73	5.49	2.37	4.93
Uttar Pradesh	8.43	6.90	-1.44	4.83
Andhra Pradesh	10.53	1.89	9.02	6.46
Karnataka	5.07	9.52	3.35	6.36
Madhya Pradesh	4.86	8.63	-5.89	3.06
Haryana	6.66	7.19	1.00	5.18
Punjab	3.69	3.19	0.29	2.47
West Bengal	9.58	4.14	6.09	6.29
Rajasthan	4.28	6.60	0.44	4.07
Bihar	0.27	14.37	-3.20	4.75
Kerala	3.97	1.30	-3.31	0.69
Orissa	9.48	4.25	8.45	7.00
Assam	9.25	6.04	1.78	5.69

Source: Computed using ASI data

Note: Growth rate for the sub-periods given above are calculated form kinked exponential model where as growth rate for 1980-13 is calculated from the semi-log trend equation.

The relative analysis of growth pattern of capital intensity between a phase of piecemeal and ad hoc policy changes 1980-91 and a phase of major changes in economic policy 1991-01 reflects that the capital deepening has been found to be more pronounced in during the period of piecemeal and ad hoc policy changes 1980-91 since the growth rate of capital intensity has been higher in nine states during the period of piecemeal and ad hoc policy changes 1980-91 compare to a phase of major changes in economic policy 1991-01.

The comparative analysis of growth pattern of capital intensity between a phase of major changes in economic policy 1991-01 and a period of consolidation of economic reforms 2001-13 highlights that the a greater labour absorption during the period of consolidation of economic reforms 2001-13 since capital intensity found to be -1.46 per cent per annum during 2001-13 against 3.73 per cent per annum during 1991-01 at aggregate Indian manufacturing. The interesting point is note that the growth of capital intensity has been found to be negative in the manufacturing states of Uttar Pradesh, Madhya Pradesh, Bihar and Kerala whereas it has been less than one per cent in the states of Punjab and Rajasthan during the period of consolidation of economic reforms 2001-13 .

Discrepancy between Potential and Actual Labour Productivity

The index of efficiency of labour has been computed as the, difference between the actual growth rate of labour productivity and desired growth rate of labour productivity. Efficiency index has taken positive sign for all the states except Gujarat, Tamil Nadu, and West Bengal during entire period of study. But there is substantial variations in efficiency indicator has been found at state levels. It is interesting that there is no discrepancy between the actual growth rate of labour productivity and desired growth rate of labour productivity in Andhra Pradesh.

The growth rate through the discrepancy between actual and potential growth rate of actual labour productivity has been less than that of potential in the aggregate manufacturing sector. From regional perspectives also picture has not been that good as the number of states showing declining trend in efficiency has been six during a phase of piecemeal and ad hoc policy changes 1980-91.The industrially developed states like Maharashtra, Gujarat and Uttar Pradesh, the index of efficiency of labour found to be negative.

The relative analysis of the discrepancy between actual and potential growth rate of actual labour productivity between a phase of piecemeal and ad hoc policy changes 1980-91 and a phase of major changes in economic policy 1991-01 reflects that the utilization of labour input has been found to be more distinct during the period of major changes in economic policy 1991-01 as the efficiency index has been 4.2. However, from regional perspectives, picture has not been that good as the number of states showing declining trend in efficiency has been six during a phase of major changes in economic policy 1991-01. The index of efficiency of labour found to be again negative in the industrially developed states like Maharashtra Gujarat and Tamil Nadu.

In all the industrially developed states like Maharashtra Gujarat and Tamil Nadu, Andhra Pradesh, Karnataka except Uttar Pradesh, the better performance in the index of labour efficiency has been found during period of consolidation of economic reforms 2001-13. Industrially lagging states Rajasthan, Bihar and Kerala the index of efficiency has been found to be negative during period of consolidation of economic reforms 2001-13

while the index of efficiency in these states has been positive during a phase of major changes in economic policy 1991-01.

Table 4 Discrepancy between Potential and Actual Labour Productivity

Period \ State	1980-91 (a phase of piecemeal and ad hoc policy changes)	1991-01 (a phase of major changes in economic policy)	2001-13 (a period of consolidation of economic reforms)	1980-13 (entire period)
All –India	-1.02	4.2	1.14	1.89
Maharashtra	-0.04	-0.14	0.13	0.2
Gujarat	-0.1	-0.24	0.06	-0.06
Tamil Nadu	0	-0.17	0.06	-0.04
Uttar Pradesh	0.17	0.07	-0.2	0.07
Andhra Pradesh	-0.33	0.04	0.07	0
Karnataka	0.11	-0.4	0.16	0.02
Madhya Pradesh	0.2	-0.64	-0.28	0.04
Haryana	-0.21	0.12	0.02	0.02
Punjab	0.06	0.04	0.01	0.06
West Bengal	-0.51	0.38	0.32	0.15
Rajasthan	0.03	0.25	-0.76	0.07
Bihar	-1.54	4.16	-4.65	0.63
Kerala	0.05	0.01	-0.17	0.01
Orissa	0.06	0.02	0.07	0.05
Assam	0.14	-0.26	0.06	-1.27

Source: Computed using tables 1, 2 and 3.

Conclusion and Policy Implications

- In relation to growth pattern of labor productivity between a phase of major changes in economic policy 1991-01 and a period of consolidation of economic reforms 2001-13 emphasizes that the impressive enhancement in labour productivity growth has been taken place at aggregate level besides some of the states in Indian manufacturing during the period of consolidation of economic reforms 2001-13.

- The capital productivity performance for aggregate Indian manufacturing has been increased tremendously and it has been observed that remarkable enrichment in most of the states in Indian manufacturing during the period of consolidation of economic reforms 2001-13.

- The comparative analysis of growth pattern of capital intensity between a phase of major changes in economic policy 1991-01 and a period of consolidation of economic reforms 2001-13 highlights that the a greater labour absorption during the period of consolidation of economic reforms 2001-13.

- Efficiency index has taken positive sign for all the states except Gujarat, Tamil Nadu, and West Bengal during entire period of study. The index of labour efficiency has not been that good as the number of states showing declining trend in efficiency has been six during a phase of piecemeal and ad hoc policy changes 1980-91.The industrially developed states like Maharashtra, Gujarat and Uttar Pradesh, the index of efficiency of labour found to be negative.

- The better performance in the index of labour efficiency has been found in the industrially developed states of Maharashtra Gujarat, Tamil Nadu, Andhra Pradesh and Karnataka except Uttar Pradesh and it has been found to be negative in the industrially lagging states of Rajasthan, Bihar and Kerala during the period of consolidation of economic reforms 2001-13. On the whole, the industrially developed states performed much better in the use of labour input in recent years.

- The growth rate through the discrepancy between actual and potential growth rate of actual labour productivity has not been that good as the number of states showing declining trend in efficiency has been six during a phase of piecemeal and ad hoc policy changes 1980-91, six during the period of major changes in economic policy 1991-01 and five during the period of consolidation of economic reforms 2001-13.

- The utilization of labour input has been found to be more pronounced during the period of major changes in economic policy 1991-01 as the efficiency index at aggregate manufacturing has been 4.2 and 1.14 during the period of consolidation of economic reforms 2001-13 although it has been negative during 1980-91. It indicates that impressive enhancement in labour utilization performance has taken place in Indian manufacturing at aggregate level on account of industrial reforms since 1991.

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