

Working Paper No. 236

**The Employment Potential of Labor
Intensive Industries in India's Organized
Manufacturing**

**Deb Kusum Das
Deepika Wadhwa
Gunajit Kalita**

June 2009



INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS

Table of Contents

Foreword.....	i
Abstract.....	ii
1. Introduction.....	1
2. Literature Review.....	2
3. Databases, Time Period and Methodology	4
4. Empirical Findings.....	5
4.1 Identification of Labor Intensive Industries of Organized Manufacturing Sector.....	5
4.2 The Performance of Labor Intensive Industries.....	9
4.2.1 <i>Output Growth, Employment Growth and Employment Elasticity</i>	9
4.2.2 <i>Labor Productivity, Capital Productivity and Capital Intensity</i>	14
4.2.3 <i>Real Wage Growth & Income Share of Labor</i>	17
5. Conclusion	20
References.....	22

List of Tables

Table 1: Labor Intensive Industries in Organized Manufacturing: 1990-91 to 2003-04.....	5
Table 2: Employment Share and Real Gross Value Added Growth of Labor Intensive Industries (1990-91 to 2003-04).....	8
Table 3: Real Gross Value Added Growth of Labor Intensive Industries.....	10
Table 4: Employment Growth and Elasticity in Different Periods: Labor Intensive Industries of Organized Manufacturing	11
Table 5: Change in Capital Intensity, Capital Productivity and Labor Productivity of Labor Intensive Industries.....	14
Table 6: Labor Productivity & Capital Productivity Growth in different periods: Labor Intensive Industries of Organized Manufacturing.....	16
Table 7: Real Wage Growth in Different Periods: Labor Intensive Industries of Organized Manufacturing	18

List of Charts

Chart 1: Labor Intensity (L/K) of All Labor Intensive Industries: 1990-91 to 2003-04.....	7
Chart 2: Employment Elasticity in All Labor Intensive Industries.....	13
Chart 3: Capital Intensity, Capital Productivity and Labor Productivity.....	15
Chart 4: Income Share of Labor in Value Added = Real Wages /Labor Productivity	19

List of Appendices

Appendix 1: Construction of Real Capital Stock.....	24
Appendix 2: Labor Intensive Industries of Indian Organized manufacturing: Product Profile	25

Foreword

This working paper is based on the first part of the research project “*Labor Intensity and Employment Potential of Indian Manufacturing*” sponsored by the National Manufacturing Competitiveness Council, Government of India. The paper attempts to identify and examine the labor intensive industries of organized manufacturing sector in India in order to understand their employment generation potential. By focusing on industries with high labor intensity, it addresses issues such as: (1) has the labor intensity changed in the identified sectors over the years to more capital intensive way of production 2) what has happened to the employment growth in these sectors, and (3) has there been any linkages between employment, labor productivity and real wages growth in the labor intensive sectors.

An important finding of the study is that labor intensity has declined in majority of industries during the selected time period. The study also finds that in most industries employment growth improved in the second half of 1990s and worsened in the early years of 2000s, and that real wages have risen continuously since the first half of 1990s and essentially reflect a rise in labor productivity. The study in my view will contribute to the empirical evidence in this important policy related area, which has also been on the primary focus of research at ICRIER



(Rajiv Kumar)
Director & Chief Executive

June 17, 2009

Abstract

This paper attempts to identify and examine labor intensive industries in the organized manufacturing sector in India in order to understand their employment generation potential. Using the data from the *Annual Survey of Industries* (Government of India, various issues), the labor intensity for 97 industries at the 4-digit disaggregate level was computed for the period 1990-91 to 2003-04. The study identifies 31 industries as ‘labor intensive industries’ within India’s organized manufacturing sector. The study finds that labor intensity has declined not only for capital intensive industries but also for labor intensive industries during the selected time period. The increase in output failed to generate enough employment growth resulting in a significant decline in employment elasticity. The paper briefly highlights the plausible factors that could have had an impact on labor intensity as well as on the performance of the organized manufacturing sector over the study period.

Key words: *Labor Intensity, Employment Growth, Labor Productivity, Capital Productivity, Organized Manufacturing.*

JEL classification: *E24, J24, J31, D24*

The Employment Potential of Labor Intensive Industries in India's Organized Manufacturing

Deb Kusum Das* Deepika Wadhwa Gunajit Kalita*****

1. Introduction

Slow growth of employment has always been a matter of serious concern for policy makers in India. One of the important objectives of India's economic liberalization process was to expand the creation of new employment opportunities for meeting the backlog on the employment front and also for absorbing new additions to the labor force. It was anticipated that trade liberalization would lead to a shift in India's industrial structure towards more labor intensive industries and this would encourage more labor intensive methods of production in which India was expected to have a comparative advantage.

However, the Indian economy has not undergone any major structural changes as far as employment generation is concerned. Even today, agriculture accounts for a bulk of the total employment in the economy, and industry is still the smallest employer accounting for just 18 per cent of the total employment. The organized manufacturing sector in India, despite its impressive growth rates in the 1980s and 1990s, has not led to any structural transformation away from agriculture to industry as far as expanding employment opportunities is concerned. The contribution of manufacturing as a whole to the Gross Domestic Product (GDP) of the country was still very low at around 16 per cent in 2006-07, which was much below that of other East Asian countries. Also, the share of employment in manufacturing in India was only 13 per cent (2004-05) whereas in China it was 31 per cent and in Malaysia, it was 50 per cent during the same time period. If the Indian manufacturing sector is to perform along the lines of China and other East Asian countries, its share both in GDP and in employment has to increase substantially.

A look at India's manufacturing performance over the last two decades suggests that it has been a period of growth without employment creation, which has also been referred to as 'jobless growth'. The low and stagnating levels of employment in the manufacturing sector, and consequently policy concerns for seeking ways to expand employment opportunities, makes it imperative to focus attention on labor intensive industries which have a stronger potential for employment generation.

*Consultant ICRIER and Reader, Department of Economics, Ramjas College, University of Delhi, ** Deepika Wadhwa, Research Associate, ICRIER and *** Gunajit Kalita, Researcher, ICRIER. This paper is from the project, "Labor Intensity and Employment Potential of Indian Manufacturing" undertaken at ICRIER under a research grant from National Manufacturing Competitiveness Council, Government of India. The authors would like to acknowledge the comments received at various stage of the study by Dr Rajiv Kumar, Shri V Krishnamurthy, Shri Govindrajan, Professor Arup Mitra and Professor Nisha Taneja. We would also like to express our thanks to Dr Meenu Tewari and Professor Pushpa Trivedi for their comments on the project report. The first author would like to acknowledge the comments received from the seminar participants on some aspects of the research project at the University of Dundee, Scotland. The usual disclaimers apply. For comments and feedback dkdas@icrier.res.in, dwadhwa@icrier.res.in, gkalita@icrier.res.in

However, there have been very few studies which have paid specific attention to the question of changes in labor intensity organized manufacturing in the post-reforms era. This paper investigates these issues in depth and fills in the gap in existing literature on labor intensity in the manufacturing sector in India. The paper is organized as follows: Section 2 reviews the literature on employment generation and labor intensity in the manufacturing sector in India. Important data issues along with methodological aspects of computing labor intensity are discussed in Section 3. Section 4 provides a quantitative appraisal of labor intensive sectors in organized manufacturing in India. The final section summarizes the major findings and their implications.

2. Literature Review

The 1980s has often been called the decade of ‘jobless growth’ in Indian manufacturing because the revival in output growth during this period was not accompanied by an adequate generation of employment. The average annual growth of gross value added was nearly 8.7 per cent whereas employment grew at an average annual rate of 0.5 per cent, resulting in an employment elasticity of only 0.06.

Several explanations have been put forward for this positive but very low employment growth in organized manufacturing during 1980-81 to 1989-90. One of these is that labor retrenching had become difficult after the introduction of job security regulations in the late 1970s, and this forced employers to adopt capital intensive production techniques (Fallon and Lucas 1993 as cited in Goldar 2000). According to another view, the slowdown in employment growth resulted from a strategy of capital deepening pursued by firms, an important reason for which was the increase in real cost of labor in the 1980s (Ghose 1994). A study undertaken by the World Bank (1989) also argued that the sharp deceleration in employment growth in the factory sector in the 1980s could be explained by acceleration in product wages, which the study attributed to union-push. Nagaraj (1994) pointed out that the ‘overhang’ of employment that existed in the 1970s was intensively used in the 1980s, thus generating only a few additional employment opportunities in the later decade. However, some economists noted a significant increase in actual hours worked per labor (or man-day per worker) indicating a more intensive use of the workforce in the 1980s, resulting in the slowdown of employment growth.¹

The 1990s witnessed the process of economic reforms in the country, which included significant liberalization of both industrial activities and trade. Many expected this process of economic reforms to boost employment in the manufacturing sector, as greater labor market flexibility and increased orientation towards trade could change the industrial structure in favor of labor intensive industries and labor intensive techniques of production. On the other hand, there were also apprehensions about the adverse implications of such reforms on employment generation in the manufacturing sector on several grounds. The most important of these was that firms in the manufacturing sector faced with greater competition on the one hand and having easier access to foreign technology and imported capital goods on the other, could adopt advanced technology leading to a rise in capital intensity. Also, firms in order to be cost competitive, could be driven towards cutting down employment.

¹ For details, see Papola 1994, Bhalotra 1998.

Goldar (2000) showed that the growth rate in employment in the organized manufacturing sector in India for the period 1990-91 to 1997-98 was 2.69 per cent per annum which was well above the growth rate of 0.53 per cent per annum achieved in the 1980s. He attributed two major reasons for this growth in employment: slowdown in growth of real wages in the 1990s and faster growth of small and medium-sized factories in organized manufacturing, which are more labor intensive as compared to large sized factories. He also highlighted that the increase in employment in the organized manufacturing sector, which took place in the 1990s, was accounted for by private sector factories. However, later Goldar (2004), by including the period 1997-98 to 2002-03 in the analysis, found some contrasting results. He found that employment in organized manufacturing during 1990-91 to 2002-03 grew at a rate of 0.5 per cent per annum whereas employment in organized manufacturing between 1997-98 to 2002-03 was negative at 2.6 per cent per annum.

Nagaraj (2000) argued that faster employment generation in the organized manufacturing sector was due to the investment boom in the decade of 1990s. In his later study, Nagaraj (2004) pointed out that faster employment generation in organized manufacturing was restricted mainly to the first half of the 1990s. As the boom went bust, there was a steep fall in employment in the second half of the 1990s. Relative cost of labor did not seem to matter in employment decisions, as the wage-rental ratio declined secularly. According to him, about 1.1 million workers, or 15 per cent of the workers in the organized manufacturing sector in the country, lost their jobs between 1995-96 and 2000-01.

However, there are very few studies which have paid specific attention to the question of changes in labor intensity in organized manufacturing in the post-reforms era. Chaudhuri (2002) studied the changes in labor intensity for 3-digit groups in the organized manufacturing sector for 1990-91 and 1997-98. He found that labor intensity had progressively gone down from 0.78 in 1990-91 to 0.56 in 1997-98. Umi and Unni (2004), observed a sharp growth in capital intensity (declining labor intensity) in both the organized and unorganized sectors. The positive growth in capital intensity was not accompanied by a rise in capital productivity in both sectors, which again implied a substitution of capital for labor, without any technological up-gradation, across all industry groups at the 2-digit level in both the sectors.

In this backdrop, the main objective of this paper is to identify labor intensive industries in the organized manufacturing sector of India over the period 1990-91 to 2003-04. It also aims to examine possible factors like growth in labor productivity, capital intensity, real product wages, capital productivity and output, which could have influenced labor intensity in the organized manufacturing sector. The paper specifically addresses the following questions:

- *Has there been a shift in the industrial structure in India towards more labor intensive industries in the post-reforms period, which was one of the main expectations of the proponents of economic reforms in the early 1990s?*
- *What has happened to the growth in output and employment of the labor intensive industries and what has been the resultant change in their employment elasticity?*
- *Has there been any increase in real product wages of labor in the labor intensive industries which could have influenced their labor intensity and employment growth?*

- *How have labor productivity, capital productivity, and capital intensity in the labor intensive industries changed in the post-reforms period? What has been their impact on labor intensity and employment growth of these industries?*

3. Databases, Time Period and Methodology

Time frame and industries

In this paper we use the National Industrial Classification (NIC 1998) at a disaggregate 4-digit level in order to assess the labor intensity of the organized manufacturing sector.² The time period chosen for the study is from 1990-91 to 2003-04.

We had to undertake a concordance between NIC 1998 4-digit and NIC 1987 3-digit industries to build a continuous time series at the 4-digit NIC 1998 classification. The 97 (4-digit industries) are spread across the 23 2-digit divisions (15 to 37): manufacture of food and beverages (division 15), manufacture of tobacco products (division 16), manufacture of textiles (division 17), manufacture of wearing apparel (division 18), tanning and dressing of leather (division 19), manufacture of wood and wood products (division 20), manufacture of paper and paper products (division 21), publishing, printing, and reproduction of recorded media (division 22), manufacture of coke, refined petroleum etc. (division 23), manufacture of chemical and chemicals products (division 24), manufacture of rubber and plastics (division 25), manufacture of other non-metallic products (division 26), manufacture of basic metals (division 27), manufacture of fabricated metal products (division 28), manufacture of machinery and equipment (division 29), manufacture of office, accounting, and computer machinery (division 30), manufacture of electrical machinery (division 31), manufacture of radio and television (division 32), manufacture of medical, precision etc. (division 33), manufacture of motor vehicles, trailers, and semi-trailers (division 34), manufacture of other transport equipment (35), manufacture of furniture, manufacturing n.e.c (division 36), and recycling (37). These 23 divisions constitute the entire manufacturing sector in India. We took into consideration all the 150 4-digit industries at the NIC 1998 classification in the organized manufacturing sector. However to build a continuous time series at NIC 1998, we had to merge as well as delete some 4-digit industries resulting in the total number of industries getting reduced to 97. These 97 industries cover the entire spectrum of organized manufacturing in India at the 4-digit level. These 97 4-digit industries belong to the organized manufacturing sector, as documented in the *Annual Survey of Industries* (Central Statistical Organization, Government of India).

Methodological Aspects of Labor Intensity Computation

As mentioned earlier, a major objective of this paper is to identify labor intensive sectors in organized manufacturing in India. Labor intensity is defined as the number of workers per unit of gross fixed capital stock (in real terms). For computing labor intensity for each of the 97 industries, data on total persons engaged was taken to represent the ‘number of workers’, and ‘gross fixed capital stock’ at constant prices was calculated using data on fixed capital

² Organized manufacturing industries comprise those industrial units which are registered as ‘factories’, i.e., they employ 10 or more workers with power or 20 or more workers without power.

and depreciation. The perpetual inventory method was used for calculating the real gross fixed capital (see Appendix 1 for details).

4. Empirical Findings

4.1 Identification of Labor Intensive Industries of Organized Manufacturing Sector

For identifying labor intensive industries, we computed the labor-intensity ratio for the given 97 industries for every year, and for each industry an average labor-intensity ratio was calculated for the period 1990-91 to 2003-04. The average labor-intensity (L/K) ratio for all industries taken together was found to be 0.26. All the industries with average labor-intensity ratio greater than 0.26 were considered as labor intensive industries and all those industries with a ratio less than 0.26 were labeled capital intensive. According to this definition, in our sample of 97 industries, we found 31 industries that were labor intensive and 66 industries that were as capital intensive (A product profile of Labor Intensive Industries in Indian Organized Manufacturing is given in Appendix 2).

The 31 labor intensive industries were identified at the 4-digit level of disaggregation (NIC 1998), drawn from a wide array of manufacturing sectors: food and beverages (15), tobacco products (16), manufacture of textiles (17), manufacture of wearing apparel (18), tanning and processing of leather (19), manufacture of wood and wood products (20), publishing and printing (22), manufacture of non-metallic minerals (26), manufacture of fabricated metal products (28), other transport equipment (35), and manufacture of furniture (36) (The labor intensive industries are given in **Table 1**). During 1990-91 and 2003-04 the average combined Gross Value Added (GVA) share (as percentage of total manufacturing value added) of these 31 industries was 13.8 per cent. The labor intensity for the selected 31 industries was also calculated for 3 sub-periods after economic liberalization: 1990-91 to 1995-96; 1996-97 to 1999-00; and 2000-01 to 2003-04. This shows a progressive decline through the different time periods across all the sectors. In some sectors, like tobacco products, leather luggage, wearing apparel, sports goods, wood, fur products, and metal products, the decline is over 50 per cent.

Table 1: Labor Intensive Industries in Organized Manufacturing: 1990-91 to 2003-04

NIC98	Industry	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
1600	Manufacture of tobacco products	3.69	2.32	1.57	2.69
1912	Manufacture of luggage, handbags, and the like, saddlery and harness	1.27	0.89	0.58	0.96
1810	Manufacture of wearing apparel, except fur apparel	1.12	0.73	0.57	0.85
1544 + 1549	Manufacture of macaroni, noodles, and similar farinaceous products + Manufacture of other food products n.e.c	0.77	0.53	0.45	0.61
3693	Manufacture of sports goods	0.84	0.47	0.35	0.6

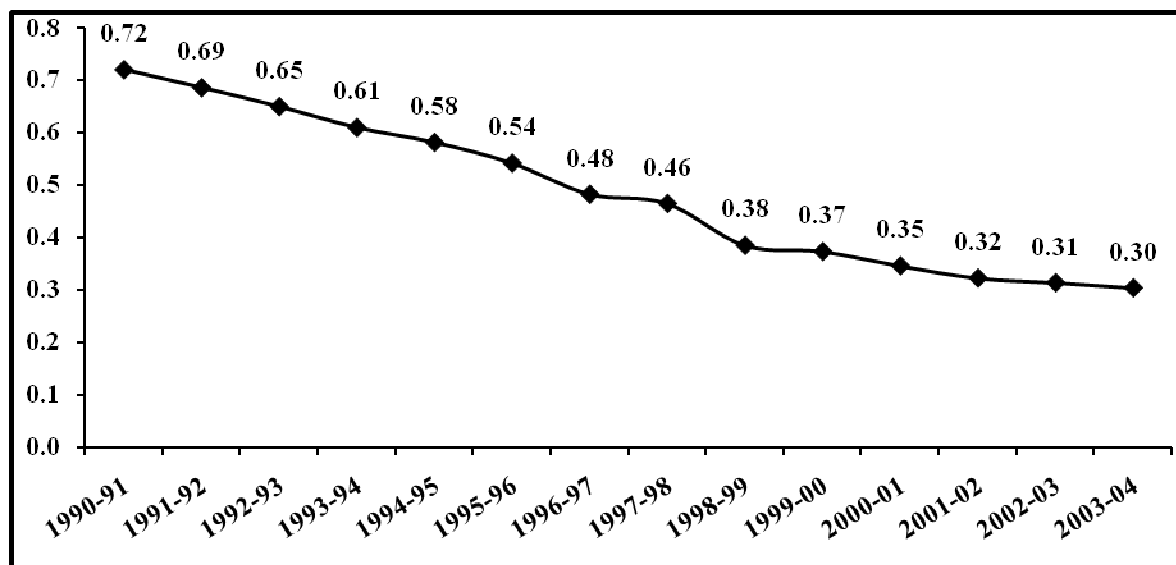
NIC98	Industry	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
2010	Saw milling and planing of wood	0.71	0.65	0.38	0.6
2023	Manufacturing of wooden containers	0.63	0.45	0.36	0.5
1730	Manufacture of knitted and crocheted fabrics	0.66	0.35	0.35	0.48
3691	Manufacture of jewellery and related articles	0.57	0.39	0.31	0.44
3592	Manufacture of bicycles and invalid carriages	0.56	0.34	0.28	0.42
2692 + 2693	Manufacture of refractory ceramic products + Manufacture of structural non-refractory clay & ceramic products	0.55	0.39	0.25	0.42
1541	Manufacture of bakery products	0.53	0.37	0.26	0.41
2022	Manufacture of builders' carpentry and joinery	0.52	0.27	0.24	0.37
2811	Manufacture of structural metal products	0.51	0.3	0.19	0.36
1820	Dressing and dyeing of fur; manufacture of articles of fur	0.51	0.29	0.22	0.36
3694 + 3699	Manufacture of games and toys + Other manufacturing n.e.c.	0.44	0.36	0.23	0.36
2222	Service activities related to printing	0.39	0.32	0.28	0.34
1920	Manufacture of footwear.	0.46	0.28	0.23	0.34
1723	Manufacture of cordage, rope, twine and netting	0.38	0.3	0.27	0.33
1721	Manufacture of made-up textile articles, except apparel	0.35	0.3	0.3	0.32
2919 + 2923 + 2927 + 2929	Manufacture of other general purpose machinery + Manufacture of machinery for metallurgy + Manufacture of weapons and ammunition + Manufacture of other special purpose machinery	0.3	0.33	0.34	0.32
2899	Manufacture of other fabricated metal products	0.46	0.29	0.15	0.32
2021	Manufacture of veneer sheets; manufacture of plywood, laminating board, particle board & other panels & boards	0.4	0.27	0.22	0.31
2211 + 2219	Publishing of books, brochures, musical books and other publications + Other publishing	0.51	0.25	0.07	0.31
2696	Cutting, shaping and finishing of stone	0.36	0.22	0.31	0.31

NIC98	Industry	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
2102	Manufacture of corrugated paper & paperboard & of containers of paper	0.37	0.27	0.22	0.3
1533	Manufacture of prepared animal feeds	0.34	0.3	0.21	0.29
3610	Manufacture of furniture	0.34	0.29	0.19	0.29
1712	Finishing of textile excluding khadi/handloom	0.36	0.25	0.2	0.28
2109	Manufacture of other articles of paper and paperboard	0.33	0.22	0.22	0.27
2519	Manufacture of other rubber products	0.33	0.24	0.17	0.26
	Average Labor Intensity (Combine GVA Share)	0.63 (12.9)	0.43 (13.3)	0.32 (15.9)	0.48 (12.9)

Source: Calculation based on Annual Survey of Industries, various issues.

Chart 1 highlights the yearly average labor-intensity³ (L/K) for the 31 labor intensive industries from 1990-91 to 2003-04. As we can see labor intensity ratio fell continuously from 0.72 in 1990-91 to 0.30 in 2003-04.

Chart 1: Labor Intensity (L/K) of All Labor Intensive Industries: 1990-91 to 2003-04



Source-Based on Author's calculation using data from Annual Survey of Industries

Thus, our results suggest that there has not been any shift in the industrial structure towards labor intensive industries in the post-reforms period; rather the relative importance of labor

³ Simple average of the whole 31 industries on yearly basis

intensive industries in output has gone down. This is contrary to what the advocates of reforms and trade openness had suggested.

While we observed a continuous decline in labor intensity across all labor intensive industries, it was also important to find out whether the decline in labor intensity was experienced by those industries with a higher employment share or otherwise. Another important factor which could influence the employment generation potential of these labor intensive industries is real GVA growth. In terms of the combined GVA share of these labor intensive industries in the total manufacturing value added, we observe an increase in their share from 12.94 per cent in 1990-91 to 15.90 per cent in 2000-01 but this share declined to 12.91 per cent in 2003-04.

Table 2 classifies the 31 labor intensive industries in four categories of employment share and compares them with their real GVA growth and labor intensity for the period 1990-91 to 2003-04. We find that industries like manufacture of tobacco products (1600), which had the highest labor intensity (2.69) during 1990-91 to 2003-04, experienced a more than 50 per cent fall in the L/K ratio and is among the industries with a high employment share. The impact of a declining L/K ratio in an industry with high employment would be more as compared to an industry with a low employment share. For instance, in manufacture of sports goods, which has high labor intensity (0.60) and very high GVA growth (20.7 per cent per annum), the impact of declining labor intensity would be less because of its very low employment share (0.07 per cent) in India's total organized manufacturing.

Table 2: Employment Share and Real Gross Value Added Growth of Labor Intensive Industries (1990-91 to 2003-04)

(Percent per annum)

	Industry Code	L/K	Employment Share	Real GVA Growth
High Employment Share (> 0.75)	1600	2.69	6.22	7.09
	1544 + 1549	0.61	4.12	-0.42
	1810	0.85	3.30	11.42
	2692 + 2693	0.42	2.06	6.56
	2919 + 2923 + 2927 + 2929	0.32	1.93	6.07
	1712	0.28	1.74	15.15
	2222	0.34	1.03	9.16
	1730	0.48	0.80	16.20
Medium Employment Share (0.75-0.50)	2696	0.31	0.75	15.27
	2519	0.26	0.64	6.77
	2811	0.36	0.63	5.77
	2899	0.32	0.59	30.60
	2211 + 2219	0.31	0.53	-6.95
	3691	0.44	0.53	47.07
	3592	0.42	0.52	7.02

	Industry Code	L/K	Employment Share	Real GVA Growth
Low Employment Share (0.50-0.20)	1541	0.41	0.49	4.30
	2102	0.30	0.47	13.33
	2021	0.31	0.42	5.97
	3694 + 3699	0.36	0.42	20.16
	3610	0.29	0.28	16.73
	1723	0.33	0.26	5.76
	1533	0.29	0.23	37.84
	2010	0.60	0.21	-2.44
Very Low Employment Share (0.20-0.0)	1721	0.32	0.19	20.44
	1912	0.96	0.15	21.46
	2109	0.27	0.15	17.44
	3693	0.60	0.07	20.72
	2022	0.37	0.04	29.07
	1920	0.34	0.04	3.54
	2023	0.50	0.04	5.18
	1820	0.36	0.02	42.57

Source: Calculation based on Annual Survey of Industries, various issues

4.2 The Performance of Labor Intensive Industries

This section considers different yardsticks like output growth, employment growth, employment elasticity, labor productivity growth, capital intensity, capital productivity, and real wages growth over the study period which could have influenced the performance of the 31 labor intensive industries.

4.2.1 Output Growth, Employment Growth and Employment Elasticity

We considered gross value added (at 1993-94 prices) as a measure of output and calculated its growth rates over the period 1990-91 to 2003-04, as well as during the sub-periods 1990-91 to 1995-96; 1996-97 to 1999-00; and 2000-01 to 2003-04. Likewise, we also calculated the average annual growth in employment for the same period by considering the total persons engaged as a measure of employment in the different industry groups.

Real Gross Value Added Growth

In terms of value added growth, all the 31 labor intensive manufacturing industries seem to have performed well, with 16 of them registering double digit growth rates for the entire period. In the first sub-period of 1990-91 to 1995-96, 18 labor intensive industries showed double-digit growth. However, in the recent sub-period, average GVA growth declined to just 2.36 per cent with only 7 industries witnessing double digit growth. Overall, output growth in these industries accelerated in the post-reforms period (**Table 3**).

Table 3: Real Gross Value Added Growth of Labor Intensive Industries**(In percent)**

Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
1600	3.04	17.56	1.67	7.09
1912	48.08	-1.61	11.23	21.46
1810	27.30	8.52	-5.55	11.42
1544 + 1549	2.08	0.91	-4.89	-0.42
3693	39.24	11.54	6.75	20.72
2010	-14.67	3.62	6.79	-2.44
2023	4.84	12.17	-1.37	5.18
1730	17.67	21.77	8.78	16.20
3691	87.45	37.76	5.90	47.07
3592	8.20	5.72	6.85	7.02
2692 + 2693	8.18	8.26	2.85	6.56
1541	4.42	6.02	2.43	4.30
2022	-2.48	56.73	40.84	29.07
2811	10.43	-2.55	8.27	5.77
1820	50.17	-15.86	91.51	42.57
3694 + 3699	21.98	34.77	3.28	20.16
2222	19.91	8.44	-3.55	9.16
1920	-0.42	10.25	1.79	3.54
1723	3.85	17.23	-3.33	5.76
1721	18.78	33.42	9.54	20.44
2919 + 2923 + 2927 + 2929	14.84	3.19	-2.01	6.07
2899	15.54	71.78	8.23	30.60
2021	11.65	-5.99	10.82	5.97
2211 + 2219	6.55	-26.83	-3.94	-6.95
2696	18.53	8.68	17.79	15.27
2102	1.60	15.93	25.40	13.33
1533	18.25	12.13	88.06	37.84
3610	24.42	15.29	8.58	16.73
1712	11.66	36.25	-1.60	15.15
2109	25.72	28.18	-3.65	17.44
2519	9.86	12.06	-2.39	6.77
Weighted Average	10.22	12.88	2.36	8.94

Source: Annual Survey of Industries, various years

Employment Growth

Table 4 lists the employment growth of selected labor intensive industries for the period 1990-2003 and for its sub-periods. The weighted⁴ average rate of growth of employment in

⁴ The weighted average is calculated by taking average employment as the weight during the respective period in each industry.

all the labor intensive industries for the entire period of 1990-91 to 2003-04 is 4.1 per cent per annum. The employment growth during the first period of 1990-91 to 1995-96 was 5.49 per cent per annum. It is important to note here that a majority of the industries, i.e., 28 out of the 31, registered positive employment growth in this period. The employment growth went down sharply from 5.49 per cent per annum during 1990-91 to 1995-96 to 1.88 per cent per annum for the period 1996-97 to 1999-00.

The dismal performance of the second period could be partly explained by the fact that only 23 industries registered positive employment growth during this period. Also, the employment growth declined sharply in industries like tobacco products, wearing apparel, refractory and non-refractory clay and ceramic products, footwear, publishing, and cutting, shaping, and finishing stone whose employment share in total organized manufacturing has been comparatively large. The best performers during this period who experienced more than a 10 per cent rate of growth in employment were made-up textiles (16.7 per cent p.a.), fur and fur articles (14.5 per cent p.a.), sports goods (13.6 per cent p.a.), knitted and crocheted fabrics (13.2 per cent p.a.), leather goods (12.2 per cent p.a.), jewellery articles (11.4 per cent p.a.), wearing apparel (10.3 per cent p.a.), other fabricated metal products (21.5 per cent p.a.), and plywood laming board (20.2 per cent p.a.). Thus, both employment creation and employment displacement resulted in the overall low employment growth in this period.

The employment situation improved after 2000, with employment growing at 5.2 per cent per annum during 2000-01 to 2003-04. However, we observe a decline in employment growth in 19 industries. The average employment growth for all labor intensive industries improved during this period as compared to the previous period. This was probably because of employment growth in industries whose employment share in total employment was very large like wearing apparel, knitted and crocheted fabrics, jewellery, footwear, and cutting, shaping, and finishing stone.

Table 4: Employment Growth and Elasticity in Different Periods: Labor Intensive Industries of Organized Manufacturing

(Percent per annum)

Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
1600	2.17 (0.71)	0.45 (0.03)	0.36 (0.22)	1.09 (0.15)
1912	19.95 (0.41)	9.39(-5.84)	5.07 (0.45)	12.12 (0.57)
1810	19.64 (0.72)	2.42 (0.28)	6.67(-1.2)	10.35 (0.91)
1544 + 1549	4.5 (2.16)	1.51 (1.65)	0.53 (-0.11)	2.36 (-5.59)
3693	16.22 (0.41)	21.03 (1.82)	3.04 (0.45)	13.65 (0.66)
2010	-1.2 (0.08)	-12.57(-3.47)	-1.56 (-0.23)	-4.81 (1.97)
2023	1.33 (0.28)	3.43 (0.28)	0.08 (-0.06)	1.59 (0.31)
1730	9.72 (0.55)	6.85 (0.31)	23.99 (2.73)	13.23 (0.82)

Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
3691	18.28 (0.21)	4.44 (0.12)	9.97 (1.69)	11.46 (0.24)
3592	4.75 (0.58)	-4.32 (-0.75)	-4.34 (-0.63)	-0.84 (-0.12)
2692 + 2693	-0.97 (-0.12)	-0.77 (-0.09)	2.1 (0.74)	0.03 (0.01)
1541	4.39 (0.99)	1.76 (0.29)	-1.35 (-0.56)	1.81 (0.42)
2022	-0.41 (0.16)	29.05 (0.51)	0.74 (0.02)	9.01 (0.31)
2811	0.46 (0.04)	-6.5 (2.55)	-0.48 (-0.06)	-1.97 (-0.34)
1820	20.1 (0.4)	41.59 (-2.62)	-19.35 (-0.21)	14.57 (0.34)
3694 + 3699	8.29 (0.38)	13.97 (0.4)	-0.97 (-0.3)	7.19 (0.36)
2222	8.18 (0.41)	2.24 (0.27)	-7.12 (2.01)	1.65 (0.18)
1920	3.76 (-8.94)	0.4 (0.04)	3.83 (2.14)	2.75 (0.78)
1723	1.5 (0.39)	20.85 (1.21)	-1.17 (0.35)	6.63 (1.15)
1721	9.69 (0.52)	27.89 (0.83)	14.45 (1.51)	16.76 (0.82)
2919 + 2923 + 2927 + 2929	4.08 (0.27)	-10.52 (-3.3)	2.54 (-1.26)	-0.89 (-0.15)
2899	10.23 (0.66)	50.02 (0.7)	6.93 (0.84)	21.46 (0.7)
2021	6.55 (0.56)	-9.42 (1.57)	1.87 (0.17)	0.2 (0.03)
2211 + 2219	3.85 (0.59)	-28.57 (1.06)	-10.01 (2.54)	-10.39 (1.5)
2696	8.67 (0.47)	-2.9 (-0.33)	57.81 (3.25)	20.23 (1.33)
2102	7.16 (4.48)	6.18 (0.39)	5.12 (0.2)	6.23 (0.47)
1533	11.13 (0.61)	7.53 (0.62)	1.14 (0.01)	6.95 (0.18)
3610	11.84 (0.48)	5.08 (0.33)	1.96 (0.23)	6.72 (0.4)
1712	5.19 (0.44)	8.85 (0.24)	-0.17 (0.1)	4.67 (0.31)
2109	13.9 (0.54)	4.55 (0.16)	5.26 (-1.44)	8.36 (0.48)
2519	5.15 (0.52)	4.29 (0.36)	-0.91 (0.38)	3.02 (0.45)
	5.49 (0.54)	1.88 (0.15)	5.24 (2.22)	4.1 (0.46)

Source: Annual Survey of Industries, various years

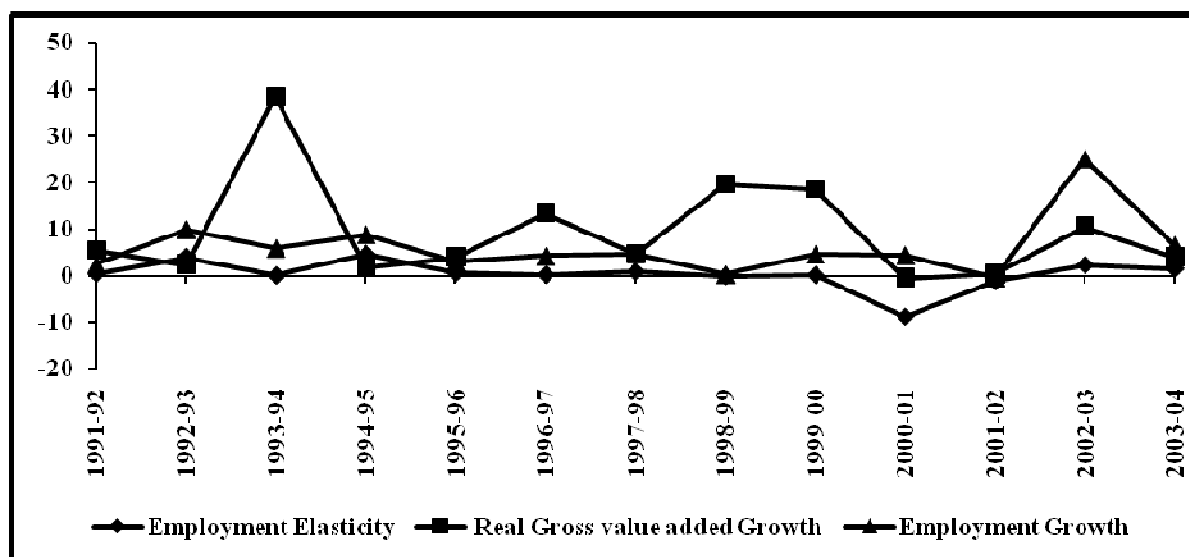
Note: Average here refers to weighted average; Figures in parenthesis are employment elasticity of each industry

Employment Elasticity

Employment elasticity indicates the percentage change in employment in response to percentage change in growth of output of an industry. Employment elasticity here has been calculated as the ratio of weighted average of employment growth rate for the labor intensive industries to weighted average⁵ of the real GVA growth rate for the same group.

While analyzing the yearly trends of employment elasticity (**Chart 2**), we observe that it declined after 1994-95 and reached a negative level in 2000-01. However, we see a substantial improvement after 2000-01 as both employment and real GVA growth accelerated after that. Employment elasticity was still low during this period probably because the high output growth did not translate into employment growth.

Chart 2: Employment Elasticity in All Labor Intensive Industries



Source-Based on Author's calculation using data from Annual Survey of Industries

While analyzing employment elasticity of all labor intensive industries in the three sub-periods (figures in parenthesis in **Table 4**), we find that the aggregate employment elasticity during 1996-97 to 1999-00 declined to 0.15 as compared to 0.54 in the first period. During 1996-97 to 1999-00, the average real GVA grew at a high rate of 12.88 per cent per annum but employment grew only at 1.88 per cent per annum. The recent period has seen a huge jump in employment elasticity to 2.22. The average⁶ real GVA growth was 2.36 per cent per annum and the average employment growth was 5.24 per cent per annum which resulted in the high employment elasticity of 2.22. A majority of the labor intensive industries with a high employment share performed well in terms of employment during this period.

⁵ The weighted average is calculated by taking employment as the weight during respective years for each industry.

⁶ Weighted average.

From **Table 4** we can identify the industries with huge potential for employment generation by looking at their employment elasticity in the recent period. These industries are knitted and crocheted fabrics (2.73), jewellery (1.69), refractory and non-refractory clay and ceramic products (0.74), footwear (2.14), made-up textiles (1.51), other fabricated products (0.84), and publishing (2.54). However, we also need to analyze labor productivity growth, capital productivity, and capital intensity of labor intensive industries in the post-reforms period which could help in explaining employment trends as well as the employment generation potential of these industries.

4.2.2 Labor Productivity, Capital Productivity and Capital Intensity

Labor productivity has been defined as value added per worker. For value added, we considered gross value added at constant prices (1993-94) and for workers, we considered total persons engaged. For labor productivity we computed the average annual growth in labor productivity over the period 1990-91 to 2003-04, and in the sub-periods 1990-91 to 1995-96; 1996-97 to 1999-00; and 2000-01 to 2003-04.

Capital productivity is defined as real gross value added per unit of gross fixed capital stock (in real terms) (GFCS). We have already seen that across all the labor intensive industries the average labor intensity (number of workers per unit of gross fixed capital stock in real terms) declined from 0.72 in 1990-91 to 0.30 in 2003-04. Alternatively, capital intensity up from 1.39 in 1990-91 to 3.30 in 2003-04. Following Chaudhuri (2002), capital intensity can go up with capital remaining constant or declining, if the number of workers goes down. From **Table 5**, it is evident that the average increase in capital intensity has been associated with additions to average gross fixed capital stock per industry. The compounded annual rate of growth (CARG) of average GFCS during 1990-91 to 2003-04 was 13.06 per cent. In such cases, a rise in capital intensity may mean technological up-gradation. It may also mean substitution of capital for labor.

Table 5: Change in Capital Intensity, Capital Productivity and Labor Productivity of Labor Intensive Industries

Years	Capital Intensity	Capital Productivity	Labor Productivity	Gross Fixed Capital Stock⁷ (Rs Lakh)
1990-91	1.39	0.38	0.60	77183.5
1991-92	1.46	0.39	0.63	82455.3
1992-93	1.54	0.34	0.59	92377.2
1993-94	1.64	0.41	0.74	105312.9
1994-95	1.72	0.39	0.75	119313.9
1995-96	1.85	0.36	0.73	134619.3
1996-97	2.07	0.34	0.77	149183.4
1997-98	2.15	0.33	0.83	166984.1
1998-99	2.60	0.33	0.90	178027.0

⁷ Average Gross Fixed Capital Stock per industry

Years	Capital Intensity	Capital Productivity	Labor Productivity	Gross Fixed Capital Stock ⁷ (Rs Lakh)
1999-00	2.68	0.32	0.94	208438.3
2000-01	2.89	0.28	0.93	211482.4
2001-02	3.11	0.27	0.98	226628.2
2002-03	3.19	0.25	0.88	239761.8
2003-04	3.30	0.25	0.91	636660.2
CARG (1990-91 to 2003-04)	7.63	-3.55	3.82	13.06

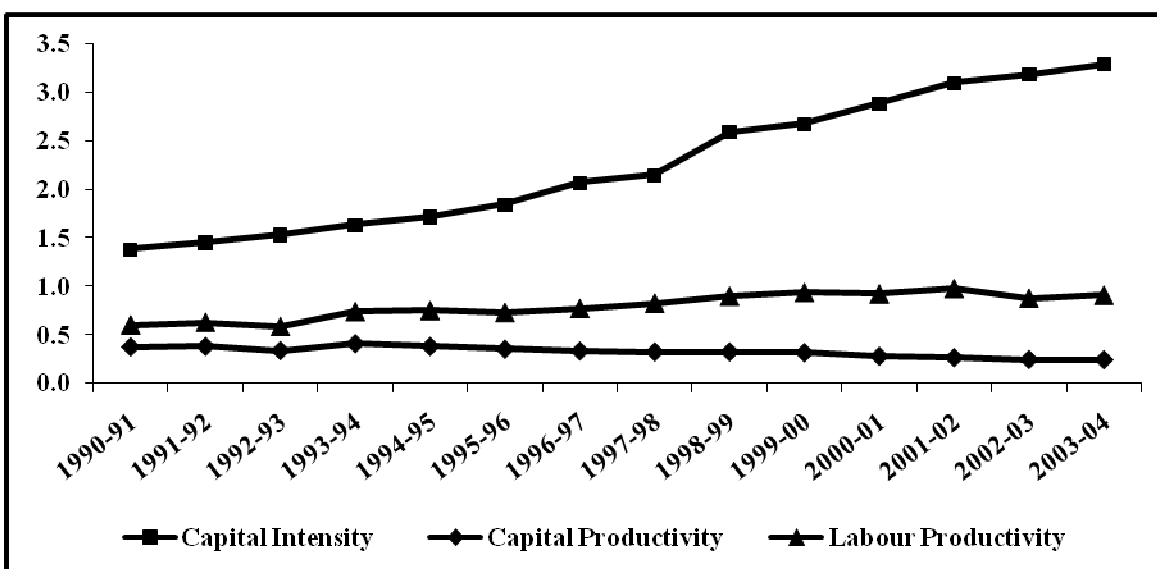
Source: Annual Survey of Industries, various years, authors' calculation

Let us consider the identity:

$$\text{Rate of Growth of Labor Productivity} = \text{Rate of growth of Capital Intensity} + \text{Rate of Growth of Capital Productivity}$$

When capital intensity rises, if capital productivity rises or remains the same, labor productivity also rises. In such cases we can consider production efficiency to have improved and the rise in capital intensity is most likely to have been associated with technological up-gradation. But with a rise in capital intensity, if capital productivity declines substantially, then it is likely that there has merely been a substitution of capital for labor [Ghose 1994].

Chart 3: Capital Intensity, Capital Productivity and Labor Productivity



Source-Based on Author's calculation using data from Annual Survey of Industries

From **Table 5** and **Chart 3**, we observe that capital intensity grew with CARG of 7.63 per cent during this period but since capital productivity went down at CARG of -3.55 per cent, the labor productivity grew at CARG of 3.82 per cent. What these numbers imply is that during 1990-91 to 2003-04 though capital intensity in the labor intensive sectors in Indian manufacturing went up substantially, the declining capital productivity led to substitution of labor by more capital, which eventually restricted the employment potential of these sectors.

Let us now look at individual industries to see trends in growth of both labor as well as capital productivity (figures in parenthesis in Table 6) movement during three different reform periods and see whether there is any relation to observed employment trends across all the labor intensive industries.

Table 6: Labor Productivity & Capital Productivity Growth in different periods: Labor Intensive Industries of Organized Manufacturing

(Percent per annum)

Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
1600	0.94 (-4.34)	18.26 (2.15)	1.42 (-5.74)	6.42(-2.77)
1912	29.96 (20.9)	-5.47 (-18.66)	8.1 (-4.12)	12.33 (1.03)
1810	5.1 (-0.59)	6.27 (-3.02)	-11.02 (-12.79)	0.5(-5.09)
1544 + 1549	-1.11 (-7.24)	-0.45 (-7.42)	-5.01 (-9.5)	-2.11 (-7.99)
3693	23.58 (23.62)	25.22 (-0.69)	-0.69 (-5.86)	16.62 (7.07)
2010	-14.7 (-17.75)	14.78 (-0.24)	7.76 (4.09)	1.28 (-5.64)
2023	0.69 (3.42)	27.02 (2.39)	-0.03 (-7.59)	8.57 (-0.29)
1730	7.62 (-4.62)	15.25 (1.17)	-11.48 (-4.57)	4.09 (-2.82)
3691	58.66 (47.26)	27.85 (27.28)	-4.54 (-12.65)	29.73 (22.68)
3592	2.62 (-2.21)	20.43(-0.34)	6.9 (2.36)	9.41 (-0.23)
2692 + 2693	9.7 (-1.75)	8.06 (-3.85)	0.58 (-3.74)	6.39 (-3.01)
1541	0.16 (-4.45)	6.84 (-3.19)	4.16 (-3.81)	3.45 (-3.86)
2022	-4.89 (-12.06)	-0.3 (-5.19)	33.39 (23.86)	8.3 (1.1)
2811	15.09 (-1.47)	3.93 (-5.93)	8.25 (2.15)	9.55 (-1.73)
1820	17.5 (7.27)	9.5 (-9.23)	102.47 (81.1)	41.19 (24.91)
3694 + 3699	13.73 (3.16)	20.81 (18.17)	5.11 (-4.67)	13.26 (5.37)
2222	11.41 (7.45)	7.88 (8.47)	2.64 (-3.04)	7.63 (4.54)
1920	-4.19 (-4.36)	9.99 (2.46)	-1.94 (-0.98)	0.86 (-1.22)
1723	5.36 (-5.64)	-3.9 (-0.14)	0.09 (-5.52)	0.89 (-3.91)
1721	8.41 (6.89)	3.44 (2.99)	-2.82 (1.6)	3.43 (4.06)
2919 + 2923 + 2927 + 2929	10.27 (4.32)	21.55 (-5.49)	-4.53 (-5.37)	9.19 (-1.68)
2899	5.33 (1.82)	5.97 (24.23)	1.16 (-3.25)	4.24 (7.16)
2021	6.06 (-0.25)	3.76 (-8.82)	9.06 (2.5)	6.28 (-2.04)
2211 + 2219	2.68 (-0.08)	11.93 (-26.96)	6.92 (-7.33)	6.83 (-10.58)
2696	9.48 (-3.99)	11.8 (-2.21)	12.94 (14.05)	11.26 (2.11)
2102	-5.29 (-8.15)	9.15 (0.44)	14.65 (15.12)	5.29 (1.66)

Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
1533	2.65 (1.56)	-3.37 (-0.92)	82.15 (68.05)	25.26 (21.26)
3610	13.33 (13.02)	12.87 (9.97)	4.74 (-4.53)	10.54 (6.68)
1712	4.61 (-1.41)	26.17 (12.02)	-1.6 (-2.74)	9.33 (2.32)
2109	11.75 (6.12)	21.45 (24.89)	-5.78 (-3.47)	9.34 (8.94)
2519	4.31 (-0.17)	7.86 (1.85)	-3.77 (-8.24)	2.92 (-2.03)
Weighted Average	4.55 (-1.83)	11.78 (-0.05)	-0.72 (-4.4)	5.39(-2.01)

Source: Annual Survey of Industries, various years, author calculation

Note: Figures in parenthesis corresponds to capital productivity growth

From **Table 6**, it can be observed that fall in capital productivity across all the industries also pulled down labor productivity and this trend is observed in industries which are highly labor intensive (for example, tobacco products, leather goods, apparel, and food items) (see **Table 1**). The industries which experienced an increase in capital intensity over the study period also witnessed a decline in their capital productivity. The possible explanation for this trend could be that with import liberalization, the availability of capital and new technology became easier and cheaper, which induced domestic manufacturers to install extra capacity to maintain both scale and price competitiveness. Since these new technologies, which are mostly adopted from the developed countries, are by nature labor saving, this led to a shift towards more capital intensive ways of production. Also, in a developing country like India, manufacturers always have resource constraints; therefore, increasingly using an input which is becoming less productive over the years⁸ would automatically have a negative effect on other inputs, which in this case is labor. Moreover, the factor input abundant in India is unskilled labor and the scarcity of a skilled workforce to work on the new installed sophisticated technologies could perhaps be another reason for falling capital productivity.

4.2.3 Real Wage Growth & Income Share of Labor

As mentioned earlier, growth of output in an industry could lead to employment growth as a result of capacity expansion. The output growth could also result in increase in workers' wages if this growth is because of rising capital intensity. However, we found that rising output growth in labor intensive industries has not translated into an increase in employment. Here we analyze the real wages of workers in labor intensive industries as they could influence employment growth.

For calculating the growth in real wages by industry groups, one can consider either the real product wages (nominal wages deflated by the output price index) or real wages (nominal wages deflated by the consumer price index). We considered real product wages as these have implications for employment growth. We calculated nominal wages by dividing total emoluments by total persons engaged and got a figure for nominal income per person. By deflating this series of nominal income per person by the output price index we arrived at real

⁸ As observed with declining capital productivity.

product wages by industry groups. We calculated the growth in average annual real wages for the period 1990-91 to 2003-04 as well as for the sub-periods 1990-91 to 1995-96; 1996-97 to 1999-00; and 2000-01 to 2003-04.

Let us now examine the trends of real wages (real product wages) in all the labor intensive industries in organized manufacturing (**Table 7**). The yearly weighted average rate of growth of real wages for the entire period of 1990-91 to 2003-04 was 2.73 per cent. By analyzing the trends in growth in real wages in the different sub-periods, we find that growth in real wages increased substantially during 1996-97 to 1999-00 but has come down in the recent past.

Table 7: Real Wage Growth in Different Periods: Labor Intensive Industries of Organized Manufacturing

(Percent per annum)

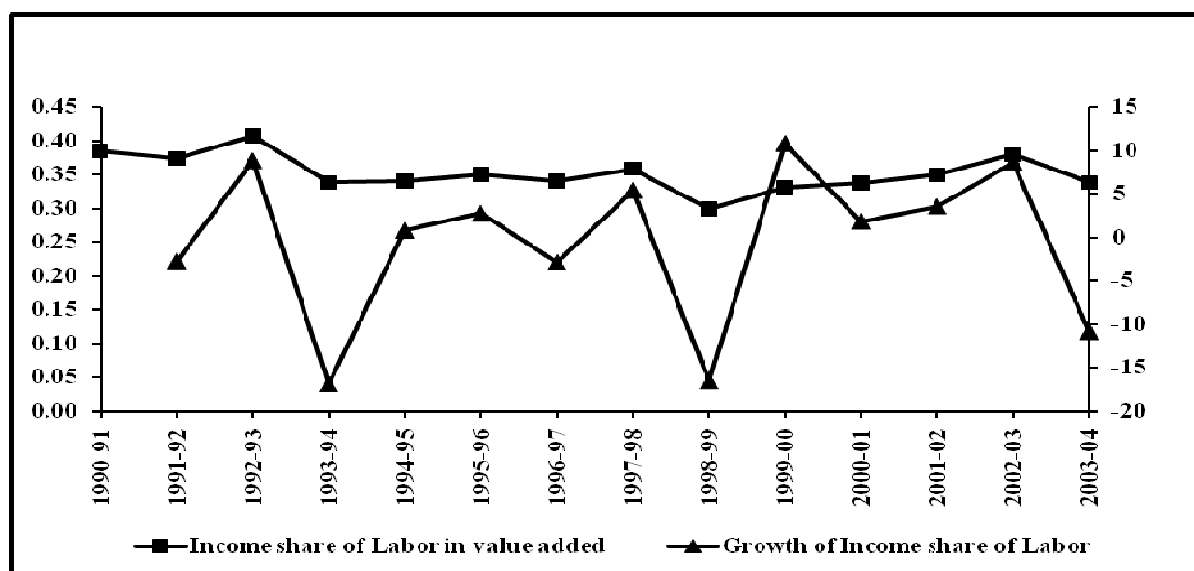
Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
1600	0.55	1.2	0.57	0.76
1912	9.4	5.4	11.52	8.82
1810	3.13	7.56	0.09	3.56
1544 + 1549	1.66	0.17	3.33	1.71
3693	3.33	-6.07	10.44	2.63
2010	-10.1	2.15	6.8	-1.13
2023	-5.06	-7.3	11.35	-0.7
1730	-1.12	17.71	-1.97	4.41
3691	7.22	7.44	8.03	7.54
3592	4.08	7.74	1.67	4.46
2692 + 2693	2.09	2.91	9.2	4.53
1541	-1.33	-1.73	7.16	1.16
2022	0.96	-1.95	9.63	2.73
2811	-2.24	5.28	-2.23	0.07
1820	14.94	-4.46	21.66	11.04
3694 + 3699	10.63	14.43	8.04	11
2222	7.57	8.93	25.19	13.41
1920	-0.82	0.59	5.4	1.53
1723	0.29	0.9	-0.28	0.3
1721	2.58	1.68	-0.31	1.42
2919 + 2923 + 2927 + 2929	3.7	9.41	-2.98	3.4
2899	4.74	5.38	-0.97	3.18
2021	5.8	-6.06	8.47	2.97
2211 + 2219	5.26	0.33	-8.55	-0.51
2696	4.86	12.34	-0.3	5.57
2102	-2.21	5.44	2.41	1.57
1533	1.46	-1.02	4.88	1.75

Industry Code	1990-91 to 1995-96	1996-97 to 1999-00	2000-01 to 2003-04	1990-91 to 2003-04
3610	8.89	-8.88	8.25	3.23
1712	0.57	15.61	1.41	5.46
2109	4.56	18.48	-0.37	7.33
2519	0.44	7.11	-4.18	1.07
Weighted Average	1.79	4.68	1.97	2.73

Source: Annual Survey of Industries, various years, author calculation

The movement in the growth of real wages could be explained by the movement of labor productivity or by the ratio of wages to labor productivity which equals income share of labor in value added or both (Goldar 2003). If we observe the movement of aggregate labor productivity growth of all the labor intensive industries and real wages, the second phase of reforms from 1996-97 to 2003-04, had very high labor productivity growth which was more than the growth of real wages. But decreasing employment growth in the same period is paradoxical if we consider the theoretical argument that increase in labor productivity and growth in real wages would lead to an increase in employment in an industry. Thus the explanation lies somewhere outside the framework of the standard theoretical argument. We observe that over the study period the income share of labor in value added went down till 1998-99 and after rising in subsequent years it fell again in 2003-04 (Chart 4).

Chart 4: Income Share of Labor in Value Added = Real Wages /Labor Productivity
(In percent)



Source-Based on Author's calculation using data from Annual Survey of Industries
Note: Left hand scale is for income share and right hand is for rate of growth

Thus, from this analysis we find that during the study period the selected labor intensive industries registered positive output growth. However, this growth was not commensurate with employment growth, resulting in low employment elasticity of labor intensive industries. Labor productivity increased consistently till 2000. However, we observe a fall in labor productivity in the third sub-period. The decline in capital productivity across all the industries could have had a negative effect on the growth in labor productivity and may have restricted it in achieving its full potential, which can be explained by the scarcity of a skilled workforce. Likewise growth in real wages after accelerating till 2000, registered a negative growth rate in the third phase of the study period. The income share of labor in total value added expressed as the ratio of real wages upon labor productivity also shows a declining trend.

5. Conclusion

The main objective of this paper was to analyze whether industrial deregulation and trade liberalization has led to a shift in India's industrial structure towards more labor intensive industries. Contrary to what the advocates of reforms and trade openness had suggested, the experience of one and a half decades starting from the early 1990s shows that the relative importance of labor intensive industries in output has gone down. We find a continuous decline in labor intensity across all the labor intensive industries. Labor-intensity ratio for the selected industries declined from 0.72 in 1990-91 to 0.30 in 2003-04; and the labor-intensity ratio declined not only for capital intensive industries but for labor intensive industries as well in the post-reforms period. The possible explanation for the observed decline in labor-intensity (L/K ratio) across all the industries - specifically the labor intensive industries in organized manufacturing - could be that with import liberalization in the early 1990s, access to capital and new technologies became easier and cheaper for developing countries like India. And these new technologies, which have been adopted from developed countries, are by nature labor saving. With increasing competition both in domestic and international markets, Indian manufacturers have installed new sophisticated technologies in their production processes to compete in terms of prices as well as in scale. However, in the absence of a skilled workforce, increasing capital intensity has shown a decline in capital productivity. This can have serious implications for employment since capital is substituting only labor. This seems very plausible when we take into account the fact that manufacturers in a developing country like India always face resource constraints in terms of production cost allocations for different factor inputs.

Our analysis of the performance of labor intensive industries shows that during the study period the selected labor intensive industries registered positive output growth. However, this growth could not commensurate with employment growth thereby resulting in low employment elasticity of labor intensive industries. Even labor productivity, which increased consistently till 2000, observed a fall in the third sub-period possibly due to decline in capital productivity during this period across all the industries. Likewise growth in real wages after accelerating till 2000, registered a negative growth rate in the third phase of the study period. The income share of labor in total value added expressed as the ratio of real wages upon labor productivity also shows a declining trend. Thus, labor intensive industries despite

performing well in the first phase of reforms could not sustain their performance and presented a dismal picture in the third phase.

Overall, the organized manufacturing sector in India despite respectable growth following the reforms initiated in the 1990s has not been able to pull out workers from agriculture and allied activities to the labor intensive sectors. This calls not only for an examination of the possible deterrents in realizing the employment potential of labor intensive industries at the industry level but also at the enterprise level. Thus, for a policy prescription, it is also important to understand the issue of declining labor intensity in organized manufacturing and its consequences for the potential of employment generation through a primary survey of some of these labor intensive enterprises.

References

- Annual Survey of Industries, Summary Results for Factory Sector* (various issues), Central Statistical Organization, Government of India.
- Bhalotra, Sonia R. 1998. "The Puzzle of Jobless Growth in Indian Manufacturing." *Oxford Bulletin of Economics and Statistics* 60, no.1: 5-32.
- Chaudhuri, Sudip. 2002. "Economic Reforms and Industrial Structure in India." *Economic and Political Weekly* 37, no. 02: 155- 162.
- Ghose, Ajit K. 1994. "Employment in Organized Manufacturing in India." *Indian Journal of Labor Economics* 37, no. 2: 141- 62.
- Goldar, Bishwanath. 2004. "Trade Liberalisation and Real Wages in Organized Manufacturing Industries in India." In *Economic Policies and the Emerging Scenario: Challenges to Government and Industry*, ed. Ajit Karnik and L. G. Burange. Mumbai: Himalaya Publishing House.
- Goldar, Bishwanath and Anita Kumari. 2003. "Import Liberalization and Productivity Growth in Indian Manufacturing Industries in the 1990s." *The Developing Economies* 41, no. 4: 436-60.
- Goldar, Bishwanath. 2000. "Employment Growth in Organized Manufacturing in India." *Economic and Political Weekly* 35, no. 14: 1191- 1195.
- Nagaraj, R. 2004. "Fall in Organized Manufacturing Employment- A Brief Note." *Economic and Political Weekly* 39, no. 30: 3387- 3390.
- _____ 2000. "Organized Manufacturing Employment." *Economic and Political Weekly* 35, no. 38: 3445- 3448
- _____ 1994. "Employment and Wages in Manufacturing Industries: Trends, Hypothesis and Evidence." *Economic and Political Weekly* 29, no. 4: 177-186.
- Papola, T S. 1994. "Structural Adjustment, Labor Market Flexibility and Employment." *Indian Journal of Labor Economics* 37, no. 1: 3-16.
- Tendulkar S D 2000. "Employment Growth in Factory Manufacturing Sector during pre and post Reform periods", paper presented at Conference to honor Professor K. L. Krishna on the theme 'Industrialisation in a Reforming Economy: A Quantitative Assessment', Delhi School of Economics, Delhi, December 20-22, 2000

Uma Rani and Jeemol Unni. 2004. "Unorganized and Organized Manufacturing in India: Potential for Employment Generating Growth." *Economic and Political Weekly* 39, no. 41: 4568–4580.

National Industrial Classification: 2003-04, Central Statistical Organization, Government of India

National Account Statistics (various issues), Central Statistical Organization, Government of India

World Bank. 1989. *India: Poverty, Employment and Social Service: A World Bank Country Study*, World Bank, Washington, DC.

Appendices

Appendix 1: Construction of Real Capital Stock

To calculate real capital stock, we needed an estimate of benchmark fixed capital stock, a time series on gross investment and a capital goods price series. The benchmark capital stock is calculated by applying the gross-net ratios obtained from the RBI Bulletin for the year 1973-74 to the net fixed capital stock available from the Annual Survey of Industries for that year. The benchmark real capital stock is arrived at by deflating it with the average capital goods price for the year 1964-65 to 1973-74. The time series on gross investment is arrived at as the sum of net fixed capital as well as depreciation, available on a yearly basis from the database. To arrive at the series of real gross investment, we deflate the yearly gross investment series so constructed by the capital goods price deflator. The capital goods price deflator is constructed as a weighted average of two components- *construction* (as a proxy for structures) and *machinery & equipment* (as a proxy for equipments). The implicit price deflator for investment in construction and machinery & equipment is used to deflate the nominal gross investment series. The deflator is composed of ratio of current gross capital formation by type of assets to constant gross capital formation by type of assets. The industry specific shares of construction and plant & machinery in the total is used as weights. These weights were for the year 1983-84. Though ASI has published weights for the years 1989-90 and 1993-94 as well, we didn't find any significant difference in these weights and hence retained 1983-84 for its wider coverage. The annual rate of discarding of capital stock has been assumed to be 2 percent.

Appendix 2: Labor Intensive Industries of Indian Organized manufacturing: Product Profile

NIC 1998	Industry Description	Products
1600	Manufacture of tobacco products	Tobacco products and products of tobacco substitutes- Cigarette Tobacco, cigars, pipe tobacco, chewing tobacco, snuff
1912	Manufacture of luggage, handbags, and the like, saddlery and harness	Luggage, hadbags and likes of leather, composition leather or any other material such as plastic sheeting, textile materials, vulcanized fibre or paper boards, saddlery and harness, nonmetallic watch straps, driving belts, packings
1810	Manufacture of wearing apparel, except fur apparel	Wearing apparel made of leather or composition leather, workwear, outerwear made of woven, knitted or crocheted fabric, nonwovens , coats, suits, ensembles, jackets, trousers, skirts, underwear and nightwear (woven, knitted or crocheted fabric lace), shirts, T shirts, Underpants, briefs, pyjamas, nightdresses, dressing gowns, blouses, slips, brassieres, corsets, babies garments, tracksuits, ski suits, swimwears, hats and caps, other accessories(gloves, belts, shawls, ties, cravats, hairnets)
1544 + 1549	Manufacture of macaroni, noodles, conscious and similar farinaceous products + Manufacture of other food products n.e.c.	Pasta such as macaroni, noodles, couscous, canned or frozen pasta
3693	Manufacture of sports goods	Hard, soft, inflatable balls; rackets, clubs and bats; skis, bindings and poles, sailboards, requisites for sport fishing, hunting, mountain climbing, leather sport gloves, sports headgears, bows and crossbows, gymnasium as well as fitness centre or athletic equipments
2010	Saw milling and planing of wood	Sawing, machining and planing of wood; slicing, peeling and chipping logs; wooden railway sleepers; unassembled wooden floorings; wood wool, wood flour, chips and particles, drying of wood, chemical treatment of wood with preservatives or other materials
2023	Manufacturing of wooden containers	packing cases, boxes, crates, drums and similar packings of wood; pallets, box pallets and load boards of wood; barrels, vats, tubs and other coopers' product of wood; wooden cable drums
1730	Manufacture of knitted and	pile and terry fabrics; net and window

NIC 1998	Industry Description	Products
	crocheted fabrics and articles	furnishing type fabrics, hosiery (socks, tights and pantyhose), pullovers, cardigans, jerseys, waistcoats and similar articles
3691	Manufacture of jewellery and related articles	coins; worked pearls; precious and semiprecious stones, diamonds, manufacture of jewellery of precious metals or base metals clad with precious metals; manufacture of goldsmiths article of precious metals (dinner ware, flatware, hollowware, toilet articles, office or desk articles, articles for religious use), technical or laboratory articles of precious metals
3592	Manufacture of bicycles and invalid carriages	non motorized bicycles; parts and accessories of bicycles, invalid carriages with or without motors, parts and accessories of invalid carriages
2692+ 2693	Manufacture of refractory ceramic products + Manufacture of structural non-refractory clay and ceramic products	refractory mortars, concretes, ceramic goods (heat insulating ceramic goods of siliceous metals, refractory bricks, blocks and tiles, retorts, crucibles, muffles, nozzles, tubes, pipes), wall tiles, mosaic cubes, ceramic flags and paving, clay building materials, ceramic bricks, roofing tiles, chimney pots, pipes, conduits, flooring blocks in baked clay
1541	Manufacture of bakery products	fresh, frozen and dry bakery products, breads and rolls, fresh pastries, cakes, pies and tarts; rusks, biscuits, preserved pastry and cakes, snack products (cookies, crackers, pretzels) tortillas, frozen bakery- pancakes, waffles and rolls
2022	Manufacture of builders' carpentry and joinery	wooden goods used in construction industry (beams, rafters, roof struts, glue laminated and pre fabricated wooden trusses, doors, windows, shutters and frame, stairs and railings wooden beadings and mouldings, shingles and shakes, paraquet floor blocks, strips), prefabricated buildings or elements thereof – wood
2811	Manufacture of structural metal products	metal frameworks or skeletons for construction (towers, masts, trusses, bridges); industrial frameworks in metals (blast furnaces, lifting and handling equipments), pre fabricated buildings of metals(site huts, modular exhibition elements); metal doors, windows and frames, shutters and gates
1820	Dressing and dyeing of fur;	bleaching and dyeing of fur skins; fur wearing

NIC 1998	Industry Description	Products
	manufacture of articles of fur	apparel and clothing accessories, assemblies for fur skins (dropped fur skins, plates and mats and strips); diverse articles of fur skins (rugs, pouffes, industrial polishing cloths)
3694+ 3699	Manufacture of games and toys +Other manufacturing n.e.c.	dolls and doll garments and accessories, toy animals, wheeled toys designed to be ridden, toy musical instruments, articles for tables and parlour games, playing cards, pin tables, coin operated games, billiards, special tables for casino, automatic bowling alley, electronic games (video consoles and chess), puzzles, reduced size recreational models + Brooms and brushes, shoe n cloth brushes, pens and pencils of all kinds, pencil leads
2222	Service activities related to printing	bindings of printed sheets into books, brochures, magazines, catalogues; plate making services; engraving or etching of cylinders for gravures; preparation of plates and dies, proofs, artistic works including lithostones and prepared woodblocks; production of reprographic products; design of printing products, etc
1920	Manufacture of footwear.	footwear for all purposes, of any material, by any process: gaiters, leggings and similar articles; uppers and parts of uppers, outer and inner soles, heels
1723	Manufacture of cordage, rope, twine and netting	twine, cordage, ropes and cables of textile fibers, knotted nettings of twine, cordage or rope; fishing nets, ships' fenders, unloading cushions loading slings, rope or cable fitted with metal rings
1721	Manufacture of made-up textile articles, except apparel	blankets, traveling rugs, bed & table& toilet linen, quilts, eiderdowns, cushions, pouffes, sleeping bags: made up articles (curtains, valances, blinds, blinds, bedspreads, furniture or machine covers, tarpaulins, tents, camping goods, sails, sun blinds, loose covers for cars, machines or furniture, flags, banners, pennants, dust cloths, dishcloths, life jackets, parachutes, textile part of electric blankets, hand woven tapestries
2919 + 2923 + 2927 + 2929	Manufacture of other general purpose machinery + Manufacture of machinery for metallurgy + Manufacture of weapons and ammunition + Manufacture of other special	Refrigerating, freezing industrial equipment, non-domestic fans, gas-generators, heat exchangers, weighting machinery, hot equipment handling machines, casting machines, ingot moulds, tanks, fighting vehicles, paper-pulp machinery and related

NIC 1998	Industry Description	Products
	purpose machinery	machineries
2899	Manufacture of other fabricated metal products n.e.c.	Pails, cans, drums, buckets, metallic closures, tins and cans for food products, nails and pins, bolts, screws, nuts and related products.
2211 + 2219	Publishing of books, brochures, musical books and other publications + Other publishing	Newspapers, magazines, periodicals, posters, dairies, calendars, maps and embossers, photos, engravings, postcards
2696	Cutting, shaping and finishing of stone	Construction stones, road stones, cemeteries stones, roofing stones and stone furniture,
2021	Manufacture of veneer sheets; manufacture of plywood, laming board, particle board and other panels and boards	Veneer sheets, plywood, veneer panels, particle boards, fiberboard, densified wood.
2102	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	Corrugated paper, paperboard, solid boards, office box files, folding paper board containers, corrugated paper containers
1533	Manufacture of prepared animal feeds	Pet feeds and farm animal feed,
3610	Manufacture of furniture	Furniture of all kinds except stone, ceramic and concrete.
1712	Finishing of textile excluding khadi/handloom	Bleaching, dyeing, printing, , dressing, drying, steaming, shrinking, mending and sanforizing of textile fibers, yarn, fabric and apparels
2109	Manufacture of other articles of paper and paperboard	Personal and household paper, cleansing tissue, wall paper, filter paper, duplicator stencils, envelopes and letter cards
2519	Manufacture of other rubber products	Rubber pipes, sheets, plates, rods. Rubber conveyor belts, rubber mattresses, rubber floor coverings etc

Source: *National Industrial Classification (All Economic Activities) 2004, CSO, Government of India.*

LATEST ICRIER'S WORKING PAPERS

NO.	TITLE	AUTHOR	YEAR
235	THE TWO WAVES OF SERVICE-SECTOR GROWTH	BARRY EICHENGREEN POONAM GUPTA	MAY 2009
234	INDIAN ECONOMIC OUTLOOK 2008-09 AND 2009-10	RAJIV KUMAR MATHEW JOSEPH DONY ALEX PANKAJ VASHISHT DEBOSREE BANERJEE	MARCH 2009
233	ADVERSE SELECTION AND PRIVATE HEALTH INSURANCE COVERAGE IN INDIA: A RATIONAL BEHAVIOUR MODEL OF INSURANCE AGENTS UNDER ASYMMETRIC INFORMATION	SUKUMAR VELLAKKAL	FEBRUARY 2009
232	INDIA IN THE GLOBAL AND REGIONAL TRADE: DETERMINANTS OF AGGREGATE AND BILATERAL TRADE FLOWS AND FIRMS' DECISION TO EXPORT	T.N. SRINIVASAN VANI ARCHANA	FEBRUARY 2009
231	TRADE IN ENERGY SERVICES: GATS AND INDIA	ARPITA MUKHERJEE RAMNEET GOSWAMI	FEBRUARY 2009
230	THE MISSING MIDDLE	ANNE O. KRUEGER	JANUARY 2009
229	WHAT CAN BE LEARNED ABOUT THE ECONOMIES OF CHINA AND INDIA FROM PURCHASING POWER COMPARISONS?	ALAN HESTON	DECEMBER 2008
228	THE COST COMPETITIVENESS OF MANUFACTURING IN CHINA AND INDIA: AN INDUSTRY AND REGIONAL PERSPECTIVE	BART VAN ARK ABDUL AZEEZ ERUMBAN VIVIAN CHEN UTSAV KUMAR	DECEMBER 2008
227	EMERGING THROUGH TECHNOLOGICAL CAPABILITY: AN OVERVIEW OF INDIA'S TECHNOLOGICAL TRAJECTORY	AMIT SHOYON RAY	NOVEMBER 2008
226	THE CHINESE EXPORT BUNDLES: PATTERNS, PUZZLES AND POSSIBLE EXPLANATIONS	ZHI WANG SHANG-JIN WEI	NOVEMBER 2008

About ICRIER

ICRIER – established in August 1981 – is an autonomous, policy-oriented, not-for-profit economic policy think tank. ICRIER's main focus is to enhance the knowledge content of policy making by undertaking analytical research that is targeted at improving India's interface with the global economy. We have nurtured our autonomy by establishing an endowment fund, income from which enables us pursue our priority research agenda. ICRIER's office is located in the prime institutional complex of India Habitat Centre, New Delhi.

ICRIER's founding Chairman was Dr. K.B. Lall who led the organization since its inception till 1992 when he handed over the Chairmanship to Mr. R.N. Malhotra (1992-1996). He was followed by Dr. I.G. Patel who remained Chairman from 1997 to 2005 until his demise in July 2005. ICRIER's current Chairperson is **Dr. Isher Judge Ahluwalia**. Amongst ICRIER's founding members are: Dr. Manmohan Singh, Dr. C. Rangarajan, Dr. M.S. Swaminathan, Dr. Jagdish Bhagwati, Dr. R. J. Chelliah, Mr. Muchkund Dubey, Prof. Deepak Nayyar etc.

To effectively disseminate the research findings, ICRIER organises workshops/ seminars/ conferences to bring together policy makers, academicians, Union Cabinet Ministers, Members of Parliament, senior industry representatives and media persons to try and create a more informed understanding on issues of major policy interest. ICRIER invites distinguished scholars and policy makers from around the world to deliver public lectures on economic themes of interest to contemporary India.

ICRIER's highly qualified **in-house team** of about 50 researchers includes several Ph.Ds from reputed Indian and foreign universities. In addition, we have 23 External Consultants working on specific projects. The team is led by **Dr. Rajiv Kumar**, D.Phil in Economics from Oxford University and Ph.D from Lucknow University.