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Study on

Employment, Productivity and Output Growth of Labour Intensive Manufacturing Industries in India

submitted to

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Foreword

Indian economy clocked an impressive average GDP growth rate of around 8 per cent during the Tenth and Eleventh Five-Year Plan periods. However, the phenomena of high economic growth has not been substantiated with high employment growth. Besides, the labour intensive manufacturing enterprises have witnessed a slowdown in total factor productivity over the years, leading to a tepid growth performance of the sector as compared to the high value added ones.

Against this backdrop, the study conducted by NILERD on "Employment, Productivity and Output Growth of Labour Intensive Manufacturing Industries in India" analyses the performance of labour intensive manufacturing industries using both primary and secondary data. The study identifies labour intensive organised manufacturing industries and then estimates the productivity and efficiency of these industries. Results of the study indicate that labour intensity has declined more in the case of labour intensive industries than all manufacturing industries over the period, suggesting that the former group of industries may be gradually opting for modern technology as a substitute for labour in the production process. The study finds that labour, capital and total factor productivity of labour intensive industries at the aggregate level have declined from pre-reforms period to post-reforms period. Based on primary survey of five labour intensive sectors such as textile, apparel, footwear, furniture and sports goods, the study finds that except for apparel, other industries are using more non-skilled workers than skilled ones, which in turn causes a decline in both labour and capital productivity of the sector. Majority of firm owners reported that lack of availability of skilled labour is one of the major constraints faced by them other than infrastructural bottlenecks, limited incentives, and issues regarding tax policy.

I hope policymakers, industrialists and economists alike will find this report interesting and useful.

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Contents

Executive Summary

Indian economy has recorded a robust and fastest economic growth after China during the 1990s and in subsequent periods due to its strong domestic demand and resilience to external shocks. The country successfully overtook Japan as the world's third largest economy in terms of purchasing power parity (PPP) in 2011. Being one of the most youthful population countries in the world where 58 per cent of population is below the age of 29 years, the country has advantages of increasing the productivity and efficiency level and set to becoming a leading global power in knowledge and global value chain process. However, some experts have cautioned that there is possibility of the 'demographic dividend' becoming a 'demographic curse' if India falls into the 'lower-middle income trap. Improving the education, health and skills of workforce is critical as 93 per cent of them are in unorganized sector. Further, as the country adds nearly 10 million people into the labour force, sustaining stronger employment growth is a challenging task since shifting of labour force from low value added sectors to high value added sectors such as services and manufacturing remains tepid even during the high economic growth periods. A study by Papola (2013) pointed out that high economic growth that has been witnessed during the post-reforms period is largely explained by increase of productivity and less by employment growth, leading to high unemployment. In order to address these critical issues, both for shorter and longer-term periods, the government of India has been focusing on reviving the manufacturing sector, particularly the low-value added labour intensive manufacturing units.

Interestingly, the post-2004-05 data shows that it is the low- value added labour intensive enterprises that are driving employment and these enterprises contribute more than 35 per cent of organized manufacturing employment in India. Ironically, labour intensive manufacturing industries have witnessed a continuous decline in total factor productivity over the years, leading to lackluster economic performance of the sector as compared to high valued sector.

In this context, the present study attempts to analyse the employment, growth and productivity performance of labour intensive manufacturing sectors in India using both secondary and primary data. For secondary data, the study uses three-digit level of National Industrial Classifications (NIC) data from Annual Survey of Industry (ASI). The study period covers from 1980-81 to 2012-13 and the whole period is divided into sub-periods for doing a comparative analysis. The sub-periods are: (i) 1980-81 to 1989-90, (ii) 1990-90 to 1999-00,

(iii) 2000-01 to 2007-08 and (iv) 2008-09 to 2012-13. For the period 2008-09 to 2012-13, we use NIC-08 at three-digit level data as the concordance table is not available between NIC-04 and NIC-08 and the analysis for the period is done separately. It is important to mention here that NIC-04 and NIC-08 provide heterogeneous industries and they are not strictly comparable. Thus, we classified them into a more comparable form for the present analysis. We have also carried out a primary survey on five labour intensive industries in ten manufacturing clusters across five states in India. The key objective of the survey was to assess the growth, employment and productivity situations and the problems inherited in doing business by small and medium registered and unregistered labour intensive manufacturing firms in India. Further, the field survey findings would help us to validate the findings from secondary data and draw informed policy choices. The key findings of the study are given below.

Key findings:

- Based on average L/K ratio, we have calculated labour intensity and selected 17 out of 58 industries as labour intensive ones for the period 1980-81 to 2007-08. Similar method is used to get 23 labour intensive industries out of total 76 industries for the period 2008-09 to 2012-13.
- The study finds that labour intensity has declined consistently since 1980s both in the case of labour intensive and all manufacturing industries. In fact, the decline is more pronounced in case of former group of industries than the later group of industries. The results suggest that labour intensive industries may be using modern technology as a substitute of labour in the production process.
- The average value added share of selected labour intensive industries was 13.72 per cent during the pre-reforms period (1980-81 to 1989-90) increased to 14.79 per cent during the post-reforms period (1990-91 and 2007-08). In contrast their employment share has remained reasonably high at 25.5 and 31.6 per cent during the same periods respectively. The recent years (2008-09 to 2012-13) data however shows that both value added and employment shares have slowed down considerably.
- Employment growth of labour intensive industries has remained moderate during the post-reforms period despite of stronger value added growth. Nonetheless, labour intensive industries performed better in terms of employment growth than all manufacturing industries.

- Our results show that employment elasticity remains low both in labours intensive and all manufacturing industries during the pre- and post-reforms periods suggesting output is less responsive to employment generations in the sector.
- The study finds that the rate of growth of labour productivity in labour intensive industries has declined more than all manufacturing industries both in the pre-and post- reforms periods. The reason could be due to output is less responsive to employment growth in the sector and shortage of skilled manpower.
- Capital productivity of labour intensive industries has also declined during the post-reforms period. The reasons of decline could be due to absorption of more unskilled labour force in the sector which leads to sub-optimal use of machinery and equipments and low output.
- Although both labour and capital productivity have declined at the aggregate level, in disaggregate level, the study finds that while some of industries show a decline in both labour and capital productivity, others show a decline in labour productivity with an increase in capital productivity and vice-versa.
- In case of total factor productivity growth (TFPG)/technical efficiency, the study finds that it has declined continuously for labour intensive manufacturing industries starting from 1980s.
- The primary survey results indicate 99 per cent of firms are owned by male members and on an average around 68 per cent of firm owners reported their willingness to expand business in next couple of years. While the highest percentage (90 per cent) of firm owners from apparel planed to expand business in next couple of years, the lowest percentage (54 per cent) of firm owners from textile industry expressed the same view.
- The study finds that average initial investment for setting up a factory is highest in textile segments and lowest in case of furniture industry.
- Among the types of employment, it is found that unskilled workers are more engaged than skilled workers in textile industry, footwear industries, furniture industry and sports goods industry. On other hand, skilled workers are employed more in apparel industry.
- The man-machine ratio which reflects labour or capital intensity position of a firm has declined for all industries, thereby suggesting labour intensive industries are gradually moving towards capital intensive over the period.

- In case of exports, the results indicate that labour intensive industries have exported more than 50 per cent of their total turnover in 2014. These industries make use exports as the means of their growth model due to comparative cost advantages.
- Lack of skilled manpower availability is the major constraints in all the labour intensive industries resulting to low productivity and efficiency in these industries.
- On government policies, majority of firms have highlighted two critical issues such as lack of incentives from the government and heavy tax burden.

From the policy perspectives, the key message that comes out from the present study is that labour intensity has been declining continuously both in labour intensive and all manufacturing industries and in fact the decline is more visible in case of labour intensive industries. It suggests that labour intensive industries are embarking more machine and modern technology as a substitute of labour. The second important point is that both partial productivity of factors (labour and capital) and total factor productivity have declined continuously in the case of labour intensive industries which suggests that the growth model of these industries are not sustainable in the long-run. Further, labour intensive industries are facing some of major constraints of doing business are availability of skilled labour force, infrastructure bottlenecks, financial support from the government and business friendly tax policies. On the backdrop of these issues, the study points to enhancing the productivity and efficiency of labour force in manufacturing sectors in general and labour intensives ones in particular to achieve both higher output and employment growth in the long run. This could be possible through strengthening both in-house and out-house training activities such as providing technical and vocational training to unskilled labour force. In this regard, the present government has already set up Mentor Councils to revise the curricula as per industries' needs. Further, around 1500 vocational training centres have been proposed by the government under PPP partnership in unserved blocks in the country. Besides skills, changes in the labour law regime in India could ensure expansion and improvement in the overall quality of employment. Providing social security and employment benefits to workers in informal sectors would further improve the productivity and efficiency of labour force.

Chapter 1

Introduction

1.1 Background

Reviving India's manufacturing has been one of the prime focus points of the current government at the Centre mainly to transform the sector as the engine of long-run growth (Economic Survey, GoI, 2014-15). In order to boost the growth and employment prospects of the sector, the Government of India had announced the National Manufacturing Policy on 25th October, 2011 to enhance the share of manufacturing in GDP to 25 percent within a decade and create 100 million jobs.[1] However, achieving this ambitious target is indeed challenging as the sector continued to face several structural problems. Ironically, the share of the sector in total GDP has remained stagnant at 15-16 per cent since 1980, while its share in comparable Asian countries has reached at 25 to 34 per cent. Although the sector's GDP growth rate has improved during the post-reforms period, particularly in the 2000s, its share in total GDP has not. The reason could be that non-manufacturing sectors have grown at a faster pace than manufacturing sector. While manufacturing sector's GDP growth registered at 5.8 per cent each in 1980s and 1990s and 7.9 per cent in 2000s, non-manufacturing sector[2] on the other hand recorded 6.5, 7.1 and 8.5 per cent growth rate respectively during the same periods[3].

Despite improved growth performance of manufacturing sector in 2000s, the sector is lagging in employment and productivity growth. Employment estimates from the National Sample Survey (NSS)'s Employment Unemployment Survey suggest that employment (formal and informal) in manufacturing sector increased from 399.6 million in 1999-2000 to 459.2 million in 2004-05, an increase of a whopping 59.6 million or about 2.2 million per annum within five years. In the next eight years (2004-05 to 2011-12), it increased merely 6 million, approximately 0.74 million per annum or compound annual growth rate of 1.3 per cent against the sector's GDP growth rate of 9.2 per cent per annum. The Annual Survey of Industry (ASI) data which report only formal employment in manufacturing sector indicate

[1] http://dipp.nic.in/english/policies/national_manufacturing_policy_25october2011.pdf
[2]Non-manufacturing sector is defined as sectors other than agriculture and allied sector and manufacturing sector.
[3]1980s, 1990s and 2000s are referred to as 1980-81 to 1989-90, 1990-91 to 1999-2000 and 2000-01 to 2009-10 respectively.

that employment grew only by 0.62 million per annum or compound annual growth rate of 6 per cent per annum during 2004-05 and 2011-12, which is substantially less than the required job creation as there are 7-8 million youth who are expected to enter the job market each year in the next ten years. Moreover, such low employment growth has been generated on the backdrop of a whopping 10.6 per cent GDP growth rate of the sector (registered manufacturing) during 2004-05 and 2011-12, suggesting that employment has been relatively unresponsive to output growth. And, more striking point is that, since the growth rate of manufacturing sector has slowed down considerably during the last two years (2012-13 and 2013-14)[4]; there is a possibility that employment may have declined significantly in this sector. The manufacturing sector has also been reeling under low productivity growth as compared to services sector. Our calculation shows that services sector's productivity was 1.5 times higher than manufacturing sector in 1993-94, which increased further to 1.7 times in 2011-12.

Moreover, the sector faces a peculiar situation – unorganized sector absorbs a whopping 85 per cent of employment but generates only 22 per cent of total output of the manufacturing sector. In other words, organized sector which generates 78 per cent of total manufacturing output, absorbs only 15 per cent of labour force (Mehrotra et al., 2012). Within organized manufacturing sector, high productive and gross value added (GVA) industries are 'metal' and machinery & transport equipment' industries which accounted (each of them) for almost one-fifth of the GVA of organized sector, followed by the chemical industry that accounts for about 13 per cent of GVA.

However, in terms of job creation, low value added and low productive[5] manufacturing sectors such as textile and food (including beverages & tobacco) industries together account for about 41 per cent of jobs in the organized manufacturing sector. In fact, the post-2004-05 data show that it is the low-productive small scale enterprises that are driving employment. Enterprises such as wearing apparel, textile, furniture and wood

[4]The average GDP growth rates of manufacturing sector (at constant 2011-12 prices) for 2012-13 and 2013-14 is 5.75 per cent.

[5]Trivedi et al., (2009) found that the total factor productivity growth (TFPG) as measured by the Growth Accounting Approach (GAA) is lowest in Food, Beverages and Tobacco industry followed by the Textiles industry. The best performers in terms of TFPG are Mechinery & Transport Equipments and Chemical industries. In terms of efficiency, the lowest mean efficiency is evident in case of Food, Beverages and Tobacco and Textile industries. The study also found that labour productivity in levels is much higher in organised manufacturing sector (15 times) than the unorganised manufacturing sector.

products produced low end products which are consumed by the lower income quintiles of the population (Mehrotra et al., 2014). Since low value added and labour intensive industries have high potential of employment generation, it is imperative to give an urgent attention on promoting these industries and link them to the mainstream agenda like 'Make in India' campaign and make them as a critical part of overall manufacturing policy in the country. Further, these industries with their ability to export based on comparative advantage in terms of low labour cost (as China had in 1980s and 1990s) provides additional benefits in terms of expanding global value chain and absorbing more labour force.

Experts have viewed that an estimated 100 million jobs will move out of China over the next few years in labour-intensive sectors, says Ajay Shankar, Member Secretary of India's National Manufacturing Competitiveness Council (Business Today, March 2014). A survey carried out by the newspaper on industries suggest that companies in labour-intensive industries are moving from China to India because of a growing shortage of workers, increase of labour cost, and exchange rate disadvantages.

Therefore, it is the topmost priority for India to revive and strengthen its manufacturing base particularly in labour intensive manufacturing products to take advantages out of other countries' disadvantages. Thus, focusing on labour intensive industries has significant policy implications in the present context considering the stagnant employment opportunities in the capital intensive organised manufacturing sectors. Improving the productivity in labour intensive organized manufacturing industries is one of the areas needs to be focused on and set as a long term goal for achieving a sustainable growth in output and employment. In this context, to make any informed policy choices on productivity and efficiency of registered labour intensive vis-a-vis all manufacturing industries, it is important to understand and analyse the past and present status.

There are many studies in the past that have explored the above issues in the Indian context. In the next section, we have reviewed a few of them to understand their approaches and findings.

1.2 Past Evidence

There are a number of studies that have examined the productivity and efficiency issues of manufacturing industry in general and labour intensive industries in particular in the Indian context. We have made a brief review of some of them below.

Some of the studies (Ahluwalia, 1991; Dholakia and Dholakia, 1994; Majumdar, 1996; Rao, 1996; and Trivedi et al., 2000) argued that TFPG had declined till 1970s and improved in mid-1980s owing to open trade and liberal industrial policies. In contrast, Balkrishnan and Puspangadan (1994) argue that improvement in TFPG during the 1980s is merely due to a measurement issue where studies used a single deflation method instead of double deflation method. A similar difference in findings of different studies is also observed for the post-reforms period. While studies such as Krishna and Mitra (1998), Unel (2003) and Tata Services Ltd. (2003) find an acceleration in TFPG in the 1990s, other studies such as Trivedi et al. (2000), Srivastav (2000), Balkrishnan et al. (2000), Ray (2002), Goldar and Kumari (2003), Goldar (2004, 2006), Das (2004) find a deceleration in TFPG in the 1990s.

In a recent study Trivedi et al. (2011) measured the TFPG of manufacturing sector using both parametric and non-parametric methods. The study finds that TFPG are sensitive to the methodology use. For the period 1980-81 to 2003-04, using GA method, they find that TFPG for all organised manufacturing sector is 0.92 per cent per annum, which is almost half of 1.81 per cent per annum obtained through using the production function approach.

Bollard et al. (2013) estimated TFPG for the manufacturing sector using Annual Survey of Industries (ASI) plant-level micro data from 1980-81 to 2007-2008. They decompose output growth into input growth vs. productivity growth. They find that TFPG is over 5 percentage points per year for the period 1993-2007 over 1980-1992.

Kathuria et al. (2013) computed TFPG of Indian manufacturing for both formal and informal sectors from 1994-95 to 2005-06 using three different techniques – growth accounting (GA) (non-parametric), production function with correction for endogeneity – Levinsohn-Petrin (LP) (semi-parametric) and stochastic production frontier analysis (SFA) (parametric) to see how sensitive are the results to different estimation methods. They have used data for the informal manufacturing sector for fifteen major states from the National Sample Survey Organization (NSSO) surveys on the informal manufacturing sector for 1994-95, 2000-01 and 2005-06. The data set for formal sector for the same three years were obtained from the Annual Survey of Industries (ASI) to compare the trends with informal sector. The study found that the TFP growth of the formal and informal sectors has differed greatly during the study period and that the estimates are sensitive to the technique used. While the GA and SFA methods show a decline in TFP growth in the formal sector in 1994-

2001, the LP method shows an increase. In 2001-2005, the GA and LP methods show a decline in TFP growth, while the SFA method shows an increase for the formal sector. In the case of informal sector, all three methods show a decline in TFP growth in 1994-2001. However, for 2001-2005, the GA and LP methods show a decline in 2001-2005 for the informal sector, while the SFA method shows an increase. They suggest that any inference on productivity growth in India since the economic reforms of 1991 is conditional on the method of measurement used, and that there is no unambiguous picture emerging on the direction of change in TFP growth in post-reform India.

There are a few other studies which have paid specific attention to the question of changes in labour intensity in organized manufacturing sector for the post-reforms period. Chaudhuri (2002) studied the changes in labour intensity for 3-digit groups in the organized manufacturing sector for 1990-91 and 1997-98. He found that labour intensity had gradually 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 labour 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 labour without any technological up-gradation, across all industry groups at the 2-digit level in both the sectors. A study by Das et al. (2009) attempts to address the issue of declining labour intensity in India's organised manufacturing sector and the constraints of employment generation in labour-intensive sectors. The study uses primary survey data of 252 labour intensive manufacturing exporting firms across five sectors – apparel, leather, gems and jewellery, sports and bicycles – for the year 2005-06 for the analysis. The study identifies several important constraints of employment generation in labour intensive sectors such as non-availability of trained skilled workers, infrastructure bottlenecks, low levels of investment, tedious labour rules and regulations, and non-competitive export orientation.

The above literature review suggests the following points. First, most of the studies have estimated TFPG for the whole manufacturing sector using different methods for different data points and their results vary from each other. Second, there is dearth of literature on measuring the productivity and efficiency of labour intensive manufacturing sector in India. Third, most of the existing studies on labour intensive manufacturing sector have not taken into account the recent data, which is important from the policy prospective. Fourth, the present study conducts a primary survey covering 11 manufacturing clusters of five labour intensive industries across different states as a supplementary analysis to validate

the findings from the secondary data. Further, we have made an attempt to collate information on problems and constraints faced by small and medium firms in doing business through direct dialogues with the firm owners and made informed policy suggestions to improve the performance of the sector.

In this context, the present study makes an attempt to first identify labour intensive industries through calculating the labour intensity of each organized manufacturing industry using the ASI data at 3-digit level and then uses three alternative methods to estimate TFPG to see how sensitive the results are to different methods. In the next step, the study discusses the primary survey data that has been collected through field survey and discussion.

1.3 Objectives

The objectives of the study are

(i) To identify industries with high labour intensity within the registered organized manufacturing sector in India.

(ii) To analyse the trends of labour intensity of the selected industries over the period and find out the plausible reasons of changes in trends.

(iii) To discuss the growth, employment and productivity trends of labour intensive industries and use different alternative methods to estimate total factor productivity growth.

(iv) To analyse the employment and growth prospects and constraints faced by small and medium firms using the field survey data and make suitable policy suggestions.

The analysis of the above objectives will be carried out by using both secondary and primary data. The secondary data will be collected from ASI covering the period from 1980-81 to 2012-13. In addition, a field level survey of selected labor intensive industries is attempted to provide an in-depth analysis. For this, a structured questionnaire has been designed to collect the field level data.

Chapter 2
Methodology

In this chapter we discuss methodologies of two important issues. They are identifying the labour intensive industries, and measuring/estimating productivity and efficiency. These two critical issues have been analysed using secondary information from 'Annual Survey of Industries (ASI)' published by the Central Statistical Organisation (CSO), Government of India. The ASI provides the data sets of organised manufacturing sectors. Organized manufacturing industries comprise of 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. All the organised manufacturing industries are classified into National Industrial Classification (NIC) 2, 3 and 4 digit levels of industries. This study uses three-digit level of industrial classifications. The study period covers from 1980-81 to 2012-13 and the whole period is divided into sub-periods for doing a comparative analysis. The sub-periods are: (i) 1980-81 to 1989-90, (ii) 1990-90 to 1999-2000, (iii) 2000-01 to 2007-08 and (iv) 2008-09 to 2012-13. As we know, the ASI data are available in different NIC codes, by using the concordance tables of NIC-98 and NIC-04, a single NIC-04 database series has been derived for the period 1980-81 to 2007-08 at three-digit level. There are 79 industries that are available at NIC-98 three-digit level and 63 industries are at NIC-04 three-digit levels. In order to get a single NIC database, some industries have been clubbed together as per the guidelines given in the concordance table. The list of industries for the whole period 1980-81 and 2007-08 are given in the Appendix. In total, 58 industries at three-digit level of NIC-04 for the period 1980-81 to 2007-08 are used in the present study (Table A1). For the period 2008-09 to 2012-13, we use NIC-08 at three-digit level data. Since, the concordance table is not available between NIC-04 and NIC-08 at three-digit level, we analyse them separately. There are 75 industries that are available at three-digit levels of NIC-08 code for the period 2008-09 to 2012-13. It is pertinent to mention here that NIC-04 and NIC-08 provide heterogeneous industries and they are not strictly comparable. Therefore, we have made an attempt to classify them in a more comparable form for the present analysis.

In order to understand various nuances of employment potential of labour intensive manufacturing industries, a field survey has also been undertaken on selected labour intensive industries. Those selected industries are:

- Spinning, weaving and finishing of textiles (NIC group-131)
- Manufacture of wearing apparel (NIC group-141)
- Manufacture of footwear (NIC group-151)
- Manufacture of furniture (NIC group -310)
- Manufacture of sports goods (NIC group-323).

The above industries have been selected based on their recent export performance relative to China's exports. Although, China's exports (in value term) of these commodities are multiple times higher than that of India's, the trends show that China's exports of these commodities have either declined or remain stagnant in recent years. This could be due to the loss of export competitiveness of China for multiple reasons – rising labour cost, exchange rate disadvantages etc. The second reason of selecting these industries is that these are some of the important labour intensive manufacturing industries in India (Das et al., 2009).

The survey has been carried out in the selected industrial clusters in different states based on purposeful sampling method. The sample size of the study is given below:

Industries	States	Name of states	Clusters (1 from each state)
Spinning, weaving and finishing of textiles (NIC group-131)	2	TN (Chennai), Haryana (Panipat)	2
Manufacturing of wearing apparel (NIC group-141)	2	Punjab (Ludhiana), TN (Chennai)	2
Manufacture of footwear (NIC group-151)	2	UP (Agra), TN (Chennai)	2
Manufacture furniture (NIC group -310)	2	Delhi (Kirtinagar & Tilak Nagar), Gujarat (Ahmedabad)	2
Manufacture of sports goods (NIC group-323)	2	Punjab (Jalandhar), UP (Meerut)	2

We have designed a structured survey questionnaire to collect the information from the selected enterprises on various key issues such as:

- Employment structure
- Output/sales growth
- Number of machine used and man-to-machine ratio
- Investment structure
- Major constraints faced by industries
- Availability of infrastructure for doing business
- Export potential

2.1 Identifying Labour Intensive Industries

In order to analyse the performance of labour intensive organised manufacturing industries, the first step is to identify them using the ASI data. The labour intensity is defined as the ratio of number of persons engaged per unit of gross fixed capital stock (in real term).

Data on total persons engaged (workers and employees), gross fixed capital formation and depreciation are used to construct industry-wise labour intensity. To estimate real gross fixed capital stock, we use the perpetual inventory method as given below.

$$K_t = K_{t-1} - \delta K_{t-1} + GFK_t = (1-\delta)K_{t-1} + GFK_t \qquad (1)$$

Where, K_t is the current year capital stock, GFK_t is gross fixed capital formation in the current year, δ is the rate of depreciation (assumed constant over time) and K_{t-1} is the previous year or initial capital stock. Following Unel (2003), we have used 5 per cent depreciation rate of capital. The investment deflator series (Base 2004-05 = 100) of machine and equipment is used to deflate the nominal gross fixed capital formation. Thus, in order to estimate capital stock series, we need (i) a time series of investment (in this case GFK), (ii) information on the initial capital stock at the time when the investment time series starts and (iii) information on the rate of depreciation of the existing capital stock. Out of these indicators, information on initial capital stock is usually not available. Hall and Jones (1999) used the following formula to calculate the initial capital stock.

$$K_0 = \frac{GFK_0}{\delta + g_{GFK}} \qquad (2)$$

Where K_0 denotes the initial capital stock, GFK_0 implies the level of gross fixed capital formation in the initial period, g_{GFK} represents the rate of growth in gross fixed capital formation, and δ is the depreciation rate. We derive capital stock in real term by using equations (1) and (2).

After calculating the capital stock, we estimate labour intensity or L/K ratio for each industry over the period (1980-81 to 2007-08 and 2008-09 to 2012-13). The average labour intensity for the first period (1980-81 to 2007-08) for all industries is 0.58. Industries with labour intensity greater than all industry average (0.58) are levelled as labour intensive industries and industries with labour intensity less than 0.58 are levelled as capital intensive

ones. Based on this criterion, we found 17 labour intensive industries for the period 1980-81 to 2007-08.

The similar exercise of labour intensity estimation has been carried out for the period 2008-09 and 2013-14. The average labour intensity ratio for all industries turns out to be 0.16. Industries with average (L/K) ratio greater than 0.16 are levelled as labour intensive industries and industries with labour intensity ratio less than 0.16 are levelled as capital intensive ones. Our estimates show 22 labour intensive industries for the period 2008-09 to 2012-13.

2.2 Total Factor Productivity (TFP): Concept and Measurement

The neoclassical economic growth theory suggests that both factors of production (i.e., labour and capital) and productivity play important roles in economic growth. Productivity is synonymously referred to efficiency in resource use. The neoclassical theory suggests that factors such as investment in human capital and infrastructure, and R&D improve the productivity, and therefore, economic growth. The literature suggests that there are single factor productivity and multi-factor or total factor productivity. The single factor productivity or partial productivity refers to a ratio of output to factor input. For example, labour and capital productivity can be defined as Q/L and Q/K. On the other hand, total factor productivity is defined as the ratio of output to weighted sum of the inputs used in the production. In other words, TFP growth can be explained by growth of real output less growth of total inputs which also indicates the growth of real output that is not explained by the growth in inputs. That is, TFP growth incorporates all the residual factors after accounting for input growth. All these residual factors could be changes in technology, capacity utilization, quality of factors of production, etc. According to Jorgenson and Griliches (1967), if all the factors of inputs are carefully taken into account in estimation of production, these residual factors might disappear.

The measurement of total factor productivity (TFP) growth has been extensively debated in the literature. Lipsey and Carlaw (2001) report three different views on TFP. The conventional view considers that TFP is the measure of the rate of technical change (Law, 2000; Krugman, 1996; and Young, 1992). The second view (Jorgensen and Griliches, 1967) argued that TFP measures only the free lunches of technical change, which are mainly associated with externalities and scale effects. The third view is highly skeptical whether TFP measures anything useful (Metcalfe, 1987; Griliches, 1995).

The literature suggests that two main techniques are used to measure TFP. They are frontier and non-frontier approaches. These approaches are further classified into parametric and non-parametric techniques.

It is pertinent to mention here that measuring TFP in growth form is more appropriate than level one. Kathuria et al. (2013) pointed out that TFP in levels are sensitive to the units of measurement of inputs and outputs and they are rarely estimated. In this study we estimate TFP in growth form. Three approaches are used to estimate TFP growth. They are growth accounting (GA) (non-parametric), production function with correction for endogeneity – Levinsohn-Petrin (LP) (semi-parametric) and stochastic production frontier analysis (SFA) (parametric).

Growth Accounting Method

The growth accounting method estimates TFP growth (TFPG) as the difference between the rate of growth of output and the weighted rates of growth of factor inputs. In this study, we use Divisia-Tornquist (D-T) approximation to estimate the TFPG. The TFPG under the D-T approximation can be written as:

$$TFPG = (\ln Y_t - \ln Y_{t-1}) - \sum_{i=1}^{n} 1/2(s_{i,t} - s_{i,t-1})(\ln X_{i,t} - \ln X_{i,t-1}) \qquad (3)$$

Where Y denotes real output in terms of value added, t is time period, s_i denotes shares of factors of production in value added and X_i factors of production. The share of labour is defined in terms of ratio of total emoluments to real output and the share of capital is one minus the share of labour under the assumption of constant returns to scale.

Levinsohn and Petrin Method

Levinsohn and Petrin (LP) method uses a semi-parametric technique to estimate TFPG. This method eliminates the simultaneity problems that usually persist in the estimation of production function. In this study, we use a Cobb-Douglas (CD) production function to estimate the TFPG. Usually, researchers use Ordinary Least Square (OLS) technique to estimate the CD production function which can be expressed as:

$$\text{Ln } Y_{it} = A_{it} + \alpha \ln L_{it} + \beta \ln K_{it} \qquad (4)$$

Where Y is real value added, L is labour and K is capital. The subscript i and t explain industry and time period. 'A' implies TFP which is nothing but the efficiency of the firm in using factor inputs to produce the output.

The main drawback of estimating CD function using OLS method is that it assumes that factor inputs are determined exogenously. But in practice, firm's input choices can be endogenous too because it uses different combinations of inputs in the production process depending upon the degree of productivity shock. Therefore, input choices and productivity are correlated and OLS estimation does not address these issues. In order to overcome these statistical problems, researches use fixed effects model which eliminates firm specific unobservable fixed characteristics that may affect simultaneously input choices and TFP. But this model does not fully address other problems such as time varying unobserved characteristics of firms that may affect input choices and TFP simultaneously. Levinsohn and Petrin (2003) developed a methodology that addresses these problems. It uses unobserved characteristics of firm as a proxy for the unobserved firm productivity and estimates unbiased coefficients of production function. The LP method uses intermediate inputs as proxies, arguing that intermediates may respond more smoothly to productivity shocks. The Levinsohn and Petrin (LP) method is estimated in the form.

$$\begin{aligned} y_{it} &= \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \omega_{it} + \varepsilon_{it} \\ &= \beta_l l_{it} + \phi_t(m_{it}, k_{it}) + \varepsilon_{it} \end{aligned} \qquad (5)$$

y_{it} is the logarithm of the industry's output which is measured in terms of value added. l_{it} and m_{it} are the logarithms of labour and intermediate input. k_{it} is the logarithm of capital. The error has two components – ω_{it} is the transmitted productivity components and ε_{it} is an error term that is uncorrelated with input choices. In the model, ω_{it} is not observable and it can impact the choices of inputs. $\phi(m_{it}, k_{it}) = \beta_k k_{it} + \int_t^{-1}(m_{it}, k_{it})$ is a non-parametric function. The estimates of β_l and ϕ_t are obtained in the first stage.

The second stage of the LP estimation obtains the estimate of β_l. LP assumes that productivity (ω_{it}) follows a first-order Markov process and is given by

$$\omega_{it} = E[\omega_{it} \mid \omega_{it-1}] + \varepsilon_{it} \quad (6)$$

where ε_{it} is an innovation to productivity that is uncorrelated with k_{it}, but not necessarily with l_{it}. This is part of the simultaneity problem leads directly to the following moment condition.

$$E[\varepsilon_{it} \mid k_{it}] = 0 \quad (7)$$

The equation (7) states that the unexpected part of the innovation in productivity in the current period is independent of capital stock of this period, which was determined by the investment of the previous period. β_k is estimated using this moment condition. The solution for β_k is as follows.

$$\varepsilon_{it}(\beta_k) = \omega_{it} - E[\omega_{it} \mid \omega_{it-1}] = (\hat{\phi}_{it} - \beta_k k_{it}) - \hat{\varphi}(\beta_k) \quad (8)$$

The capital coefficient β_k is identified by this moment. Here, the current period's capital stock is determined before the shock in the current period's productivity.

The Stochastic Production Frontier

We use stochastic frontier model to estimate the technical efficiency of industries. The technical efficiency is estimated by employing the stochastic frontier production model proposed by Battese and Coelli (1995). Here we use the CD production frontier with two inputs labour and capital. The stochastic frontier production function for estimating industry level technical efficiency can be specified as:

$$Y_i = f(X_i;\beta) + \varepsilon_i \quad \text{i=1,2,……n} \quad (9)$$

Where Y_i denotes value of output, X_i denotes the actual input vector such as the value of total capital equipment and total number of workers. Here, we have taken natural log for value of output, value of capital equipments and total number of workers. β is vector of production function and ε is the error term that is decomposed into:

$$\varepsilon = V_i - U_i \quad (10)$$

Where V_i is the symmetric disturbances assumed to be identically, independently and normally distributed as N $(0,\sigma_v^2)$ given the stochastic structure of the frontier. The second component U_i is a one-sided error term that is independent of V_i and is normally distributed as $(0,\sigma_u^2)$, allowing the actual production to shortfall below the frontier but without attributing all shortfalls in output from the frontier as inefficiency.

The industry-specific technical efficiency is defined in terms of observed output (Y_i) to the corresponding frontier output ($\overset{*}{Y}_i$) using the available technology derived which is defined as follows:

$$TE_i = \frac{Y_i}{\overset{*}{Y}_i} = \frac{E(Y_i \mid u_i, X_i)}{E(Y_i \mid u_i = 0, X_i)} = E[\exp(-U_i)/\varepsilon_i] \qquad (11)$$

TE takes values within the interval (0, 1), where 1 indicates a fully efficient industry.

Variables' Definitions

We used variables such as output, labour, capital and intermediate inputs to estimate the productivity and efficiency using different methods.

Output: Like past studies (Goldar, 1986; Ahluwalia, 1991 and Balakrishnan and Pushpangadan, 1994, 1998), we use gross value added not gross output as a measure of output for each three-digit levels labour intensive manufacturing industry. It has been argued that gross output that includes raw material inputs grossly undermines the impact of labour and capital on productivity growth (Hossain and Karunakara, 2004). Further, value added is considered as a better indicator than gross output as the latter includes cost of intermediate inputs which vary greatly across industries and therefore comparison of industries is becoming difficult (Diewert, 2000). The real gross value added at constant 2004-05 prices has been obtained by deflating the nominal value by the price index of machinery and equipments.

Labour: Total number of persons engaged is taken as the measure of labour input for each industry. Since working proprietors/owners and supervisory/managerial staff have a significant influence on the productivity of a firm, the total number of persons engaged is a preferred indicator to measure labour input.

Capital: Capital stock at constant 2004-05 prices is taken as a measure of capital input. The Perpetual Inventory method is used to construct the nominal capital stock series and then deflated by national level price deflator of machinery and equipment as industry level price deflator of the same is not available.

Material Inputs: The value of material inputs has been deflated price index of machinery and equipments to obtain the real value at 2004-05 prices.

Chapter 3

Employment and Output Growth of Labour Intensive Manufacturing Industries

In this chapter we discuss employment and output performance of manufacturing sector in general and labour intensive industries in particular. The analysis has been carried out using a long-span time series data of 34 years starting from 1980-81. During this period, the Indian economy has witnessed a series of structural transformations in various economic dimensions such as trade, industry, money and finance and so on and so forth. One of the critical objectives of these policy changes was to improve the productivity and efficiency of economic activities to achieve a sustainable high and inclusive economic growth which in turn will help in generating adequate employment opportunities and reducing the level of poverty. In this context, the policy makers in India have often spoken and put emphasis on improving the performance of manufacturing sector since the sector has potential to grow at a faster pace and has ability to absorb larger portions of the labour force, particularly unskilled, from primary sector that witnessed massive disguised unemployment.

Manufacturing sector has performed reasonably well in economic front during the past two decades. Between 1993-94 and 1998-99, it registered on an average 7.9 per cent real GDP growth rate, nearly the same as services sector and faster than the national GDP growth rate of 6.4 per cent. In the immediate next five years, there was slowing down of GDP growth rate across all sectors, so as growth rate of manufacturing sector. The sectoral growth rate however picked up again between 2004-05 and 2008-09. While the overall GDP growth rate was 8.4 per cent between 2004-05 and 2008-09, manufacturing sector recorded an outstanding growth rate of 9.3 per cent and maintained nearly the same growth rate between 2009-10 and 2011-12, whereas the services sector declined 1 percentage point. Although the manufacturing sector has performed really well in terms of GDP growth rate, the employment growth rate has not. The sector absorbed 42.8 million labour force in 1999-2000 over 38.9 million in 1993-94, merely 0.6 million jobs per annum as compared to 1.7 million jobs in services sector. The reason could be due to sharp fall in employment in the registered manufacturing sector during the second-half of 1990s (Nagaraj, 2004). Between 1999-2000 and 2004-05, employment in absolute number increased more than the previous period despite the lower GDP growth rate. Interestingly, number of jobs improved across all major

sectors including agriculture sector during the first five years of 2000s. The highest number of employment created in agriculture sector (22 million) is against the Lewisian theory of structural shift of labour force from underdeveloped and unproductive (agriculture) sector to developed and productive sector (manufacturing and services). In this context, Mehrotra et al., (2014) pointed out that such an unexpected increase in employment in agriculture sector is an outlier. In the subsequent periods, the agriculture sector however shows significant decline in employment and non-manufacturing sector particularly construction sector shows sharp increase in employment – a clear structural shift of employment to high value added sectors (Table 3.1).

Table 3.1: Employment and Output by Sectors

Sectors	**Employment (PS+SS) (in millions)**					**Real GDP growth rate***			
	1993-94	1999-00	2004-05	2009-10	2011-12	1993-94 to 1998-99	1999-00 to 2003-04	2004-05 to 2008-09	2009-10 to 2011-12
Agriculture	241.4	246.6 (5.2)	268.6 (22.0)	244.9 (-23.7)	231.9 (-13.0)	3.5	2.2	3.1	4.8
Manufacturing	38.9	42.8 (3.9)	53.9 (11.1)	50.7 (-3.2)	59.8 (9.1)	7.9	5.6	9.3	9.2
Non-mfg.	15.8	20.4 (4.6)	29.4 (9.0)	48.3 (18.9)	55.3 (7.0)	7.4	7.4	9.7	8.5
Services	77.7	89.8 (12.1)	107.3 (17.5)	116.3 (9.0)	127.3 (11.1)	8.0	7.7	9.9	8.9
Total	373.8	399.6 (25.8)	459.2 (59.6)	460.2 (1.0)	474.3 (13.9)	6.4	5.9	8.4	8.1

Source: National Account Statistics, CSO and NSSO various rounds.
Note: * GDP data at constant 2004-05 prices; Non-manufacturing sector consists of services and industry other than manufacturing. Figures in the parentheses indicate absolute change of numbers over the previous round.

But, it is disappointing that employment in high value added sectors such as manufacturing and services have not increased in tandem with their high output growth. Even today agriculture still accounts for the bulk of the total employment in the economy (48.9% in 2011-12) and industry is still the least important employer accounting 24 percent (**Figure 3.1**). Within industry, manufacturing sector is the largest employer, followed by construction. Although the improved performance of construction sector has generated large scale employment during the 11th FYP, the manufacturing sector has not, despite its high growth rate. However, the silver lining is that it is the low-productive small scale enterprises that are driving employment in post-2004-05 period (Mehrotra et al., 2014).

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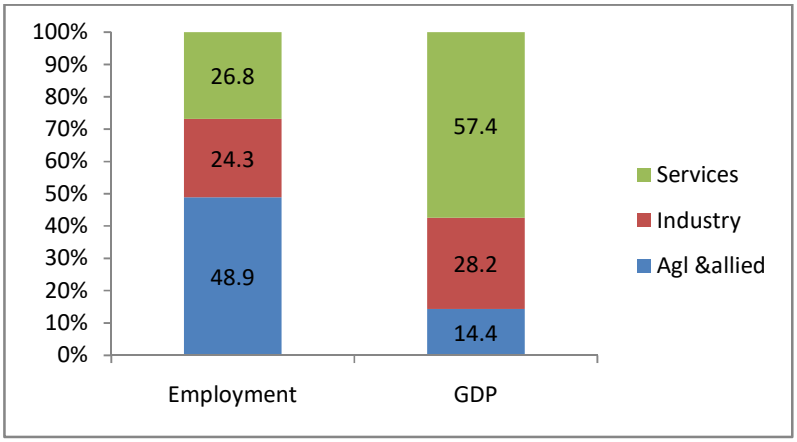
Figure 3.1: Share of Employment and Output by Sectors (%) in 2011-12



Source: National Account Statistics, CSO and NSSO

The data show that in terms of jobs creation, low value added and low productive manufacturing sectors such as textile and food (including beverages & tobacco) industries together account for about 41 per cent of jobs in the organized manufacturing sector. Enterprises such as wearing apparel, textile, furniture and wood products produced low-end products which are consumed by the lower income quintiles of the population. These industries have potential to grow if constraints faced by them are addressed through a suitable policy framework. In the next section, we first identify the registered labour intensive industries at the NIC 3-digit level and then discuss their performance in terms of employment, output and elasticity as compared to overall manufacturing sector.

3.1. Analysis of Labour Intensity

Table 3.2 shows the labour intensity of labour intensive manufacturing industries in India during the period 1980-81 to 2007-08. The labour intensity has been measured by using the ratio of labour to capital stock. It indicates number of labour units required per unit of capital to produce a given level of output. This has been calculated for all 58 manufacturing industries at 3-digit NIC level.[6] The ratio works out at 0.584 for all manufacturing industries. Industries having ratios above the national average have been reported in Table 3.2. There are 17 manufacturing industries that have been considered relatively more labour intensive than others and have been chosen in this study for a detailed analysis. There are many labour intensive industries where labour intensive ratio is more than one such as manufacture of tobacco products, saw milling and planing of wood, manufacture of wearing apparel except

[6] Out of total 60 industries, 2 have been dropped from the present analysis because of insufficient time series information.

fur apparel, manufacture of railway and tramway locomotives and rolling stock, manufacture of grain mill products, starches and starch products, and prepared animal feeds, dressing and dyeing of fur and manufacture of articles of fur. These industries use more than one unit of labour per unit of capital to produce a given level of output. There are other industries where the ratio is close to one are manufacture of knitted and crocheted fabrics and articles and manufacture of footwear. The findings of the study are very similar to the findings of the previous studies (Das et al., 2009; Sen and Das, 2014) despite the differences in data periods and classification of industries.

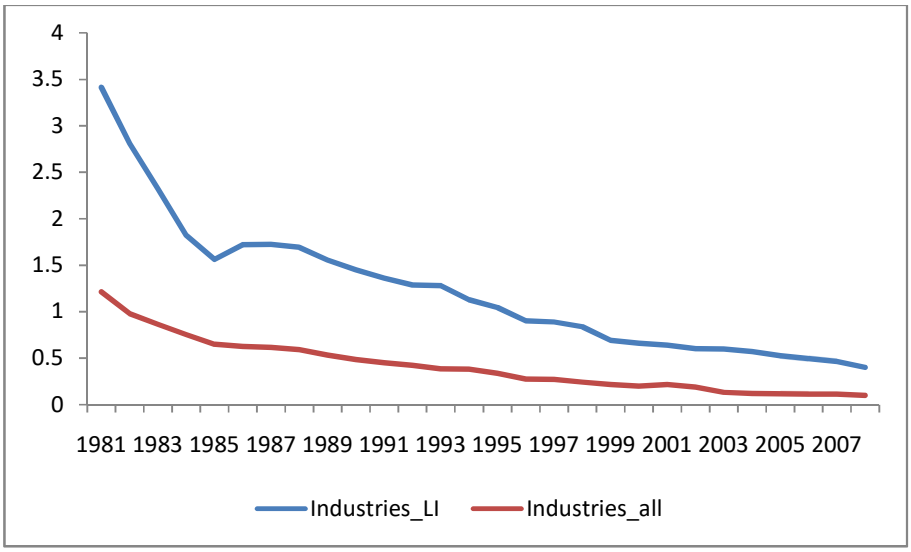
Table 3.2. Labour Intensity of Labour Intensive Manufacturing Industries in India: 1980-81 to 2007-08

Sl. No.	Industries	NIC-2004	L/K
1	Manufacture of tobacco products	160	4.308
2	Saw milling and planing of wood	201	2.015
3	Manufacture of wearing apparel, except fur apparel	181	1.702
4	Manufacture of railway and tramway locomotives and rolling stock	352	1.370
5	Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	1.171
6	Dressing and dyeing of fur; manufacture of articles of fur	182	1.049
7	Manufacture of knitted and crocheted fabrics and articles	173	0.983
8	Manufacture of footwear	192	0.973
9	Manufacture of furniture	361	0.882
10	Manufacture of products of wood, cork, straw and plaiting materials	202	0.795
11	Manufacture of other electrical equipment n.e.c.	319	0.736
12	Manufacture of glass and glass products	261	0.721
13	Manufacturing n.e.c.	369	0.709
14	Manufacture of optical instruments and photographic equipment	332	0.705
15	Manufacture of other food products	154	0.688
16	Casting of metals	273	0.640
17	Manufacture of other textiles	172	0.604
	Average (All industries)		**0.584**

Source: Author's calculation

The trends of labour intensity of labour intensive manufacturing industries and all manufacturing industries during the period 1980 and 2008 are illustrated in **Figure 3.2**. The figure shows that in case of labour intensive manufacturing industries, labour intensity ratio was more than one till 1995 and declined thereafter. Between all industries and labour intensive industries, labour intensity has declined more in the case of latter than the former.

Figure 3.2. Trends in Labour Intensity of Manufacturing Industries (Weighted Average)



Source: Author's calculation

For the period 2008-09 to 2012-13, the list of labour intensive registered manufacturing industries at 3-digit NIC-2008 classification is given in **Table 3.2a**. The average labour intensity for all industries is turned out to be 0.157. Industries that are above the average are considered as labour intensive ones. In total 22 registered manufacturing industries have been selected as labour intensive industries. The value added contribution of these industries to value added of all registered manufacturing industries is 12.7 per cent, which is lower than the average share of 13.87 per cent for the period 2000-01 to 2007-08.[7] The employment share of labour intensive industries shows 24.08 per cent for the period 2008-09 to 2012-13. Some of the industries (tobacco products, wearing apparel, knitted and crocheted apparel, furniture, and other food products) which are relatively comparable for both NIC-04 and NIC-08 codes show decline in labour intensity during 2008-09 and 2012-13 as compared to 2000-01 and 2007-08.

[7]It is important to note here that labour intensive industries that are reported in two sub-periods i.e., 2000-01 to 2007-08 and 2008-09 to 2012-13 are not strictly comparable. While industries for the former period are based on NIC-04 code, industries for the latter period are based on NIC-08 code.

Table 3.2a. Labour Intensity of Labour Intensive Manufacturing Industries in India: 2008-09 to 2012-13

Sl. No.	Industries	NIC-2008	L/K
1	Manufacture of tobacco products	120	1.059
2	Manufacture of games and toys	324	0.827
3	Manufacture of wearing apparel, except fur apparel	141	0.789
4	Manufacture of military fighting vehicles	304	0.696
5	Processing and preserving of fish, crustaceans and molluscs and products thereof	102	0.546
6	Materials recovery	383	0.515
7	Manufacture of jewellery, bijouterie and related articles	321	0.405
8	Manufacture of transport equipment n.e.c.	309	0.390
9	Manufacture of knitted and crocheted apparel	143	0.384
10	Manufacture of prepared animal feeds	108	0.366
11	Manufacture of musical instruments	322	0.357
12	Repair of fabricated metal products, machinery and equipment	331	0.319
13	Manufacture of structural metal products, tanks, reservoirs and steam generators	251	0.306
14	Manufacture of weapons and ammunition	252	0.299
15	Manufacture of optical instruments and equipment	267	0.230
16	Manufacture of furniture	310	0.225
17	Installation of industrial machinery and equipment	332	0.221
18	Manufacture of articles of fur	142	0.191
19	Manufacture of medical and dental instruments and supplies	325	0.176
20	Processing and preserving of meat	101	0.168
21	Manufacture of sports goods	323	0.167
22	Manufacture of other food products	107	0.162
	Average of all industries		**0.157**

Source: Author's calculation

After identifying the labour intensive industries, in the next step we discuss the changes of intensity over the period to understand the changes of employment vis-à-vis capital to produce a given level of output. **Table 3.3** shows the changes in labour intensity of labour intensive industries and all manufacturing industries during the pre- and post-reforms periods. All industries' average labour intensity ratio shows close to one during the pre-reforms period (1980-81 to 1989-90) which indicates that equal number of labour and capital units are required to produce a given level of output. However, the ratio has declined continuously during the post-reforms period to 0.458 between 1990-91 and 1999-2000 to 0.279 between 2000-01 and 2007-08. It suggests that manufacturing industries have gradually moved from labour intensive to capital intensive over the period. More interestingly, the similar trends are also visible in the case of labour intensive manufacturing industries. The rate of decline of labour intensity is even more pronounced in the case of labour intensive industries than capital intensive ones. It indicates that labour intensive industries are also embarking the modern technology as a substitute of labour in the production process. Among

the labour intensive industries, the ratio has fallen at faster rates in the case of top four labour intensive industries as compared to others. We also find similar results for the period 2008-09 to 2012-13 at aggregate levels although it varies to some extent at the disaggregated levels.

Table 3.3. Changes in Labour Intensity (L/K)

Sl. No	Industries	NIC-2004	Pre-reform	Post-reform		
			1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
1	Manufacture of tobacco products	160	7.44	3.62	1.96	3.11
2	Saw milling and planing of wood	201	3.35	1.60	0.90	1.34
3	Manufacture of wearing apparel, except fur apparel	181	3.28	1.03	0.57	0.82
4	Manufacture of railway and tramway locomotives and rolling stock	352	2.56	1.16	0.14	0.71
5	Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	1.88	1.00	0.50	0.78
6	Dressing and dyeing of fur; manufacture of articles of fur	182	1.87	0.95	0.28	0.65
7	Manufacture of knitted and crocheted fabrics and articles	173	1.81	0.65	0.37	0.53
8	Manufacture of footwear	192	1.91	0.51	0.38	0.45
9	Manufacture of furniture	361	1.71	0.52	0.30	0.42
10	Manufacture of products of wood, cork, straw and plaiting materials	202	1.46	0.53	0.30	0.42
11	Manufacture of other electrical equipment n.e.c.	319	1.41	0.44	0.27	0.36
12	Manufacture of glass and glass products	261	1.66	0.29	0.08	0.20
13	Manufacturing n.e.c.	369	1.06	0.63	0.36	0.51
14	Manufacture of optical instruments and photographic equipment	332	1.49	0.36	0.15	0.27
15	Manufacture of other food products	154	1.34	0.40	0.24	0.33
16	Casting of metals	273	-	0.98	0.25	0.64
17	Manufacture of other textiles	172	0.98	0.41	0.33	0.38
	Average (labour intensive industries)		**2.201**	**0.887**	**0.434**	**0.701**
	Average (All industries)		**0.952**	**0.458**	**0.279**	**0.375**

Source: Author's calculation

3.2. Performance of Labour Intensive Industries

In this section we discuss the performance of registered labour intensive industries vis-à-vis all manufacturing industries using a long span of 34 years time series data. The value added share of labour intensive manufacturing industries to all manufacturing industries is reported in **Table 3.4**. The average value added share was 14.79 per cent during 1990-91 and 2007-08 as compared to 13.72 per cent during the pre-reforms period (1980-81 to 1989-90). The value added contribution comes more from manufacture of other food products (4.1%) followed by manufacture of wearing apparel except fur apparel (1.77%), manufacture of tobacco products (1.75%) and manufacture of grain mill products, starches and starch products (1.33%) . While the value added contribution of some industries such as manufacturing of other food products, manufacture of railway and tramway locomotives and manufacture of furniture has declined from pre-reform period to post-reforms period, it shows opposite trends for manufacture of tobacco products, manufacture of wearing apparel except fur apparel, manufacture of grain mill products, starches and starch products and manufacture of knitted and crocheted fabrics and articles.

In contrast to value added share, the employment share of labour intensive manufacturing industries to all manufacturing industries has remained reasonably high as illustrated in **Table 3.5**. It was 25.5 per cent during the pre-reforms period (1980-81 to 1989-90) and increased to 31.6 per cent during the post-reforms period (1990-91 to 2007-08). Among the labour intensive industries, the highest employment share is reported in the case of manufacture of other food products (8.59%) followed by manufacture of tobacco products (5.88%), manufacture of wearing apparel except fur apparel (3.96%) and manufacture of grain mill products, starches and starch products (3.74%). Interestingly, these are industries that have also contributed more in terms of value added as compared to other labour intensive industries. It is pertinent to be noted here that there are a few labour intensive industries that are embarking modern technology as substitutes of labour to sustain their production activities. For example, tobacco industries in India are using modern technology in processing and manufacturing of cigarette production (FAO, 2003).[8]

[8] Issues in the Global Tobacco Economy: Selected case studies. http://www.fao.org/3/a-y4997e.pdf

Table 3.4. Gross Value Added (GVA) Share of Labour Intensive Industries in Total Manufacturing Value Added (in Percent) by Industries

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	0.923	1.75	1.743	1.746
Saw milling and planing of wood	201	0.128	0.045	0.019	0.029
Manufacture of wearing apparel except fur apparel	181	0.648	1.882	1.703	1.773
Manufacture of railway and tramway locomotives and rolling stock	352	2.002	1.022	0.193	0.518
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	1.295	1.351	1.315	1.329
Dressing and dyeing of fur; manufacture of articles of fur	182	0.006	0.012	0.006	0.009
Manufacture of knitted and crocheted fabrics and articles	173	0.255	0.461	0.698	0.605
Manufacture of footwear	192	0.487	0.567	0.426	0.481
Manufacture of furniture	361	0.345	0.199	0.216	0.209
Manufacture of products of wood, cork, straw and plaiting materials	202	0.336	0.254	0.185	0.212
Manufacture of other electrical equipment n.e.c.	319	0.205	0.147	0.273	0.224
Manufacture of glass and glass products	261	0.535	0.505	0.481	0.49
Manufacturing n.e.c.	369	0.527	0.941	1.137	1.06
Manufacture of optical instruments and photographic equipment	332	0.051	0.082	0.091	0.087
Manufacture of other food products	154	5.795	5.004	3.471	4.071
Casting of metals	273	-	0.865	0.714	0.773
Manufacture of other textiles	172	0.435	0.436	0.689	0.589
Value Added Share (%)		**13.72**	**15.53**	**13.87**	**14.79**

Source: Author's calculation

Table 3.5. Employment Share of Labour Intensive Industries in Total Manufacturing Industries (percent) by Industry

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	2.90	6.18	5.54	5.88
Saw milling and planing of wood	201	0.44	0.23	0.13	0.18
Manufacture of wearing apparel, except fur apparel	181	1.02	2.86	5.24	3.96
Manufacture of railway and tramway locomotives and rolling stock	352	3.02	2.34	0.29	1.39
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	3.22	3.62	3.86	3.74
Dressing and dyeing of fur; manufacture of articles of fur	182	0.01	0.02	0.02	0.02
Manufacture of knitted and crocheted fabrics and articles	173	0.31	0.61	1.81	1.17
Manufacture of footwear	192	0.66	0.96	1.26	1.10
Manufacture of furniture	361	0.32	0.26	0.35	0.30
Manufacture of products of wood, cork, straw and plaiting materials	202	0.64	0.57	0.52	0.55
Manufacture of other electrical equipment n.e.c.	319	0.17	0.16	0.35	0.25
Manufacture of glass and glass products	261	0.88	0.71	0.61	0.67
Manufacturing n.e.c.	369	0.48	0.89	1.61	1.22
Manufacture of optical instruments and photographic equipment	332	0.03	0.06	0.07	0.07
Manufacture of other food products	154	10.85	8.87	8.25	8.59
Casting of metals	273		1.32	1.42	1.36
Manufacture of other textiles	172	0.55	0.63	1.74	1.15
Total Employment share		**25.50**	**30.32**	**33.08**	**31.60**

Source: Author's calculation using ASI data

Gross Value Added and Employment Growth

The growth (weighted) of gross value added of labour intensive industries and all industries over the period are illustrated in **Table 3.6**. The trends show that the average growth of gross value added of labour intensive industries has increased from 8.52 per cent during 1980-81 and 1989-90 to 9.45 per cent during 1990-91 and 2007-08. Interestingly, the weighted average growth of all industries has increased at a faster rate during the same period as compared to labour intensive industries. It suggests that as compared to labour intensive industries, capital intensive industries have registered substantial output expansion during the post-reforms period. Among the largest employment generating labour intensive industries, except tobacco industry, all other industries (manufacture of wearing apparel except fur apparel, manufacture of grain mill products, starches and starch products, manufacture of other food products) have registered healthy growth during the post-reforms period.

The growth rates of employment of different labour intensive industries are reported in **Table 3.7**. It is observed that a considerable downward slide in growth rate of employment in major labour intensive industries during the post-reforms period is a major concern. Except wearing apparel industry, all other major industries such as tobacco products, manufacture of grain mill products, starches and starch products and manufacture of other food products have shown decline in employment growth during the post-reforms period as compared to pre-reforms period. However, the overall employment growth of all labour intensive industries recorded considerable improvement of employment growth during the post-reforms period as compared to pre-reforms period largely due to higher growth in industries such as dressing and dyeing of fur, manufacture of knotted and crocheted fabrics and articles, manufacture of furniture and manufacturing n.e.c. (includes sports goods, games and toys, musical instruments etc.).

In the recent period (2008-09 to 2012-13), we find that the gross value added growth rate of both labour intensive industries and all manufacturing industries has slowed down as compared to the earlier period (2000-01 to 2007-08) (**Table 3.7a**). This is mainly due to the negative impact of financial crisis on the economy during the period 2008-09 and 2009-10. The employment growth rate however shows marginal improvement in the recent period over 2000-08 for both labour intensive industries and all manufacturing industries despite a significant increase of real wage rate of workers from 2.64 per cent in the latter period to 8.41 per cent in the recent period.

Table 3.6 Changes in GVA Growth of Labour Intensive Industries

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	14.33	11.70	3.07	8.15
Saw milling and planing of wood	201	2.30	0.46	13.05	5.65
Manufacture of wearing apparel except fur apparel	181	19.40	6.08	10.22	7.89
Manufacture of railway and tramway locomotives and rolling stock	352	5.86	-2.62	13.68	4.51
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	10.80	10.07	11.93	10.84
Dressing and dyeing of fur; manufacture of articles of fur	182	7.21	-6.35	2.17	-3.80
Manufacture of knitted and crocheted fabrics and articles	173	17.86	17.70	18.32	17.88
Manufacture of footwear	192	13.16	4.79	9.08	6.56
Manufacture of furniture	361	-3.84	9.63	15.17	12.00
Manufacture of products of wood, cork, straw and plaiting materials	202	7.20	4.99	27.04	13.26
Manufacture of other electrical equipment n.e.c.	319	11.06	5.87	13.33	9.35
Manufacture of glass and glass products	261	8.80	12.56	9.69	11.38
Manufacturing n.e.c.	369	-5.64	15.27	17.81	16.54
Manufacture of optical instruments and photographic equipment	332	-0.65	2.04	15.61	8.21
Manufacture of other food products	154	11.50	7.25	7.94	7.51
Casting of metals	273		2.94	15.40	9.17
Manufacture of other textiles	172	2.78	14.67	11.02	13.17
Weighted Average (Labour Intensive Industries)		**8.52**	**9.35**	**9.59**	**9.45**
Weighted Average (All industries)		**8.94**	**10.30**	**15.82**	**12.78**

Table 3.7. Changes in Employment Growth of Labour Intensive Industries

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	7.90	1.50	-2.09	0.02
Saw milling and planing of wood	201	-3.98	-5.38	1.92	-2.64
Manufacture of wearing apparel except fur apparel	181	8.34	11.96	9.88	11.11
Manufacture of railway and tramway locomotives and rolling stock	352	0.12	-0.27	6.64	2.20
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	3.70	3.26	2.14	2.80
Dressing and dyeing of fur; manufacture of articles of fur	182	4.88	8.67	29.51	14.35
Manufacture of knitted and crocheted fabrics and articles	173	10.38	11.59	16.85	13.76
Manufacture of footwear	192	6.36	2.69	8.32	5.01
Manufacture of furniture	361	-4.17	8.41	9.38	8.77
Manufacture of products of wood, cork, straw and plaiting materials	202	0.37	0.14	6.01	2.56
Manufacture of other electrical equipment n.e.c.	319	3.74	4.08	6.69	5.22
Manufacture of glass and glass products	261	-0.80	0.51	2.36	1.20
Manufacturing n.e.c.	369	3.82	10.66	11.02	10.82
Manufacture of optical instruments and photographic equipment	332	7.28	10.46	7.89	9.40
Manufacture of other food products	154	-3.36	1.02	0.47	0.79
Casting of metals	273		-1.64	6.95	2.12
Manufacture of other textiles	172	0.99	9.34	-2.94	4.73
Weighted Average (Labour Intensive Industries)		**0.53**	**3.19**	**4.39**	**3.72**
Weighted Average (All industries)		**0.81**	**1.96**	**3.95**	**2.85**

Table 3.7a. Changes in employment and GVA growth (2008-09 to 2012-13)

Industries	NIC-2008	Changes in employment growth	Changes in GVA growth
Manufacture of tobacco products	120	0.82	16.29
Manufacture of games and toys	324	-3.36	-21.52
Manufacture of wearing apparel except fur apparel	141	1.23	8.42
Manufacture of weapons and ammunition	304	-27.08	-3.49
Processing and preserving of fish, crustaceans and molluscs and products thereof	102	0.89	22.57
Materials recovery	383	2.52	-10.93
Manufacture of jewellery, bijouterie and related articles	321	9.51	19.20
Manufacture of transport equipment n.e.c.	309	8.43	12.21
Manufacture of knitted and crocheted apparel	143	6.32	13.68
Manufacture of prepared animal feeds	108	9.02	-19.39
Manufacture of musical instruments	322	-4.93	-4.50
Repair of fabricated metal products, machinery and equipment	331	2.98	6.44
Manufacture of structural metal products, tanks, reservoirs and steam generators	251	1.77	3.96
Manufacture of weapons and ammunition	252	11.07	18.74
Manufacture of optical instruments and equipment	267	32.32	3.53
Manufacture of furniture	310	9.19	1.40
Installation of industrial machinery and equipment	332	53.99	80.00
Manufacture of articles of fur	142	-25.79	-2.16
Manufacture of medical and dental instruments and supplies	325	14.67	22.02
Processing and preserving of meat	101	13.81	15.38
Manufacture of sports goods	323	10.20	9.29
Manufacture of other food products	107	2.32	9.14
Weighted Average (Labour Intensive Industries)		**3.74**	**8.82**
Weighted Average (All industries)		**4.15**	**13.74**

Employment Elasticity

Employment elasticity of labour intensive industries over the period is reported in **Table 3.8**. Employment elasticity implies proportionate changes of output with respect to proportionate changes of employment. If elasticity is more than one, it indicates high elasticity and less than one implies the opposite. In other words, low elasticity of employment suggests that changes of output are less responsive to changes of employment. The table shows that employment elasticity of labour intensive industries has remained persistently low during the pre- and post-reforms periods. Similarly, employment elasticity of all manufacturing industries has also remained low throughout the pre- and post-reforms periods. Among the labour intensive industries, the largest employment generating sectors such as tobacco products, other food products, wearing apparel and saw milling and planning of wood demonstrate low elasticity of employment. On the other hand, sectors such as manufacture of knotted and crocheted fabrics and articles and manufacture of other electrical equipments have reported high employment elasticity. There are few critical labour intensive sectors such as footwear and furniture have reported either negative employment elasticity or extremely low employment elasticity during the post-reforms period. The employment output elasticity for the recent period (2008-09 and 2012-13) reported in **Table 3.8a** shows that it continued to remain low both for labour intensive and all manufacturing industries suggesting unresponsiveness of output changes to employment changes. But the silver line is that the elasticity has improved in the recent period both in case of all manufacturing industries and all labour intensive industries. Among the comparable industries for both the periods, while tobacco and furniture industries recorded decline in elasticity in the recent period, other industries such as manufacture of wearing apparel and manufacture of knitted and crocheted apparel show the reverse trend.

Table 3.8. Changes in Employment Elasticity of Labour Intensive Industries

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	1.01	0.19	0.68	0.38
Saw milling and planing of wood	201	0.73	0.13	0.03	0.09
Manufacture of wearing apparel, except fur apparel	181	0.26	0.83	0.82	0.82
Manufacture of railway and tramway locomotives and rolling stock	352	0.48	0.80	-0.35	0.39
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	-0.46	0.09	0.26	0.16
Dressing and dyeing of fur; manufacture of articles of fur	182	-0.28	-0.37	2.26	0.83
Manufacture of knitted and crocheted fabrics and articles	173	1.01	1.33	1.07	1.23
Manufacture of footwear	192	0.36	-0.01	0.28	0.10
Manufacture of furniture	361	0.19	-0.95	1.23	-0.14
Manufacture of products of wood, cork, straw and plaiting materials	202	0.49	1.08	0.05	0.69
Manufacture of other electrical equipment n.e.c.	319	-0.19	0.95	1.04	0.98
Manufacture of glass and glass products	261	0.60	-0.32	0.02	-0.19
Manufacturing n.e.c.	369	-0.06	0.41	0.45	0.43
Manufacture of optical instruments and photographic equipment	332	0.02	0.70	0.09	0.47
Manufacture of other food products	154	-0.29	0.90	0.10	0.60
Casting of metals	273		0.49	0.35	0.45
Manufacture of other textiles	172	0.15	0.22	1.74	0.66
Weighted Average (Labour Intensive Industries)		**0.05**	**0.41**	**0.46**	**0.43**
Weighted Average (All industries)		**0.14**	**0.37**	**0.44**	**0.40**

Table 3.8a: Changes in Employment Elasticity in Labour Intensive Industries (2008-09 to 2012-13)

Industries	NIC-2008	Elasticity
Manufacture of tobacco products	120	0.31
Manufacture of games and toys	324	-0.77
Manufacture of wearing apparel except fur apparel	141	3.20
Manufacture of weapons and ammunition	304	2.64
Processing and preserving of fish, crustaceans and molluscs and products thereof	102	0.05
Materials recovery	383	0.84
Manufacture of jewellery, bijouterie and related articles	321	-0.30
Manufacture of transport equipment n.e.c.	309	-0.94
Manufacture of knitted and crocheted apparel	143	3.02
Manufacture of prepared animal feeds	108	-0.16
Manufacture of musical instruments	322	0.37
Repair of fabricated metal products, machinery and equipment	331	0.43
Manufacture of structural metal products, tanks, reservoirs and steam generators	251	0.48
Manufacture of weapons and ammunition	252	-0.02
Manufacture of optical instruments and equipment	267	0.91
Manufacture of furniture	310	0.18
Installation of industrial machinery and equipment	332	0.49
Manufacture of articles of fur	142	2.99
Manufacture of medical and dental instruments and supplies	325	0.26
Processing and preserving of meat	101	0.10
Manufacture of sports goods	323	-3.04
Manufacture of other food products	107	-0.037
Weighted Average (Labour Intensive Industries)		**0.51**
Weighted Average (All industries)		**0.45**

Overall, the study finds that manufacturing sector has performed really well in terms of GDP growth during the post-reforms period. However, the sector's employment growth has remained tepid during the same period. Importantly, low valued added labour intensive manufacturing industries which contribute considerably to overall employment generation of the sector are continued to perform well in terms of employment generation, although the growth rate of employment has slowed down in the recent years owing to capital used a substitute and increase in real wage rate. This is evident from the data of registered manufacturing industries that labour intensity has declined continuously since 1980s. Nevertheless, the value added contribution of labour intensive registered manufacturing industries to overall registered manufacturing industries has increased from 13.72 per cent during the pre-reforms period (1980-81 to 1989-90) to 14.79 per cent during the post-reforms

period (1990-91 and 2007-08). Similarly, its employment contribution has increased from 25.5 per cent during the pre-reforms period (1980-81 to 1989-90) to 31.6 per cent during the post-reforms period (1990-91 to 2007-08). In terms of employment elasticity, both labour intensive and all manufacturing industries show low elasticity during the pre- and post-reforms periods suggesting that output is less responsive to employment generation in the sector. The reasons could be due to low productivity and efficiency of labour force in the sector.

Chapter 4

Productivity and Efficiency of labour Intensive Manufacturing Industries

4.1. Introduction

Productivity and efficiency of manufacturing industries in India has been discussed and debated extensively in the literature. However, the findings of different studies are not unanimous because of different methods and data points used by them. While studies such as Krishna and Mitra (1998) and Unel (2003) find an acceleration in TFPG in the 1990s, other studies like Trivedi et al. (2000), Srivastav (2000), Balkrishnan et al. (2000), Goldar and Kumari (2003), Goldar (2004, 2006), Das (2004) find a deceleration in TFPG in the 1990s. Unel's estimates show that the average annual growth rate in TFP in aggregate manufacturing is 1.8 per cent per annum for the period 1979-80 to 1990-91 and 2.5 per cent per annum for the period 1991-92 to 1997-98. On the other hand, Goldar and Kumari (2003) found that TFPG declined from 1.89 per cent per annum during the period 1981-82 to 1990-91 to 0.69 per cent per annum during the period 1990-91 to 1997-98.

In case of productivity and efficiency of labour intensive industries, which has been debated very recently, it is found that not many in-depth researches have been done in the Indian case. In this context, the present study uses a long span data of 34 years covering both pre- and post-reform periods to analyse the productivity and efficiency of labour intensive registered manufacturing industries using ASI data at NIC-3-digit level.

As discussed in the literature, two prime techniques are used to measure TFP. One is frontier approach and second is non-frontier approach. These two approaches are further classified into parametric and non-parametric techniques. The present study uses growth accounting (GA) (non-parametric), Levinsohn-Petrin (LP) (semi-parametric) and stochastic production frontier analysis (SFA) (parametric) approaches to estimate TFP. It is important to point out here that we estimate TFP in growth form as it is more appropriate than level one. Kathuria et al. (2013) pointed out that TFP in levels are sensitive to the units of measurement of inputs and outputs and they are rarely estimated.

In this chapter we estimate and discuss the results of partial and TFP of labour intensive registered manufacturing industries for the period 1980-81 to 2012-13. The analysis is done both at aggregate and disaggregate levels for the pre- and post-reforms periods.

4.2. Measurement of Labour and Capital Productivity

Labour productivity (Q/L) is defined as output per unit of labour. Similarly, capital productivity (Q/K) is defined as output per unit of capital. These are estimate of partial productivity of factors of production. The growth of labour productivity of all labour intensive industries shows a continuous decline and even at a higher rate as compared to all manufacturing industries (**Table 4.1**). The reasons could be the employment growth in labour intensive industries that have increased at a faster rate than output expansion. While value added growth of labour intensive industries increased from 8.52 per cent during 1980-81 and 1989-90 to 9.45 per cent during 1990-91 and 2007-08, the employment growth registered a faster growth from 0.53 to 3.72 per cent respectively during the same period. Another plausible factor that may be responsible for declining labour productivity is shortage of skilled manufacturing manpower. Among the labour intensive industries, labour productivity has declined substantially in industries such as manufacture of other food products, manufacture of tobacco products, manufacture of wearing apparel and manufacture of knitted and crocheted fabrics and articles. But, the results for the recent period (2008-09 to 2012-13) confirm that there is a turnaround in labour productivity, where some of the labour intensive industries namely manufacturing of wearing apparel, manufacture of knitted and crocheted apparel, articles of fur and other food products show an increase in labour productivity (**Table 4.1a**).

The results also show that all labour intensive industries evidence decline in capital productivity during the post-reforms period (**Table 4.2)**. Capital productivity implies output produced per unit of capital. Capital productivity of labour intensive industries was (-) 0.45 between 1980-81 and 1989-90 and it declined to (-)1.46 between 1990-91 and 1999-2000 and further to (-)2.53 between 2000-01 and 2007-08. The reasons of decline in capital productivity in labour intensive industries could be due to the fact that industries are primarily employing more unskilled labour force that leads to sub-optimal use of machinery and equipments. Interestingly, some of labour intensive industries (wearing apparel, except fur apparel, knitted and crocheted fabrics and articles, other food products, other textiles) have reported decline in both labour and capital productivity. In contrast to labour intensive industries, all

manufacturing industries show an improvement in capital productivity during the post-reforms period. Capital productivity of all industries was negative (- 3.73) between 1980-81 and 1989-90, which increased to 0.81 between 1990-91 and 1999-2000 and further to 5.7 between 2000-01 and 2007-08. But, the recent period data show contrasting results where industries that recorded a decline in labour productivity between 2000-01 and 2007-08 have posted an increase in capital productivity and vice-versa (**Table 4.1a**).

Table 4.1. Changes in Labour Productivity Growth in Labour Intensive Industries

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	7.37	10.79	5.42	8.58
Saw milling and planing of wood	201	7.31	5.30	11.91	8.03
Manufacture of wearing apparel except fur apparel	181	10.06	3.35	0.36	2.12
Manufacture of railway and tramway locomotives and rolling stock	352	5.65	-1.63	16.37	6.24
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	9.38	9.47	9.37	9.43
Dressing and dyeing of fur; manufacture of articles of fur	182	18.53	3.50	25.98	12.15
Manufacture of knitted and crocheted fabrics and articles	173	8.60	6.76	-1.55	3.34
Manufacture of footwear	192	6.86	2.23	0.71	1.60
Manufacture of furniture	361	5.35	20.21	2.66	12.99
Manufacture of products of wood, cork, straw and plaiting materials	202	7.23	5.35	10.88	7.63
Manufacture of other electrical equipment n.e.c.	319	5.20	4.56	5.47	4.96
Manufacture of glass and glass products	261	9.24	12.12	9.50	11.04
Manufacturing n.e.c.	369	6.70	7.03	6.19	6.66
Manufacture of optical instruments and photographic equipment	332	2.13	8.17	-0.60	4.66
Manufacture of other food products	154	16.66	6.37	1.98	4.56
Casting of metals	273		8.05	8.06	8.05
Manufacture of other textiles	172	9.41	4.81	-8.86	-0.32
Weighted Average (Labour Intensive Industries)		13.95	7.97	1.37	5.02
Weighted Average (All industries)		8.32	7.19	5.42	6.40

Table 4.1a. Changes in Labour and Capital Productivity (2008-09 to 2012-13)

Industries	NIC-2008	Changes in Labour Productivity	Changes in Capital Productivity
Manufacture of tobacco products	120	4.21	-2.65
Manufacture of games and toys	324	-16.39	152.55
Manufacture of wearing apparel except fur apparel	141	7.36	-2.41
Manufacture of military fighting vehicles	304	33.56	27.20
Processing and preserving of fish, crustaceans and molluscs and products thereof	102	19.34	-30.08
Materials recovery	383	-17.81	33.46
Manufacture of jewellery, bijouterie and related articles	321	8.62	-7.75
Manufacture of transport equipment n.e.c.	309	3.76	-26.49
Manufacture of knitted and crocheted apparel	143	6.07	7.88
Manufacture of prepared animal feeds	108	-34.91	-7.56
Manufacture of musical instruments	322	-0.66	-13.03
Repair of fabricated metal products, machinery and equipment	331	5.68	-39.18
Manufacture of structural metal products, tanks, reservoirs and steam generators	251	2.68	-14.05
Manufacture of weapons and ammunition	252	-23.19	-24.15
Manufacture of optical instruments and equipment	267	-3.06	-16.55
Manufacture of furniture	310	-6.86	8.96
Installation of industrial machinery and equipment	332	56.86	128.94
Manufacture of articles of fur	142	20.04	-5.67
Manufacture of medical and dental instruments and supplies	325	6.09	-1.87
Processing and preserving of meat	101	2.10	-1.23
Manufacture of sports goods	323	0.82	-5.03
Manufacture of other food products	107	6.65	-4.09
Weighted Average (Labour Intensive Industries)		**5.63**	**- 0.8**
Weighted Average (All industries)		**6.20**	**4.33**

Table 4.2. Changes in Capital Productivity Growth in Labour Intensive Industries

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	1.29	-1.75	-2.57	-2.09
Saw milling and planing of wood	201	-4.26	0.65	-2.52	-0.54
Manufacture of wearing apparel except fur apparel	181	-3.36	-4.78	-1.79	-3.55
Manufacture of railway and tramway locomotives and rolling stock	352	-6.46	-12.08	13.59	-1.51
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	-0.96	-0.76	1.92	0.34
Dressing and dyeing of fur; manufacture of articles of fur	182	-19.29	-9.41	-4.66	-8.32
Manufacture of knitted and crocheted fabrics and articles	173	-3.78	-3.66	-4.33	-3.94
Manufacture of footwear	192	-11.17	-4.11	3.07	-1.15
Manufacture of furniture	361	-0.64	6.06	-0.87	3.03
Manufacture of products of wood, cork, straw and plaiting materials	202	-6.04	-2.43	9.73	2.58
Manufacture of other electrical equipment n.e.c.	319	-5.97	-5.37	-5.80	-5.57
Manufacture of glass and glass products	261	-10.14	-4.97	1.72	-2.22
Manufacturing n.e.c.	369	0.19	-0.52	6.38	2.50
Manufacture of optical instruments and photographic equipment	332	-11.89	-3.66	-6.98	-4.99
Manufacture of other food products	154	-0.70	-0.20	-4.34	-1.90
Casting of metals	273		-14.44	1.88	-7.30
Manufacture of other textiles	172	0.20	1.12	-5.04	-1.41
Weighted Average (Labour Intensive Industries)		**-0.45**	**-1.46**	**-2.53**	**-1.93**
Weighted Average (All industries)		**-3.73**	**0.81**	**5.70**	**2.98**

4.3 Total Factor Productivity

As reported in earlier chapters, we estimate total factor productivity of each industry by using three well defined approaches. These are growth accounting method, Levinsohn-Petrin (LP) method and stochastic frontier method. The results of growth accounting method are reported in **Table 4.3**. The results suggest that the TFPG of labour intensive industries has declined continuously from pre-reforms period to post-reforms period. The decline in TFPG is found more intense in high employment generating sectors such as manufacture of other food products, tobacco products and wearing apparel. Industries that have seen improved productivity growth during the post-reform period as compared to pre-reform period are manufacture of grain mill products, manufacture of furniture, manufacture of other electrical equipment n.e.c., manufacture of other textiles, manufacture of glass and glass products. The results of GA method broadly indicate that high (low) employment generating industries recorded low (high) productivity growth.

In similar to the results of GA method, the results of LP method indicate a continuous decline in TFPG of labour intensive manufacturing industries during the post-reforms period (**Table 4.4**). However, across the industries, the result differs from the findings of GA method. For example, tobacco industry which showed considerable decline in TFPG during the post-reforms period in GA method, registered a marginal improvement in the LP method. A similar result is also found in the case of manufacture of wearing apparel industry. Industries those have recorded improvement in productivity growth during the post-reforms period in both GA and LP methods are grain mill products, manufacture of furniture, manufacture of other electrical equipment n.e.c., manufacture of other textiles. In general, the results of both the methods showed that industries having low employment share are the ones that have registered an improvement in TFPG during the post-reforms period.

The results of SPF method corroborate the findings of earlier two methods. The technical efficiency of all labour intensive industries has declined during the post-reforms period (**Table 4.5**). More importantly, all major labour intensive industries have also apparently recorded a decline in technical efficiency over the period. The largest employment generating industries such as manufacture of tobacco products, saw milling and planing of wood, manufacture of wearing apparel, manufacture of other food products, manufacture of grain mill products, starches and starch products – all have recorded a continuous decline in technical efficiency during the post-reforms period. However, the results of TFPG for the

period 2008-09 to 2012-13 show that a few labour intensive industries recorded an increase in productivity growth under the GA and LP methods, although SPF method suggests a decline in TFPG (**Table 4.5a**). Nevertheless, this study finds that there is a turnaround visible in labour and capital productivity growth and also TFPG in some of the labour intensive registered manufacturing industries ((Saw milling and planing of wood (201), railway and tramway locomotives and rolling stock (352), grain mill products, starches and starch products, and prepared animal feeds (153), furniture (361), products of wood, cork, straw and plaiting materials (201) and glass and glass products (261)) in India in the recent years. From the policy perspectives, it is pertinent to enhance the productivity and efficiency of labour force in the largest employment generating sectors to achieve both higher output and employment growth. This could be imparted through strengthening of both the in-house and out-house training activities such as providing technical and vocational training to unskilled labour force.

Table 4.3. Total Factor Productivity Growth (TFPG) in Labour Intensive Industries - Growth Accounting (GA) Method

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	13.18	9.85	2.61	6.87
Saw milling and planing of wood	201	-0.73	-4.28	6.79	0.28
Manufacture of wearing apparel except fur apparel	181	16.50	11.62	8.86	10.48
Manufacture of railway and tramway locomotives and rolling stock	352	2.65	-14.84	12.29	-3.67
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	7.32	8.12	10.39	9.05
Dressing and dyeing of fur; manufacture of articles of fur	182	-4.30	-11.71	-16.69	-13.5
Manufacture of knitted and crocheted fabrics and articles	173	13.92	13.95	8.08	11.53
Manufacture of footwear	192	4.85	-0.08	8.10	3.29
Manufacture of furniture	361	-10.45	21.16	6.22	15.01
Manufacture of products of wood, cork, straw and plaiting materials	202	4.76	1.21	12.12	5.70
Manufacture of other electrical equipment n.e.c.	319	3.12	16.62	8.29	13.19
Manufacture of glass and glass products	261	4.47	5.85	4.29	5.21
Manufacturing n.e.c.	369	3.09	16.90	15.23	16.21
Manufacture of optical instruments and photographic equipment	332	-17.93	6.75	-5.35	1.91
Manufacture of other food products	154	9.35	6.03	-0.02	3.54
Casting of metals	273		-2.44	13.68	4.62
Manufacture of other textiles	172	6.23	11.92	8.74	10.61
Weighted Average		11.45	9.42	5.92	7.85

Table 4.4. Total Factor Productivity Growth (TFPG) in Labour Intensive Industries - Levinsohn-Petirn (LP) Method

Industries	NIC-2004	Pre-reform	Post-reform		
		1980-81 to 1989-90	1990-91 to 1999-00	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	2.313	3.153	0.619	2.556
Saw milling and planing of wood	201	-2.77	3.11	8.89	6.05
Manufacture of wearing apparel except fur apparel	181	-1.08	1.05	-3.12	0.14
Manufacture of railway and tramway locomotives and rolling stock	352	-3.69	-6.60	9.56	1.21
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	-0.52	6.65	1.88	5.06
Dressing and dyeing of fur; manufacture of articles of fur	182	17.97	-3.83	65.54	29.70
Manufacture of knitted and crocheted fabrics and articles	173	-1.09	0.31	-5.15	-0.58
Manufacture of footwear	192	-7.50	13.28	-1.17	7.64
Manufacture of furniture	361	-3.91	22.42	-2.80	11.50
Manufacture of products of wood, cork, straw and plaiting materials	202	-6.81	5.35	6.08	6.45
Manufacture of other electrical equipment n.e.c.	319	0.38	11.04	-3.54	4.96
Manufacture of glass and glass products	261	-3.55	-1.91	4.69	1.74
Manufacturing n.e.c.	369	4.78	14.36	0.29	8.77
Manufacture of optical instruments and photographic equipment	332	36.00	16.91	10.04	14.84
Manufacture of other food products	154		0.10	-1.73	-0.37
Casting of metals	273	6.90	-4.67	0.34	-0.86
Manufacture of other textiles	172	1.33	3.33	0.40	2.22
Weighted Average		**3.85**	**2.69**	**0.67**	**3.47**

Table 4.5. Technical Efficiency in Labour Intensive Industries – Stochastic Production Frontier (SPF) Method

Industries	NIC-2004	Pre-reforms	Post-reforms		
		1980-81 to 1989-90	1990-91 to 1999-2000	2000-01 to 2007-08	1990-91 to 2007-08
Manufacture of tobacco products	160	0.939	0.827	0.746	0.642
Saw milling and planing of wood	201	0.726	0.688	0.651	0.454
Manufacture of wearing apparel except fur apparel	181	0.932	0.915	0.694	0.664
Manufacture of railway and tramway locomotives and rolling stock	352	0.955	0.832	0.770	0.641
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	0.801	0.743	0.688	0.530
Dressing and dyeing of fur; manufacture of articles of fur	182	0.795	0.915	0.694	0.636
Manufacture of knitted and crocheted fabrics and articles	173	0.917	0.899	0.715	0.667
Manufacture of footwear	192	0.903	0.804	0.695	0.578
Manufacture of furniture	361	0.951	0.850	0.828	0.719
Manufacture of products of wood, cork, straw and plaiting materials	202	0.806	0.739	0.695	0.527
Manufacture of other electrical equipment n.e.c.	319	0.963	0.919	0.857	0.811
Manufacture of glass and glass products	261	0.851	0.765	0.740	0.580
Manufacturing n.e.c.	369	0.944	0.954	0.840	0.852
Manufacture of optical instruments and photographic equipment	332	0.943	0.952	0.939	0.926
Manufacture of other food products	154	0.870	0.730	0.656	0.501
Casting of metals	273	0.948	0.823	0.594	0.519
Manufacture of other textiles	172	0.873	0.823	0.741	0.633
Average		**0.887**	**0.834**	**0.741**	**0.643**

Table 4.5a. TFPG and Technical Efficiency in Labour Intensive Industries (2008-09 to 2012-13)

Industries	NIC-2008	GA method	LP method	SF model
Manufacture of tobacco products	120	14.76	15.24	0.319
Manufacture of games and toys	324	-18.32	-19.72	0.452
Manufacture of wearing apparel except fur apparel	141	8.36	6.95	0.251
Manufacture of weapons and ammunition	304	-5.77	-2.88	0.279
Processing and preserving of fish, crustaceans and molluscs and products thereof	102	-3.98	18.22	0.367
Materials recovery	383	-11.30	-16.57	0.315
Manufacture of jewellery, bijouterie and related articles	321	1.69	10.98	0.546
Manufacture of transport equipment n.e.c.	309	10.95	4.81	0.856
Manufacture of knitted and crocheted apparel	143	11.29	7.94	0.223
Manufacture of prepared animal feeds	108	-37.81	-20.21	0.745
Manufacture of musical instruments	322	-50.90	28.12	0.487
Repair of fabricated metal products, machinery and equipment	331	5.48	3.94	0.680
Manufacture of structural metal products, tanks, reservoirs and steam generators	251	3.24	2.27	0.705
Manufacture of weapons and ammunition	252	-5.09	-25.29	0.578
Manufacture of optical instruments and equipment	267	-29.33	-3.47	0.635
Manufacture of furniture	310	-6.00	-0.27	0.500
Installation of industrial machinery and equipment	332	10.40	-14.18	0.801
Manufacture of articles of fur	142	-7.17	-26.21	0.288
Manufacture of medical and dental instruments and supplies	325	4.96	10.04	0.630
Processing and preserving of meat	101	10.39	5.53	0.578
Manufacture of sports goods	323	7.70	2.51	0.277
Manufacture of other food products	107	7.89	6.76	0.323
Average		**7.97**	**2.29**	**0.485**

Chapter 5

Labour Intensive industry: An Overview of Firm Level Survey

5.1. Introduction

Industrial reforms in India were undertaken by the Government of India in 1948, 1956 and 1991, which provided a positive policy environment for creating a strong manufacturing base in the country. The post-economic reforms period (1990s and 2000s) saw a significant expansion of manufacturing output, which in turn created more employment opportunities during the period as compared to pre-reforms period. In the post-reforms periods, the trade liberalisation have brought lowering of industrial tariffs and non- tariff barriers to create more employment opportunities especially in labour intensive organised manufacturing sector through emphasising the competitiveness, quality enhancement and export promotions. However, despite industrial and trade reforms, the pace of employment growth of manufacturing sector has remained tepid due to various structural problems such as inadequate physical infrastructure, complex regulatory framework, inadequate availability of skilled manpower and capital etc. Therefore, in order to revive and strengthen the manufacturing sector, the government of India had announced the National Manufacturing Policy on 25th October, 2011 to enhance the share of manufacturing in GDP to 25 percent within a decade and creating 100 million jobs. To achieve these objectives, the current government at the Centre has initiated several measures for easy-doing business and active participation of private players in manufacturing sector. The policy of 'Make in India' campaign is one such initiatives with an aim of developing India as a manufacturing hub. In this context, the present study makes an attempt through field survey and discussion to assess the growth, employment and productivity situations and the problems inherited in doing business by small and medium registered and unregistered labour intensive manufacturing enterprises in India, which will help us to draw informed policy choices and make suitable policy suggestions.

This chapter provides the basic profile of labour intensive industries, constraints of doing business, employment, production and export performance of labour intensive industries based on field survey. We have selected five labour intensive industries based on their importance and performance in the Indian manufacturing industry. The selected industries are:

- Spinning, weaving and finishing of textiles (NIC group-131)
- Manufacturing of wearing apparel (NIC group-141)
- Manufacture of footwear (NIC group-151)
- Manufacture of furniture (NIC group -310)
- Manufacture of sports goods (NIC group-323

Textile Industry: Textile industry plays a critical role through its contribution to industrial output, employment generation and export earnings of the country. Indian textile industry contributes about 14 per cent to the industrial production, 4 per cent to the GDP and 11 per cent to the country's export earnings. Textile sector is the second largest provider of employment after agriculture (Annual Report, 2013-14, Ministry of Textiles, Government of India).

At present, Indian textile exports is US$ 40.2 billion and it is growing at a faster pace than other competitor countries. While the global textile exports growth recorded 4.7 per cent in 2013-14, India achieved an impressive 23 per cent textile exports growth during the same year, surpassing China and Bangladesh with 11.4 and 15.4 per cent respectively. The share of textiles export in total exports earnings has increased from 11.63 per cent in 2012-13 to 12.58 per cent in 2013-14. While, overall Indian export had a growth of 4 per cent, textile exports grew by 13 per cent in US$ terms during 2013-14. India's textiles products including handlooms and handicrafts are being exported to more than a hundred countries. USA and the European Union are the largest market for India's textile exports. The other exporting destination are China, U.A.E., Sri Lanka, Saudi Arabia, Republic of Korea, Bangladesh, Turkey, Pakistan, Brazil, Hong Kong, Canada Egypt etc. (Annual Report, 2013-14, Ministry of Textiles, Government of India).

Apparel Industry: As per the Working Group of Ministry of Textiles Report for the 12th Plan, readymade garments (RMG) and apparel sector provides 11.22 million jobs, and it is 24.83 per cent of total employment in textile sector. Apparel exports were US$ 1425 million in June 2014-15 with an increase of 14 per cent against the corresponding month of last financial year. India's RMG export to World for the first quarter (April-June) of 2014-15 was to the tune of US$ 4,239 million up by 18 per cent from the same period of the previous financial year. During April-June 2014-15 India's apparel exports were to the tune of US$ 4,239 million as against US$ 3,596 million of April-June 2013-14. The domestic apparel industry has 3 segments such as: Men's wear, Women's wear and Kid's wear. Men's wear

accounts for 40 per cent of the total market and women's wear and children's wear 35 per cent and 25 per cent respectively.

The major competitors for India in the apparel sector are Bangladesh, Myanmar, Indonesia, Taiwan, Hong Kong, Singapore and China. Rajiv Kumar et al. (2008) found that employment growth in apparel industry had grown at an average annual rate in excess of 10 per cent per annum against an average of 4.1 per cent for the whole labour intensive sectors over the period 1990-2003. This sector has employment generation potential. Currently, there is a rise in the cost of production, raw material costs and wages in the apparel industry. Improving the performance of this sector is critical owing to its significant contribution to employment generation in the country.

Footwear Industry: The footwear sector is a very important sector of the leather industry in India. India is the second largest global producer of footwear after China. Indian footwear industry contributes 13 per cent of the global footwear production of 16 billion pairs. India produces 2,065 million pairs of different categories of footwear (leather footwear - 909 million pairs, leather shoe uppers - 100 million pairs and non-leather footwear – 1,056 million pairs). India exports about 115 million pairs. Thus, nearly 95 per cent of its production goes to meet its own domestic demand. About 1.10 million are employed in the footwear manufacturing industry.

Indian footwear companies have collaborated with European countries such as Italy, Spain and Portugal. US Retail giant Wal-Mart has also begun sourcing footwear from India. India's export of footwear was to the tune of US$ 2077.27 million in 2011-12, accounting 42.67 per cent in India's total export from the leather sector of US$ 4868.71 million. India's footwear export (leather, uppers & non-leather) is growing at a Compound Annual Growth Rate (CAGR) of 8.67 per cent in the last five years ending 2011-12. During 2010-11, the main markets for Indian footwear are UK with a share of 19.16 per cent, Germany (16.15 per cent), Italy (12.46 per cent), USA (8.04 per cent), France (8.93 per cent)., Spain (6.45 per cent), Netherlands (4.51 per cent), Portugal (1.41 per cent), U.A.E (2.45 per cent) and Denmark (0.97 per cent). These 10 countries together accounts for 80.53 per cent share in India's total footwear export. Nearly 90 per cent of India's export of footwear goes to

European Countries and the USA.[9] It is worthwhile to examine this sector for its export and employment generating potential.

Furniture Industry: In the year 2012-13, the Indian furniture retail market became the 14th largest furniture markets in the world. The Indian furniture industry is estimated at around US$ 8 billion in 2012-13 and is growing at a rate of 30 per cent annually. The furniture industry in India is considered as an unorganised sector. Nearly, 85 per cent of the home furnishing industry is in the unorganized sector and remaining 15 per cent is in the organized sector.[10] Currently, the Indian furniture market is expanding. The demand for luxurious living room sets, lavish bedrooms and stylish kitchens is increasing rapidly. The size of the Indian furniture retail market is estimated around Rs.30, 000 crores in 2012-13. The furniture sector makes a marginal contribution of 0.5 per cent to India's GDP. In terms of employment, it absorbs nearly 300,000 workers.

Sports Goods Industry: The sport goods industry provides employment to more than 500,000 people and it is labour intensive in nature. The manufacturing units of this industry are largely concentrated in the states like Punjab and Uttar Pradesh. Jalandhar in the state of Punjab and Meerut in the state of Uttar Pradesh, account for nearly 75 per cent of the total production in India. These two towns have 3,000 manufacturing units and 130 exporters. About 60 per cent of the sports goods manufactured in Jalandhar consist of different kinds of inflatable balls. The industry exports nearly 60 per cent of its total output to different countries. The sports goods market in India was valued at US$ 2 billion in 2012-13. The market has been growing by 35-40 per cent annually and it is expected to reach US$ 3.6 billion by 2015.

Sports industry exports were valued at approximately US$ 127.76 million in 2012-13 and were mostly exported to the UK, the US and Australia. The Sports Goods Export Promotion Council (SGEPC) promotes the export of sports goods and toys from India. The SGEPC represents the leading 200 manufacturers and exporters of sports goods and toys in India.[11] This sector has scope of expanding the market base and hence has potential of employment generation.

[9] Council for Leather Exports, sponsored by Ministry of Commerce and Industry, Governent of India
[10] Indian mirror, Indian-industries, 2013
[11] India brand equity foundation, An initiative of the Ministry of Commerce & Industry, Government of India

5.2. Sample Selection and Data

The primary survey has covered five labour intensive industries based on purposive sampling method. The total sample size consists of 320 firms across different states. **Table 5.1** shows the sample size of number of firms covered under five labour intensive industries. For textile industry we have covered 33 firms from Gujarat and 17 firms from Haryana. In total 50 firms have been surveyed for textile sector. In case of apparel sector, total 60 firms have been covered. Out of which, 50 per cent is covered each from Punjab and Tamil Nadu. For footwear industry, the sample size is 60, out of which, 53 per cent of firms are covered from Uttar Pradesh and the rest of firms are covered from Tamil Nadu. Our sample coverage for furniture industry is 86 firms – 30 firms from Gujarat, 32 firms from Uttar Pradesh and 24 firms from Delhi. For sports industry, total 64 firms are covered, out of which, 50 per cent each surveyed from Uttar Pradesh and Punjab.

Table 5.1: Types of Firms by State

State	Spinning, Weaving and finishing Textile	Wearing Apparel	Footwear	Furniture	Sports goods	Total
Gujarat	33 (66.00)			30 (34.88)		63 (19.69)
Haryana	17 (34.00)					17 (5.31)
Punjab		30 (50.00)			32 (50.00)	62 (19.38)
Tamil Nadu		30 (50.00)	28 (46.67)			58 (18.13)
Uttar Pradesh			32 (53.33)	32 (37.21)	32 (50.00)	96 (30.00)
Delhi				24 (27.91)		24 (7.50)
Total	50 (100)	60 (100)	60 (100)	86 (100)	64 (100)	320 (100)

Table 5.2 shows the basic statistics of firms. Out of total 320 firms, nearly 87 per cent are registered firms and the remaining are unregistered firms. Across the firms, the least number of registered firms is reported in case of furniture. As far as size of the firm is concerned, our sample size covers mostly small and medium firms with 50.9 per cent and 38.1 per cent respectively. The size of the firm has been calculated by using the total turnover of the firm which varies from one category to other. The results also show that 99 per cent of

firms are owned by male members and the average age of owners is 50 years. In order to understand the future business plan of firms, a question was asked to firm owners that whether they have any proposal of expanding their business in future. An overwhelmingly 68.14 per cent of firm owners reported that they would like to expand their business in next couple of years.

Table 5.2: Descriptive Statistics

Variable	Textile	Apparel	Footwear	Furniture	Sports goods	Total
Registered Firms (%)	98.00	93.33	98.33	58.14	98.44	86.56
Firm Sizes in 2014 (%)*						
- Small	34.7	54.2	58.3	62.1	42.9	50.9
- Medium	53.1	35.6	25.0	31.0	47.6	38.1
- Large	12.2	10.2	16.7	6.9	9.5	11.1
Male Owners (%)	97.96	100.0	100.0	98.84	100.0	99.37
Average Age of Owners	49.0	49.0	53.0	45.0	57.0	50.0
Plan to expand business in next couple of years, Yes (%)	54.00	90.00	63.33	58.82	75.81	68.14

* Textile: Small (<6 crore), Medium (6-30 crore) and Large (>30 crore)
Apparel: Small (<6 crore), Medium (6-30 crore) and Large (>30 crore)
Footwear: Small (<10 crore), Medium (10-30 crore) and Large (>30 crore)
Furniture: Small (<0.5 crore), Medium (0.5-1 crore) and Large (>1 crore)
Sports goods: Small (<5 crore), Medium (5-30 crore) and Large (>30 crore)
Note: Calculation of small, medium and large enterprises is based on Das & Kalita (2009).
Source: Authors' calculation

Table 5.3 shows the average number of workers currently engaged and its composition in different labour intensive firms. Average number of workers engaged in textile firms is highest (182 workers) followed by apparel firms (180) and footwear firms (168). The least number of workers engaged has been reported in the case of furniture industry, which is quite obvious as this industry represents mostly small firms with low turnover and small size of workforce. Within the workforce, maximum number of workers were skilled workers (49.13%) followed by helpers (28.95%). It is important to mention here that industries usually go for hiring more number of helpers because of multiple reasons – Firstly, helpers are usually contractual labourers being paid low wages. Secondly it is easier to hire and fire contractual labourers as per the demand of the firms. Thirdly, since helpers usually worked with technicians/skilled workers; gradually they learn the technical work and become capable of doing the work that has been carried out by technicians/skilled workers. The survey results show that share of skilled workers is maximum in apparel industry

(63.15%) followed by footwear industry (51.04%). The results also show that while textile industry hires maximum number of helpers (45.92%), apparel industry on the other hand hires least number of helpers accounting for 19.17 per cent.

Table 5.3: Employment Composition

Variable	Textile	Apparel	Footwear	Furniture	Sports goods	Total
	Average					
Workers currently engaged	182.16	179.53	168.07	8.59	107.06	117.36
	Percent					
Managers	4.10	5.26	5.75	19.97	8.20	9.71
Technicians	6.15	8.89	9.61	7.88	5.65	7.68
Skilled workers	40.03	63.15	51.04	44.73	47.24	49.13
helpers	45.92	19.17	26.70	25.71	31.31	28.95
Other workers	3.80	3.53	6.90	1.71	6.04	4.22

Source: Authors' calculation

5.3 Man-Machine Ratio

Man-Machine ratio indicates number of labourers engaged per unit of machine. Usually, labour intensive firms in India have used relatively less machine and more labourers to produce a given level of output in contrast to capital intensive firms. **Table 5.4** shows the employment details of five labour intensive industries. The CAGR of employment and number of machines used are calculated between the starting year of business and the current year. Our dataset shows, the starting years of business are different from firm to firm, therefore CAGR is used to find out average growth at the industry.

We find that average number of workers at the starting year of business is 72.4, which has increased to 182.16 in the current year for textile industry with a CAGR of 7.39 per cent. In the case of number of machines used for the same industry, we find that on an average 15.89 machines are used at the starting year of business and 50.8 are used in the current year with a CAGR of 8.26 per cent. Interestingly, the man-machine ratio has declined from 4.66 to 4.02 thereby reflecting the fall in labour intensity in textile industry.

In apparel industry, average number of workers at the starting year is 12.98 and employment growth has recorded at a CAGR of 12.09 per cent. On the other hand, the number of machine used has increased at CAGR of 11.68 per cent. The man-machine ratio

has declined from 1.6 at the starting year to 1.36 at the current year reflecting the decline in labour intensity in apparel industry.

The average number of workers is found to be 23.78 at the starting year of business in footwear industry, the second highest among the five selected labour intensive industries. While the CAGR of employment has been recorded at 9.36 per cent, the number of machinery used shows a relatively lower growth rate of 8.81 per cent in footwear industry. Like textile and apparel industries, the man-machine ratio for footwear industry has declined from 3.58 to 3.15.

In furniture industry, average number of workers at the staring year is 3.38, the lowest among all the five labour intensive industries. Employment in furniture industry has increased at a CAGR of 10.89 per cent between starting year and current year. Similar to other labour intensive industries, the man-machine ratio in furniture industry has also declined from 2.02 to 1.89.

In the case of sports goods industry, the survey results show an increase in the growth rate of employment by 6.76 per cent as compared to 10.43 per cent increase in the number of machines. The man-machine ratio shows a marginal decline from 3.76 to 3.14.

Table 5.4: Employment, machinery details and total persons to machine ratio

Variable	Textile	Apparel	Footwear	Furniture	Sports goods	Total
Workers at the starting year of business	72.40	12.98	23.78	3.38	13.77	21.87
Workers currently engaged	182.16	179.53	168.07	8.59	107.06	117.36
Machines at the starting of business	15.89	12.09	13.27	1.84	4.50	9.05
Machines currently in operation	50.80	167.29	105.02	5.13	44.08	70.83
Compounded annual growth rate of employment	7.39	12.50	9.36	10.89	6.76	9.54
Compounded annual growth rate of machine	8.26	11.68	8.81	18.20	10.43	11.89
Man-Machine ratio at starting year	4.66	1.60	3.58	2.02	3.76	3.01
Man-Machine ratio at current year (2014)	4.02	1.36	3.15	1.89	3.14	2.62

Source: Authors' calculation

Overall, we find that man-machine ratio is highest in textile industry and lowest in apparel industry. By types of employment, the average number of skilled workers engaged is least in textile industry and highest in apparel industry. It suggests that more number of

skilled workers engaged in apparel industry used more machines and therefore man-machine ratio is lowest as compared to other labour intensive industries. The results also suggest that the man-machine ratio has declined across all industries, implying labour intensive industries are gradually becoming more capital intensive and these findings are more consistent with the results obtained through using the ASI data in the earlier chapter.

5.4 Total Turnover and Export in Labour Intensive Industry

Table 5.5 shows total turnover and export (% of total turnover) of labour intensive industries for the period 2012 to 2014. We find that total turnover has increased continuously during this period in all the labour intensive industries. In case of exports, the percentage of exports to total turnover has increased continuously only in two industries such as textile and apparel. In case of footwear and sport goods industries, exports as percentage of total turnover has increased marginally between 2012 and 2013 but declined between 2013 and 2014. In contrast, in case of furniture industry total exports as percentage of total turnover has declined between 2012 and 2013 and then remains at the same level between 2013 and 2014. It is pertinent to mention here that all the labour intensive industries have exported more than 50 per cent of their total turnover in 2014 and it is increasing monotonously over the period. Further, the survey results show that exports as percentage of total turnover is highest in apparel industry followed by footwear, textiles, sports goods and furniture industries. Another important conclusion can be drawn from the above results that invariably labour intensive industries use exports as the means of their growth model due to comparative cost advantages. However, due to cost advantages of other competitive countries (for example, Bangladesh's advantages in textile products), the textile industry in India is finding it difficult to retain or expand its exports share in the global market. The similar situation also prevails for other labour intensive industries.

Table 5.5: Total Turnover and Export in Labour Intensive Industry

Variable	Textile	Apparel	Footwear	Furniture	Sports goods	Total
	Average					
Total turnover in 2014 (Lakhs Rs.)	1510.0	1460.0	1890.0	39.8	1220.0	1220.0
Total turnover in 2013 (Lakhs Rs.)	1310.0	1050.0	1670.0	36.2	984.0	998.0
Total turnover in 2012 (Lakhs Rs.)	1250.0	994.0	1420.0	35.5	920.0	902.0
Exports as per cent of turnover in 2014	58.78	88.25	61.67	50.00	54.17	63.94
Exports as per cent of turnover in 2013	34.67	85.11	62.44	50.00	54.66	62.43
Exports as per cent of turnover in 2012	26.50	80.02	61.39	55.00	52.45	60.38

Source: Authors' calculation

5.5. Major Constraints/Hurdles faced in doing Business

In this section we analyse the major constraints or hurdles faced by labour intensive firms for doing business. The analysis is done for different industries at the state levels. **Table 5.6** shows that more than 60 per cent of textile firms from Gujarat have reported that they are facing four major constraints in doing business such as lack of skilled manpower availability, shortage of capital, heavy tax burden and lack of incentives from the government. In Haryana, poor infrastructure facilities, lack of skilled manpower availability and lack of incentives from the government are the major constraints in doing business for textiles firms. The survey results show that more than 70 per cent of firms reported that lack of skilled manpower availability is the major constraints in textile industry in both the states. In case of infrastructure, while a whopping 82.35 per cent of textile firms reported that poor infrastructure is a major constraint in doing business in Haryana, only 21.2 per cent of firms reported the same problem in Gujarat. On an average, 30 per cent of textile firms responded that harsh clearance and license rules are constraints in doing business in both the states.

Table 5.6: Major Constraints/Hurdles faced in doing Business (Textile Firms)

Constraints	Gujarat	Haryana	Total
	Per cent		
Shortage of capital (Money)	66.67	5.88	46.00
Lack of incentives from the government (tax concession, financial support etc.)	60.61	58.82	60.00
Lack of skilled manpower availability	87.88	70.59	82.00
Harsh clearance and license rules	33.33	23.53	30.00
Poor infrastructure facilities (including electricity)	21.21	82.35	42.00
Labour Laws and Regulations	54.55	17.65	42.00
Lack of availability of raw materials	36.36	23.53	32.00
Heavy tax burden	63.64	47.06	58.00

Source: Authors' calculation

Table 5.7 shows the major constraints faced by apparel firms in doing business in Punjab and Tamil Nadu. More than 93 per cent of firms in each state reported that lack of skilled manpower availability to be the major constraint in doing business despite of the fact that this industry employs more number of skilled manpower as compared to other industries. It was also found that poor infrastructure and heavy tax burden are other two major constraints in doing business in Punjab. In Tamil Nadu shortage of capital, lack of incentives from the government and lack of availability of raw materials are other three major constraints that are faced by apparel firms in doing business. Shortage of capital and lack of

availability of raw materials are the least constraints in Punjab whereas in Tamil Nadu, heavy tax burden, poor infrastructure facilities and harsh clearance & licence facilities are the least constraints.

Table 5.7: Major Constraints/Hurdles faced in doing Business (Apparel Firms)

Constraints	Punjab	Tamil Nadu	Total
	Per cent		
Shortage of capital (Money)	3.33	80.00	41.67
Lack of incentives from the government (tax concession, financial support etc.)	30.00	63.33	46.67
Lack of skilled manpower availability	93.33	93.33	93.33
Harsh clearance and license rules	53.33	50.00	51.67
Poor infrastructure facilities (including electricity)	86.67	50.00	68.33
Labour Laws and Regulations	33.33	56.67	45.00
Lack of availability of raw materials	0.00	60.00	30.00
Heavy tax burden	73.33	46.67	60.00

Source: Authors' calculation

The major constraint faced by footwear firms in doing business in Uttar Pradesh and Tamil Nadu are given in **Table 5.8**. In Tamil Nadu, a whopping 82.14 per cent footwear firms have reported that shortage of capital to be the major constraint in doing business. Other two major constraints are lack of availability of raw materials and heavy tax burden in doing business for footwear firms. The survey also found that poor infrastructure is the least concern in doing business in footwear industry in Tamil Nadu. In Uttar Pradesh, more than 50 per cent of firms responded that they are facing all common problems in doing business, out of which the top four major constraints are: lack of incentives from the government, shortage of capital, lack of skilled manpower and harsh clearance & licence rules. Overall, the survey finds that major hurdles for footwear industry are the shortage of capital and lack of incentives from the government in both states.

Table 5.8: Major Constraints/Hurdles faced in doing Business (Footwear Firms)

Constraints	Tamil Nadu	Uttar Pradesh	Total
	Per cent		
Shortage of capital (Money)	82.14	71.88	76.67
Lack of incentives from the government (tax concession, financial support etc.)	67.86	81.25	75.00
Lack of skilled manpower availability	39.29	71.88	56.67
Harsh clearance and license rules	60.71	71.88	66.67
Poor infrastructure facilities (including electricity)	10.71	56.25	35.00
Labour Laws and Regulations	21.43	53.13	38.33
Lack of availability of raw materials	71.43	53.13	61.67
Heavy tax burden	67.86	65.63	66.67

Source: Authors' calculation

Constraints faced by furniture firms in Gujarat, Uttar Pradesh and Delhi are reported in **Table 5.9**. Heavy tax burden is the most important constraint faced by the furniture firms in Gujarat (90 per cent of them have reported it) and other two major constraints are lack of skilled manpower availability and lack of incentives from the government. The survey found that infrastructure facilities are good in Gujarat where only 17 per cent of firms have said that poor infrastructure is affecting their business. In contrast, more than 93 per cent of the furniture firms in Uttar Pradesh reported that poor infrastructure facilities are the main constraint in doing business. Other three important problems in doing business in Uttar Pradesh are heavy tax burden, lack of incentives from the government and lack of availability of raw materials. In Delhi, labour laws and regulations, availability of raw materials and clearance & licence rules are better than other two states and these are least constraints for firms in furniture industry in the state. Shortage of capital is the major constraints in Delhi and as per survey results 79.17 per cent of firms faced this problem in doing business.

Table 5.9: Major Constraints/Hurdles faced in doing Business (Furniture Firms)

Variable	Gujarat	UP	Delhi	Total
	Per cent			
Shortage of capital (Money)	20.00	40.63	79.17	44.19
Lack of incentives from the government (tax concession, financial support etc.)	70.00	90.63	58.33	74.42
Lack of skilled manpower availability	73.33	59.38	41.67	59.30
Harsh clearance and license rules	36.67	53.13	8.33	34.88
Poor infrastructure facilities (including electricity)	16.67	93.75	25.00	47.67
Labour Laws and Regulations	50.00	56.25	0.00	38.37
Lack of availability of raw materials	20.00	84.38	8.33	40.70
Heavy tax burden	90.00	90.63	54.17	80.23

Source: Authors' calculation

Table 5.10 shows the major constraints faced by the sports goods firms in doing business in Punjab and Uttar Pradesh. Lack of skilled manpower availability, poor infrastructure facilities and lack of incentives from the government are major problems in doing business for sport goods firms in Punjab. In Uttar Pradesh, the major constraints in doing business in sport goods industry are poor infrastructure facilities and lack of skilled

manpower availability. Harsh clearance & licence rules are least problem as compared to other constraints in Punjab. The survey also found that only 3.3 per cent of sports goods firms from Uttar Pradesh have reported shortage of capital as the problem in doing business. Other two constraints such as harsh clearance & license rules and labour laws & regulation are the problems in doing business in Uttar Pradesh.

Overall, the survey results show that lack of skilled manpower availability is the common problem faced by all labour intensive firms in doing business, which in turn has affected the productivity and efficiency of these industries. It is important to mention here that the above survey findings support our earlier findings using secondary data that there is a decline in productivity and efficiency in labour intensive industries in India. Other two major constraints faced by all firms are lack of incentives from the government and heavy tax burden – both problems relate to policy decisions of the government. It warrants a cohesive and a business friendly tax regime to encourage small and medium firms to flourish.

Table 5.10: Major Constraints/Hurdles faced in doing Business (Sports goods firms)

Variable	Punjab	UP	Total
	Per cent		
Shortage of capital (money)	37.50	3.13	20.31
Lack of incentives from the government (tax concession, financial support etc.)	84.38	12.50	48.44
Lack of skilled manpower availability	96.88	56.25	76.56
Harsh clearance and license rules	31.25	6.25	18.75
Poor infrastructure facilities (including electricity)	93.75	93.75	93.75
Labour Laws and Regulations	78.47	6.25	42.36
Lack of availability of raw materials	65.63	25.00	45.31
Heavy tax burden	59.38	21.88	40.63

Source: Authors' calculation

5.6 Major Findings

The major survey findings of the study are stated below.

- Out of total firms covered under the survey, nearly 99 per cent of the firms are owned by male member i.e., merely 1 per cent of firms are owned by female members.
- The willingness of the owners to expand business in future indicates a positive sign of economic prosperity and progress of the sector. On an average, 68 percentage of the firms' owners reported expansion of business in the next couple of years. The highest percentage (90%) of owners from apparel industry has reported in favour of expansion of business.
- It is found that the average initial investment is highest in textile industry and lowest in furniture industry.
- Except apparel industry, it is found that non-skilled workers are engaged more than skilled workers in industries such as textile, footwear, furniture and sports goods.
- The man-machine ratio which indicates labour or capital intensity position of a firm has declined for all industries, thereby suggesting labour intensive industries are gradually moving towards capital intensive nature over the period.
- All the labour intensive industries have exported more than 50 per cent of their total turnover in 2014 and it is increasing gradually over the period.
- Labour intensive industries use exports as the means of their growth model due to comparative cost advantages.
- Lack of skilled manpower availability is the major constraints faced by all labour intensive industries covered under this survey, which in turn, negatively affects the productivity and efficiency of labour intensive industries.
- Other two major constraints related to policy decisions of the government are lack of incentives from the government and heavy tax burden. It was suggested by the firm owners that a cohesive and business friendly tax regime will encourage the industry to grow and eventually it will help in improving the productivity and efficiency of firms.

Chapter 6

Conclusions and Suggestions

Improving the performance and strengthening the base of manufacturing sector has been one of the key policy objectives of government of India in recent time, essentially to transform the sector as the engine of long-run growth (Economic Survey, GoI, Vol. I, Chapter - 7, 2014-15). Further, development of manufacturing sector would make it possible to shift the labour force from low value added sector and improve their standard of living. It is evident that manufacturing sector has performed well in terms of economic growth especially during the post-reforms period. However, it faces several structural challenges such as land, labour, forest and infrastructure etc., that are creating hurdles in expanding the base. The sector witnessed a low base and it continues for a long period. The share of the sector in total GDP has remained stagnant at 15-16 per cent since 1980, while its share in comparable Asian countries has reached at 25 to 34 percent[12]. Although the sector's GDP growth rate has improved during the post-reforms period particularly in 2000s, its share in total GDP has not. The problem is more acute as far as employment in the sector is concerned. Despite improved growth performance in 2000s, the sector is lagging in employment growth. While the sector witnessed a whopping 59.6 million increase in employment (both formal and informal) between 1999-2000 and 2004-05, in eight years (2004-05 to 2011-12); it recorded merely 15 million increases in employment. However, the data show that it is the low-productive small scale enterprises that are driving employment (Mehrotra et al., 2014). It is evident that low value added and labour intensive industries have high potential of employment generation. Therefore, it is essential to give an urgent attention to these industries in terms of enhancing the output, productivity and efficiency. In this context, the present study estimates the productivity and efficiency of registered labour intensive manufacturing industries and draws informed policy choices.

The study uses ASI data published by CSO, Government of India for the period 1980-81 to 2012-13. The whole period is divided into different sub-periods for making a comparative analysis. The sub-periods are: (i) 1980-81 to 1989-90, (ii) 1990-91 to 1999-2000, (iii) 2000-01 to 2007-08 and (iv) 2008-09 to 2012-13. As discussed in the methodology section, the data from 1980-81 to 2007-08 are taken at 3-digit NIC-2004 level, whereas the

[12] http://commerce.nic.in/ann/National_Manfacturing_Policy2011.pdf?id=10

data for the remaining period are taken at 3-digit NIC-2008 level. We have also carried out a field survey on five labour intensive industries in ten manufacturing clusters across five states in India. The key focus of the survey was to assess the growth, employment and productivity situations and the problems inherited in doing business by small and medium registered and unregistered labour intensive manufacturing firms in India. The survey findings are also used to validate the findings from secondary data. Some of the important findings of the study are: (i) labour intensity has declined more in the case of labour intensive industries than all manufacturing industries. This suggests that labour intensive industries are using the modern technology at a greater degree as a substitute of labour in the production process. (ii) Results of GA method suggest that the TFPG of labour intensive industries has declined continuously from pre-reforms period to post-reforms period at the aggregate level of labour intensive industries and all manufacturing industries. The similar findings are also evident in the case of LP and SPF methods. However, the study finds that there is variation in results of three methods across the industries. The results for the recent years (2008-09 to 2012-13) suggest that there is a positive turnaround of employment elasticity and TFPG labour intensive industries such as manufacture of wearing apparel, manufacture of knitted and crocheted fabrics and other food products indicating sustainability and positive employment growth prospects of these industries in the long run. Overall, the study finds that all labour intensive industries experienced a decline of employment elasticity, labour and capital productivity and total factor productivity over the period.

From the primary survey, the study finds that 99 per cent of firms are owned by male members and on an average around 68 per cent of firm owners reported their willingness to expand business in the next couple of years, highest 90 per cent reported from apparel industry. Within different categories of workers, unskilled workers are more engaged than skilled workers in textile industry, footwear industries, furniture industry and sports goods industry. The reverse is true in the case of apparel industry. The man-machine ratio which reflects labour or capital intensity position of a firm has declined for all industries, thereby suggesting that labour intensive industries are gradually moving towards capital intensive nature over the period. The results show that labour intensive industries have exported more than 50 per cent of their total turnover in 2014 and it increases monotonously over the period. As far as constraints faced by the firms in doing business are concerned, it is found that majority of the firms reported lack of skilled manpower, lack of government incentives and heavy tax burden, and poor infrastructure (except in Gujarat).

From the policy perspectives, it is pertinent to enhance the productivity and efficiency of labour force in the largest employment generating sectors to achieve both higher output and employment growth in the long run. This could be imparted through strengthening both in-house and out-house training activities such as providing technical and vocational training to unskilled labour force. It is necessary to bring in changes in the labour law regime in India to ensure expansion and improvement in the overall quality of employment. Some of the studies argue that 'Restrictive labour laws' have often been identified among the factors that constrain increase in investment and employment (Fallon and Lucas, 1991; Besley and Burgess, 2004, Hasan et al., 2003; Goldar 2011). The states also need to step in ensuring a vibrant business environment by facilitating the world class infrastructure facilities and business friendly economic policies. In order to improve the business climate and easy doing business, the government of India has recently undertaken various initiatives with respect to labour laws (for example, new labour laws have been introduced in the State like Rajasthan) and easy regulations related to natural resources.

References

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

—— and K. Pushpangadan (1994), "Total Factor Productivity Growth in Manufacturing Industry: A Fresh Look", *Economic and Political Weekly*, July 30, 2028 – 2035.

—— and K. Pushpangadan (1998), "What do we know about productivity growth in Indian industry?", *Economic and Political Weekly*, 33, 2241 – 46.

—— K. Pushpangadan and M. Suresh Babu (2000), "Trade liberalisation and prodictivity growth in manufacturing: Evidence from firm-level panel data", *Economic and Political Weekly*, 35, 3679 – 3682.

Battese, G. E. and T. J. Coelli (1995), "A model for technical inefficiency effects in a stochastic frontier production function for panel data", *Empirical Economics*, 20, 325 – 332.

Besley, T. and R. Burgess (2004), "Can Labour Regulation Hinder Economic Performance? Evidence from India", *The Quarterly Journal of Economics*, 119(1).

Bollard, A., P. J. Klenow and G. Sharma (2013), "India's mysterious manufacturing miracle", *Review of Economic Dynamics*, 16, 59 – 85.

Business Today (2014), Made in India', March 2.

Chaudhuri, Sudip (2002), "Economic Reforms and Industrial Structure in India", *Economic and Political Weekly*, January 12, 155 – 62.

Das, D. K. (2004), "Manufacturing productivity under varying trade regimes, 1980-2000", *Economic and Political Weekly*, 39, 423 – 433.

Das Dev, Kusum, Deepika Wadhwa and Gunajit Kalita (2009), "The Employment Potential of Labour Intensive Industries in India's Organized Manufacturing", ICRIER Working Paper No. 236, New Delhi.

Das Deb Kusum and Gunajit Kalita (2009), "Do Labor Intensive Industries Generate Employment? Evidence from firm level survey in India", ICRIER Working Paper No. 237, New Delhi.

Dholakia, R. H. and B. H. Dholakia (1994), "Total factor productivity growth in Indian manufacturing", *Economic and Political Weekly*, 29, 342 – 344.

Diewert, W. E. (2000), "The quadratic approximation lemma and decompositions of superlative indexes", Discussion Paper 00-15, Department of Economics, University of British Columbia, Canada.

Economic Survey, Vol. I, Chapter 7, 2014-15, Economic Division, Ministry of Finance Government of India.

Fallon, Peter R. and R.E.B. Lucas (1991), "The Impact of Changes in Job Security Regulations in India and Zimbabwe', *World Bank Economic Review*, 5(3).

Goldar, B. (1986), *Productivity Growth in Indian Industry*, Allied Publishers, New Delhi.

—— and A. Kumari (2003), "Import liberalization and productivity growth in Indian manufacturing industries in the 1990s", *The Developing Economies*, 41, 436 – 60.

—— (2004), "Productivity Trends in Indian Manufacturing in the Pre-and Post-reforms Period", ICRIER Working Paper No. 137, 1 – 34.

—— (2006), "Productivity growth in Indian manufacturing in the 1980s and 1990s", in Tendulkar, S. D., A. Mitra, K. Narayanan and D. K. Das (eds.), *India: Industrialization in a Reforming Economy*, Academic Publishers, New Delhi.

—— (2011), "Growth in Organised Manufacturing Employment in Recent Years", *Economic and Political Weekly*, February 12, 46 (7), 20 – 23.

Griliches, Z. and V. Ringsted (1971), *Economies of Scale and Form of the Production Function*, North-Holland Publishing Company, Amsterdam.

Hall, R. and C. Jones (1999), "Why Do Some Countries Produce so Much More Output per Worker than Others?", *Quarterly Journal of Economics*, 114, 83 – 116.

Hossain, M.A. and N.D. Karunaratne (2004), "Trade liberalization and technical efficiency: evidence from Bangladesh manufacturing industries", *The Journal of Development Studies*, 40, 87 – 114.

Hassan, Rana, Devashish Mitra and K.V. Ramaswamy (2003), "Trade Reforms, Labour Regulations and Labour Demand Elasticities: Empirical Evidence from India", Working Paper No. 9879, National Bureau of Economic Research, Cambridge MA.

Jorgenson, D.W. and Z. Griliches (1967), "The explanation of productivity change", *Review of Economic Studie*s, 34, 349 – 83.

Kathuria, V., S. N. Rajesh and Kunal Sen (2013), "Productivity measurement in Indian manufacturing: A comparison of alternative methods", *Journal of Quantitative Economics*, 11, 1&2, 148 – 76.

Krishna, P. and D. Mitra (1998), "Trade liberalization, market discipline and productivity growth: new evidence from India", *Journal of Development Economics*, 56, 447 – 462.

Krugman, Paul (1996), "The Myth of Asia's Miracle" in Pop Internationalism, Cambridge: MIT Press.

Law, M. T. (2000), "Productivity and Economic Performance: An Overview of the Issues", *Public Policy Sources*, 37.

Levinsohn, J. and A. Petrin (2003), "Estimating Production Functions Using Inputs to Control for Unobservables", *Review of Economic Studies*, 70, 317 – 342.

Lipsey, R. G. and K. Carlaw (2001), "What does Total Factor Productivity measure?", Study Paper version 2, Simon Fraser University, Vancouver BC. (http://www.csls.ca/ipm/1/lipsey-e.pdf accessed in Aug 2011).

Mahadevan, R. (2003), "To measure or not to measure Total Factor Productivity Growth?", *Oxford Development Studies*, 31(3), 365 – 78.

Majumdar, S. K. (1996), "Fall and rise of productivity in Indian industry: has economic liberalization had any impact?", *Economic and Political Weekly*, 31, M-46 – M-53.

Mehrotra, S., A. Gandhi, P. Saha, and B. K. Sahoo (2012), "Joblessness and Informalization: Challenges to inclusive growth in India", IAMR Occasional Paper, No. 9/12.

Mehrotra, S., J. Parida, S. Sinha, and A. Gandhi (2014), "Explaining employment trends in the Indian economy: 1993-94 to 2011-12", *Economic and Political Weekly,* August, 32.

Papola, T. S. (2013), "Economic growth and employment linkages, the Indian Experience", ISID working paper series, 13/01, January.

Rao, J.M. (1996), "Manufacturing Productivity Growth: Method and Measurement", *Economic and Political Weekly*, 31, 2927 – 36.

Ray, S. C. (2002), "Did India's economic reforms improve efficiency and productivity? A non-parametric analysis of the initial evidence from manufacturing", *Indian Economic Review*, 37, 23 – 57.

Sen, Kunal and Deb K. Das (2014), 'Where Have All the Workers Gone? The Puzzle of Declining Labour Intensity in Organized Indian Manufacturing', Institute for Development Policy and Management (IDPM), Development Economics and Public Policy, Working Paper Series, WP No. 35/ 2014.

Srivastava, V. and A. Sengupta (2000), "Endogeneity of the Solow Residual: Some evidence from Indian Data", National Council of Applied Economic Research (NCAER), Discussion Paper No. 13, June.

Tata Services Limited (2003), "Reforms and Productivity Trends in Indian Manufacturing Sector", Department of Economics and Statistics, Tata Services Limited, Mumbai.

Trivedi, P., A. Prakash and D. Sinate (2000), "Productivity in Major Manufacturing Industries in India: 1973-74 to 1997-98," Development Research Group Study No. 20, Department of Economic Analysis and Policy, Reserve Bank of India, Mumbai.

Trivedi Puspa, L. Lakshmanan, Rajeev Jain and Yogesh Kumar Gupta (2011), Productivity Efficiency and Competitiveness of the Indian Manufacturing Sector, Development Research Group, Study No- 37, Department of Economic and Policy Research, Reserve Bank of India, Mumbai.

Unel, Bulent (2003), "Productivity Trends in India's Manufacturing Sectors in the last Two Decades", IMF Working Paper No. WP/03/22.

Young, A. (1992), "The tyranny of numbers: confronting the statistical realities of the East Asian growth experience", *Quarterly Journal of Economics,* 110, 641 – 80.

Appendix

Table A1. Selected Industries (3-digit NIC-2004) for the period 1980-81 to 2007-08

Industries	NIC-2004	L/K
Manufacture of tobacco products	160	4.308
Saw milling and planing of wood	201	2.015
Manufacture of wearing apparel, except fur apparel	181	1.702
Manufacture of railway and tramway locomotives and rolling stock	352	1.370
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	153	1.171
Dressing and dyeing of fur; manufacture of articles of fur	182	1.049
Manufacture of knitted and crocheted fabrics and articles	173	0.983
Manufacture of footwear	192	0.973
Manufacture of furniture	361	0.882
Manufacture of products of wood, cork, straw and plaiting materials	202	0.795
Manufacture of other electrical equipment n.e.c.	319	0.736
Manufacture of glass and glass products	261	0.721
Manufacturing n.e.c.	369	0.709
Manufacture of optical instruments and photographic equipment	332	0.705
Manufacture of other food products	154	0.688
Casting of metals	273	0.640
Manufacture of other textiles	172	0.604
Manufacture of structural metal products, tanks, reservoirs and steam generators	281	0.572
Tanning and dressing of leather, manufacture of luggage, handbags, saddlery and harness	191	0.543
Publishing	221	0.540
Manufacture of bodies (coach work) for motor vehicles; manufacture of trailers and semi-trailers	342	0.526
Manufacture of coke oven products	231	0.492
Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes except optical instruments	331	0.466
Manufacture of domestic appliances, n.e.c.	293	0.461
Production, processing and preservation of meat, fish, fruit vegetables, oils and fats	151	0.447
Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	322	0.442
Manufacture of other fabricated metal products; metal working service activities	289	0.441
Spinning, weaving and finishing of textiles	171	0.425
Manufacture of parts and accessories for motor vehicles and their engines	343	0.424
Manufacture of accumulators, primary cells and primary batteries	314	0.417
Printing and service activities related to printing	222	0.405
Manufacture of electric lamps and lighting equipment	315	0.396

Manufacture of dairy products	152	0.386
Building and repair of ships & boats	351	0.378
Manufacture of electricity distribution and control apparatus	312	0.373
Manufacture of transport equipment n.e.c.	359	0.369
Manufacture of electric motors, generators and transformers	311	0.364
Manufacture of general purpose machinery	291	0.361
Manufacture of electronic valves and tubes and other electronic components	321	0.349
Manufacture of office, accounting and computing machinery	300	0.340
Manufacture of special purpose machinery	292	0.337
Manufacture of non-metallic mineral products n.e.c.	269	0.332
Reproduction of recorded media	223	0.329
Manufacture of other chemical products	242	0.313
Manufacture of beverages	155	0.311
Manufacture of plastic products	252	0.286
Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods	323	0.283
Manufacture of rubber products	251	0.232
Manufacture of watches and clocks	333	0.231
Manufacture of man-made fibers	243	0.222
Manufacture of insulated wire and cable	313	0.210
Manufacture of motor vehicles	341	0.182
Manufacture of paper and paper product	210	0.163
Manufacture of aircraft and spacecraft	353	0.143
Manufacture of Basic Iron & Steel	271	0.120
Manufacture of basic precious and non-ferrous metals	272	0.085
Manufacture of basic chemicals	241	0.054
Manufacture of refined petroleum products	232	0.043
Total		**0.584**

Table A2. Selected Industries (3-digit NIC-2004) for the period 2008-09 to 2012-13

Industries	NIC-2008	L/K
Manufacture of tobacco products	120	1.059
Manufacture of games and toys	324	0.827
Manufacture of wearing apparel, except fur apparel	141	0.789
Manufacture of weapons and ammunition	304	0.696
Processing and preserving of fish, crustaceans and molluscs and products thereof	102	0.546
Materials recovery	383	0.515
Manufacture of jewellery, bijouterie and related articles	321	0.405
Manufacture of transport equipment n.e.c.	309	0.390
Manufacture of knitted and crocheted apparel	143	0.384
Manufacture of prepared animal feeds	108	0.366
Manufacture of musical instruments	322	0.357
Repair of fabricated metal products, machinery and equipment	331	0.319
Manufacture of structural metal products, tanks, reservoirs and steam generators	251	0.306
Manufacture of weapons and ammunition	252	0.299
Manufacture of optical instruments and equipment	267	0.230
Manufacture of furniture	310	0.225
Installation of industrial machinery and equipment	332	0.221
Manufacture of articles of fur	142	0.191
Manufacture of medical and dental instruments and supplies	325	0.176
Processing and preserving of meat	101	0.168
Manufacture of sports goods	323	0.167
Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	292	0.142
Processing and preserving of fruit and vegetables	103	0.136
Manufacture of irradiation, electro-medical and electrotherapeutic equipment	266	0.133
Manufacture of other food products	107	0.132
Other manufacturing n.e.c.	329	0.129
Support activities to agriculture and post-harvest crop activities	16	0.125
Manufacture of other fabricated metal products; metalworking service activities	259	0.101
Manufacture of magnetic and optical media	268	0.100
Manufacture of other electrical equipment	279	0.095
Waste treatment and disposal	382	0.088
Manufacture of grain mill products, starches and starch products	106	0.084
Manufacture of products of wood, cork, straw and plaiting materials	162	0.081
Manufacture of railway locomotives and rolling stock	302	0.081
Manufacture of man-made fibres	203	0.079
Manufacture of dairy products	105	0.073
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	151	0.067
Manufacture of computers and peripheral equipment	262	0.066
Reproduction of recorded media	182	0.066
Manufacture of parts and accessories for motor vehicles	293	0.065

Spinning, weaving and finishing of textiles	131	0.060
Manufacture of electric lighting equipment	274	0.059
Manufacture of general purpose machinery	281	0.058
Manufacture of footwear	152	0.057
Manufacture of communication equipment	263	0.055
Manufacture of air and spacecraft and related machinery	303	0.055
Manufacture of vegetable and animal oils and fats	104	0.051
Manufacture of glass and glass products	231	0.046
Manufacture of other chemical products	202	0.045
Manufacture of coke oven products	191	0.042
Manufacture of other textiles	139	0.037
Manufacture of pharmaceuticals, medicinal chemical and botanical products	210	0.032
Casting of metals	243	0.031
Manufacture of basic precious and other non-ferrous metals	242	0.030
Manufacture of plastics products	222	0.029
Publishing of books, periodicals and other publishing activities	581	0.028
Manufacture of rubber products	221	0.028
Building of ships and boats	301	0.025
Manufacture of beverages	110	0.023
Manufacture of wiring and wiring devices	273	0.022
Manufacture of domestic appliances	275	0.021
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	271	0.017
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	201	0.016
Manufacture of consumer electronics	264	0.015
Printing and service activities related to printing	181	0.013
Manufacture of special-purpose machinery	282	0.012
Manufacture of motor vehicles	291	0.010
Manufacture of refined petroleum products	192	0.008
Manufacture of basic iron and steel	241	0.008
Manufacture of paper and paper products	170	0.007
Manufacture of non-metallic mineral products n.e.c.	239	0.006
Manufacture of batteries and accumulators	272	-0.002
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	265	-0.036
Manufacture of electronic components	261	-0.037
Average		**0.157**