Employment Growth in India: Findings from Organized Manufacturing Industries

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This study attempts to understand the dynamics of the sluggish growth of Indian organized manufacturing sector and employment intensity at aggregate as well as industry levels using Annual Survey of Industry data at 3-digit level. Time period considered is from 1981 to 2014 with the trend breaks in major economic events/shocks in Indian economy. The study shows a small improvement in the employment elasticity of organized manufacturing sector over the period of time. Within the broad industrial groups, the gap between employment and gross value added of medium low-tech industrial group has come down rapidly over the period. Similarly, low-tech group has also shown a slight improvement in the employment elasticity over the period.

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Introduction

Indian economic growth during the neoliberal period has some peculiar characteristics, which appear to be different from the conventional development models, experienced by most of the countries in the world. The shift of economic growth from agriculture to the service sectors and stagnating manufacturing growth are two typical characteristics of India's structural transformation. However, specific characteristics of the manufacturing sector make it imperative as an 'engine of growth' for the economy and hence make industrialization essential for economic growth. The manufacturing sector, which constitutes just about 12.6 per cent of India's workforce, undoubtedly has the capacity to create more employment than any other sector of the economy. A large number of industrial jobs will be possible only by a rapid and sustained growth of manufacturing sector, which will greatly improve the conditions of India's low/semi skilled labor force through greater productive job creation in the next few years (Kapoor, 2015).

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employment intensive for a long period of time. It has been observed that "jobless growth" during the 1980s was followed by an employment boom in early 1990s and retrenchment thereafter. However, during the period 1996-97 to 2003-04 employment growth has declined and this deceleration in employment was because of new liberal economic policy brought a significant change in the nature of product market and domestic competition. Opening up the domestic market for transnational enterprises resulted in high import intensity of domestic manufacturing that in turn reduced the employment in manufacturing (Kannan & Raveendran, 2009). However, during the period 2004-05 to 2011-12, employment in organized manufacturing has grown significantly and this acceleration in employment has been attributed to the end of jobless growth due to the changes in the labor reforms at the state level (Goldar, 2011). A different line of explanation has been put forward that the recent employment boom in manufacturing sector may not signify the end of jobless industrial growth. Instead, it could be merely a recovery of employment lost over the previous years (Nagraj, 2011).

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There has been extensive debate on the employment growth in the organized manufacturing sector in India for different time periods (Nagaraj, 2000; Bhalotra, 1998; Goldar, 2000; Majumder, 2006; Roy, 2016). A few researchers have discussed employment elasticity in the context of Indian organized manufacturing sector. For example, Seth and Seth (1991) estimated labor absorption capacity of 20 major Indian manufacturing industries during 1960-1984 with the help of CES production function. They have concluded that the labor absorption capacity of the manufacturing sector has lagged behind the rate of growth of output.

Furthermore, Mazumdar and Sarkar (2004) have examined employment elasticity in the manufacturing sector during 1974-1996. They found a clear distinction in employment elasticity in three periods. During the first period 1974 to 1980, they have found higher employment elasticity followed by jobless growth with a negative value of elasticity and finally the reform period 1986-1996 when the employment started to recover with a high rate of output growth.

The analysis of employment elasticity has further been extended by Kannan and Raveendran (2009) up to 2004-05. They claimed that 16 out of 22 industries (2 digit level classification) registered positive employment elasticity during the pre-reform period. These industries belong to the group of industries whose

share in total employment is very low. Total employment loss in organized manufacturing during pre-reform period was due to the low performance of two industries i.e. food products and beverages and textiles, which together constitute about 42 percent in total employment of organized manufacturing sector, while in the post-reform period employment growth has witnessed a marginal improvement despite a higher growth rate of output.

The present study attempts to analyze the employment elasticity at a greater disaggregate level in the Indian organized manufacturing sector. This study would make a significant contribution to the prevailing literature at the industries level and the results might be useful to know the pattern of employment intensity across industries in Indian organized manufacturing sector.

Database & Classification of the Industries

The study is based on the Annual Survey of Industries (ASI) data, published by the Central Statistical Organization (CSO) under the Ministry of Statistics and Program Implementation. The time period considered is from 1981 to 2014, which is further divided in to three sub-periods considering major economic events/shocks in Indian economy (1981-1990, 1991-2007, and 2008-2014). We further classified whole organized manufacturing industries into four sub-categories: high-tech, medium high-tech, medium low-tech, and low-tech industries on the basis of relevant technology-intensive industrial classification of Organization for Economic Co-operation and Development (OECD). This study has considered 51 three-digit industries for the analysis.

Concept of 'Employment Elasticity'

Employment elasticity explains the sensitivity of the labor market with a change in the macroeconomic conditions of the economy. It is estimated by dividing percentage change in employment by percentage change in output growth (Kapsos, 2005). A high value of employment elasticity explains that growth in output leads to substantial job creation, whereas lower value indicates a weak association between output and employment growth (Misra & Suresh, 2014). In the present study, we used log-linear regression model to calculate employment elasticity:

$$In\ L = \alpha + \beta\ In\ Y \quad \text{.....(1)}$$

Where L represents employment, Y stands for output, and *In* indicates the natural logarithm of the variable. b coefficient stands for the employment elasticity. It shows that for one percentage point increase in gross value added, employment will be increased by b percentage point.

The contributions of both labor input and labor productivity are important in economic growth. However, a clear interpretation of both employment and productivity are significant while studying the employment elasticity. Studying the world trends of employment elasticity, Kapsos (2005) provided a theoretical relationship

between employment and productivity growth through an arithmetic identity given in equation 2.

$$Y_i = E_i \times P_i \quad \text{.....(2)}$$

Where Y_i stands for output, E_i stands for employment and P_i stands for productivity.Equation 2 shows that for a given change in output the following will hold:

$$\Delta Y_i = \Delta E_i + \Delta P_i \quad \text{.....(3)}$$

Dividing the equation we will get the following:

$$e = 1 - \frac{\Delta P_i}{\Delta Y_i}, \text{ where } e = \frac{\Delta E_i}{\Delta Y_i} \text{.....(4)}$$

Equation 4 shows the relationship between employment and labor productivity with a given output growth rate.

Simple Exponential Growth Rate

Consider the following linear form:

$$\ln(Q_t) = a + bt + u_t \quad \text{.....} \quad (5)$$

Where, Q_t= output, t = time, b = coefficient of time, and a = con-stant. The coefficient of time, b, is the continuous rate of growth. It closely approximates the annual compound growth rates. Therefore, the estimates of b are presented as growth rates. This technique is used to estimate the overall growth rate (1981-2014).

Kinked Exponential Growth Rate

The study also computed kinked-exponential growth rates for the sub-periods 1981-1990, 1991-2007 and 2008-2014, in which the trend lines of the three sub-periods are forced to meet at the mid-point that divides the sub-periods. Considering a time series for the period $t = 1, \ldots, n$ is broken at two points' k_1 and k_2. Discontinuous growth rate estimates for the three resulting sub-periods could be derived by estimating them separately or, equivalently, by fitting the unrestricted (discontinuous) single equation:

$$\ln Y_t = \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + (\beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3)t + u_t \text{ ..(6)}$$

The estimated growth rates from (1), $\hat{\beta}_1, \hat{\beta}_2$ and $\hat{\beta}_3$, are the same as if exponential trends were fitted separately to the data for each sub-period. The two-kinked exponential model is derived by imposing linear restrictions such that the sub-period trend lines meet at $k_1$and k_2:

$$\alpha_1 + \beta_1 k_1 = \alpha_2 + \beta_2 k_1 \text{ .....(7a)}$$

$$\alpha_2 + \beta_2 k_2 = \alpha_3 + \beta_3 k_2 \text{ .....(7b)}$$

Substituting for α_2 and α_3, we obtain the two-kink exponential model:

$$\ln Y_t = \alpha_1 + \beta_1(D_1 k_1 + D_2 k_1 + D_3 k_1) + \beta_2(D_2 t - D_2 k_1 - D_3 k_1 + D_3 k_2) + \beta_3(D_3 t - D_3 k_2) + ut \text{....(8)}$$

The growth rates in the three sub-periods are now given by the OLS estimates of the coefficients of the resulting composite variables. The kinked exponential growth model reduces discontinuity bias, provides a better basis for growth rate comparison, reduces instability or cyclical fluctuations, and uses a full set of available information to esti-

mate the growth rates for each sub-period in a single step (Boyce, 1986).

Trends in Employment Elasticity

This section examines the trends in the employment intensity of the output of the organized manufacturing sector at the aggregate level. The results of employment elasticity for the three time periods: 1981-1990, 1991-2007 and 2008-2014 along with overall period 1981-2014 are presented in Table 1. It has been observed that the employment elasticity for the period 1981-2014 of the total organized manufacturing industry is 0.11. The employment elasticity during the period from 1981-1990 has been very low and statistically insignificant, while it has imperceptibly expanded to 0.039 during the post-reform period 1991-2007 and further to 0.36 during 2008-2014. The explanation behind low employment elasticity in the pre-reform period 1981-1990 was because of job security regulation, expansion in the wage rate, rise in capital intensity (Fallon & Lucas, 1993; World Bank, 1999; Ahluwalia, 1991 cited in Goldar, 2000), and actual hours worked per worker (Nagaraj, 1994; Bhalotra, 1998). The marginal expansion in the employment elasticity in the post-reform period 1991-2007 might be the effect of economic reform. It leads to more market flexibility and increased trade orientation leading to change in the structure of industries in favor of labor intensive technique of production (Papola, 1994; cited in Goldar, 2000). Further, acceleration in the employment elasticity of the organized manufacturing sector during the current period 2008-2014 might be the result of labor reform undertaken by several Indian states at ground level. The states, which have relaxed more labor laws have experienced higher growth in

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Table 1 Employment Elasticity, Employment and GVA Growth of Organized Manufacturing Sector

Periods	Elasticity	Employment	GVA
1981-1990	0.007	0.3	7.0*
1991-2007	0.039	0.2*	5.1*
2008-2014	0.368*	2.8*	6.2*
1981-2014	0.110*	0.5*	5.6*

Notes: (i) * significant at 1 per cent level; ** significant at 5 per cent level; and *** significant at 10 per cent level.
(ii) RC indicate regression coefficient.

employment compared to the states which have relaxed fewer labor laws (Goldar, 2011).The results of employment elasticity are further examined using growth figures of employment and gross value added. The growth of employment and gross valued added are shown in column 3 and 4 of the Table 1. It is observed that despite high growth rate in gross value added, employment has grown with lower rate in all the sub-periods including overall period. In the recent period, small improvement is noted in the employment growth. Based on the overall results of employment elasticity, employment and gross value added growth rate it can be concluded that organized manufacturing sector could not be able to create enough employment in the 1980s and 1990s, however, the situation has improved during 2008-2014 at the aggregate level. Therefore, an industry level analysis would give better insight to understand the dynamics of the employment intensity of this sector.

Trends in Employment Elasticity at Industry Level

From the above analysis of employment elasticity at the aggregate level, it is quite clear that the overall organized manufacturing sector failed in employment generation. But now the question is whether all the industries have experienced jobless growth pattern or a few have experienced so during the period under investigation. Therefore, in the following section, an attempt has been made to find out the pattern of employment elasticity across the industries.

Employment Elasticity in High-tech Industries

The high-tech industrial group is defined as the group which uses most advanced technology in the production process. Employment elasticity of high-tech industry has increased over the period of study (0.27 during 1981-1990, as compared to 0.30 during 2008-2014). The overall employment elasticity of high-tech industry during 1981-2014 is 0.17 which characterized the industry as low employment with high productivity. For the sub-industries level, electronics and valves has achieved highest elasticity 0.37 during the period of 1981-2014, followed by optical instruments (0.24) and medical appliance (0.22), while the television and radio have experienced lowest employment elasticity (-0.24). A significant improvement in the elasticity values has been observed in the optical instruments over the period of study. The medical appliance is the only industry which has experienced continuously declining trend in the elasticity value. Its elasticity has declined from 0.21 in 1981-1990 to 0.13 from 1991 to 2007 and further to -0.03 in 2008-2011 (Table 2).

Furthermore, employment elasticity figures can be examined considering the employment and gross value added growth rates of the high-tech industry. At the aggregate level, gross value added growth of high-tech industry was 5.7 per cent and employment growth was 0.9 per cent per annum for the entire period of study. At the industries level, TV and radio transmitters, TV and radio receivers and aircraft and spacecraft have ex-

Table 2 Employment Elasticity of High-tech Industries

Code	Industries	1981-90	1991-07	2008-14	1981-14
321	Electronic Valves & Tube	0.398*	0.339*	0.351	0.371*
322	Television and Radio Transmitters	-	-0.043	0.280	0.065
323	Television and Radio Receivers	0.231***	-0.117	0.063	-0.241*
331+ 333	Medical Appliance & Instruments	0.215*	0.130*	-0.033	0.224*
332	Optical Instruments	0.183*	0.228*	1.049*	0.248*
353	Aircraft and Spacecraft	0.040	0.259	0.646*	0.083
	High-tech Industries	0.273*	-0.012	0.301	0.172*

Notes: Same as in Table 1.

perienced negative employment growth rate, while electronic valves and tubes, medical appliance and optical instruments have experienced positive employment growth rate. About the gross value added, most of the industries have witnessed less than the growth rate experienced by the high-tech industry as a whole, only electronic valves and tubes have experienced growth rate above the high-tech industry (Table 6).

The results of the kinked exponential growth rate at aggregate and disaggregate level for the high-tech industry for three periods; 1981-1990, 1991-2007 and 2008-2014 are presented in Table 6 The growth rate of gross value added of high-tech industry has declined to 4.9 per cent per annum during 1991-2007 from 9.0 per cent per annum during 1981-1990, and further to 4.8 per cent per annum during 2008-2014. Similarly, the growth rate of employment of high-tech industry has also declined to 0.1 per cent per annum in 1991-2007 from 2.7 per cent per annum in 1981-1990 and finally it has reached the level of 2.2 per cent per annum in 2008-2014. Among the industries, three out of six industries have witnessed continuous declining trends in the employment growth during the above mentioned periods; these are electronic valves and tubes, television and radio and optical and photographic instruments. On the contrary, one (medical appliance) out of six industries has experienced a continuous increasing trend in the gross value added. The rest of the industries in the high-tech sector have grown with several ups and downs in both employment and gross value added. It can be concluded that the growth of the high-tech industry is mainly driven by productivity rather than employment because of technologically advanced and capital-intensive nature of production.

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Employment Elasticity in Medium High-tech Industries

The medium high-tech industry comprises chemical products, man-made fibers, special purpose machinery, domestic appliance, electric motors, electricity distribution, accumulators, electric lamp, other electrical equipment, motors vehicles, body

for motor vehicles, transport equipment and railways. The results of employment elasticity with respect to different time periods are presented in Table 3.

Table 3 Employment Elasticity of Medium High-tech Industries

Code	Industries	1981-90	1991-07	2008-14	1981-14
242	Other chemical products	0.152*	0.184*	0.401*	0.219*
243	Man-made fibers	-	0.317*	0.229**	0.187**
292	Special purpose machinery	-0.013	-0.117	0.334*	0.053*
293	Domestic appliances	-0.258	-0.045	0.393*	-0.037
311	Electric motors, generators	0.098**	-0.096	1.017*	0.175*
312+313	Electricity distribution	0.072**	0.196*	0.856*	0.085*
314	Accumulators and primary cells	-0.129	0.19*	0.768*	0.232*
315	Electric lamps	-	0.055	0.557*	0.268*
319	Other electrical equipment	0.352*	0.464*	0.514*	0.395*
341	Motor vehicles	0.072**	0.216	0.448*	-0.115**
342	Bodies for motor vehicles	0.595*	0.328*	0.418*	0.415*
352	Railway and tramway locomotives	-0.106	1.791*	0.256	-0.603*
359	Transport equipment	0.372*	0.159**	0.467*	0.225*
	Medium High-tech Industries	0.084*	-0.052	0.455*	0.105*

Notes: Same as in Table 2.

Employment elasticity of medium high-tech industry has declined over the period of study with small ups and downs (0.045 in 2008-2014, as compared to 0.084 during 1981–1990. Negative and statistically insignificant elasticity value has been observed during 1991-2007). For the whole period, employment elasticity of medium high-tech industry has been noted merely 0.10, which is comparatively higher than other sub-periods. At industries level, severe fluctuations have been observed in the employment elasticity. During the pre-reform period 1981-1990, motor vehicles industry has achieved the highest value of employment elasticity (0.59) followed by transport (0.37) and other electrical equipment (0.35). Similarly, during the post-reform period, differences in the pattern of employment elasticity across industries have been observed. The period during 1991-2007, other chemical products, electricity distribution, accumulators, other electrical equipments and railways have experienced acceleration in elasticity value except for two industries namely body for motor vehicles and transport equipment. However, railways have achieved the highest rank in the elasticity among all the industries. During 2008-2014, ten out of thirteen industries have experienced acceleration in the value of elasticity. These industries are special purpose machinery, domestic appliance, electric motors, electricity distribution, accumulators, electric lamps, other electrical equipment, motors vehicles, body for motors vehicles, and transport equipment.

The results of growth rate of the medium high-tech industry are presented in Table 6. It has been observed that in spite of higher growth rate in gross value added (5.6 per cent per annum) employ-

ment has grown at a very low rate (0.5 per cent per annum) during the period. Within the medium high-tech industry, four out of thirteen industries have experienced negative employment growth rate (man-made fibers, domestic appliance, motor vehicles, and railways). In other nine industries, highest employment growth has been observed in the body for motor vehicle industry (2.7 per cent per annum) followed by other electrical equipment (2.6 per cent per annum), while special purpose machinery has been experiencing lowest employment growth (0.1 per cent per annum). In gross value added, most of the industries have experienced a growth rate, above 5 per cent per annum. The highest gross value added growth has been noted in the transport and equipment industry (7.2 per cent per annum).

These figures indicate a large gap between employment and gross value added growth in the medium high-tech sector.

Results of kinked exponential growth model suggests that employment and gross value added have declined to -0.1 and 5.1 percent per annum during post-reform and pre-crisis period (1991-2007) from 1.1 and 6.8 percent per annum during pre-reform period (1981-1990), and increased to 3.6 and 6.5 percent per annum respectively during post-crisis period (2008-2014). These figures indicate a large gap between employment and gross value added growth in the medium high-tech sector. At industries level, three out of thirteen industries have experienced negative employment growth rate during the pre-reform period (1981-1990). These industries are domestic appliances, accumulators and other electrical equipment. During the post-reform and pre-crisis period (1991-2007), six industries have experienced negative employment growth rate (man-made fibers, special purpose machinery, electric motors, motor vehicles, and railways). Whereas during the post-crisis period (2008-2014), man-made fibers and electricity distribution have witnessed negative employment growth rate and five industries have witnessed more than 5 per cent per annum employment growth rate (electric motors, accumulators, electric lamp, motors vehicles, and body for motors vehicles) with the highest growth in electric motors (7.4 per cent per annum). Turning to gross value added, most of the industries have experienced growth rate more than 6.5 per cent per annum during the post-crisis period (2008-2014) in comparison to two periods: pre-reform period (1981-1990) and post-reform and pre-crisis period (1991-2007).

Employment Elasticity in Medium Low-tech Industries

The medium low-tech industry includes coke oven, refined petroleum, rubber, plastic, glass and glass products, non-metallic, basic iron and steel, casting of metals, basic precious and non-ferrous metals structural metal products, other fabricated metal products and building and repairs of ships. Employment elasticity of medium low-tech industry has shown an increasing trend over the pe-

Table 4 Employment Elasticity of Medium Low-tech Industries

Code	Industries	1981-1990	1991-2007	2008-2014	1981-2014
231	Coke oven products	0.069	0.005	0.033	0.056*
232	Refined petroleum products	0.014	0.186*	-0.044	0.218*
251	Rubber products	0.087***	0.148*	0.448*	0.224*
252	Plastic products	0.271*	0.395*	0.451*	0.378*
261	Glass and glass products	-0.1	-0.063	0.402**	0.003
269	Non-metallic mineral products	0.17*	0.167*	0.737**	0.193*
271	Basic Iron & Steel	-0.097	-0.023	0.005	0.016
272	Basic precious and non-ferrous metals	0.085*	0.139*	0.225	0.135*
273	Casting of metals	-	0.116**	0.328*	0.275*
281	Structural metal products	0.21*	0.079	0.474*	0.192*
289	Other fabricated metal products	0.066	0.375*	0.406*	0.323*
351	Building and repair of ships & boats	0.846*	0.028	0.028	0.016
	Medium Low-tech Industries	0.064*	0.104*	0.528**	0.165*

Notes: Same as in Table 2

riod of study. It has increased from 0.06 during the pre-reform period (1981-1990) to 0.10 during the post-reform and pre-crisis period (1991-2007) and further to 0.52 during the post-crisis period (2008-2014). For the whole period, employment elasticity of medium low-tech industry has been 0.16 which is comparatively higher from medium high-tech and low-tech industry (Table 4). At industries level, the value of elasticity has fallen in the range of 0.003 to 0.37 during the period under investigation. Highest value has been noted in the plastic products (0.37) followed by other fabricated metal (0.32), casting of metal (0.27) and rubber products (0.22). During the pre-reform period (1981-1990), most of the industries in the medium low-tech group have shown very small value of elasticity except building and repair of ships. However, during the post-reform and pre-crisis period (1991-2007), five industries (refined petroleum products, rubber products, plastic products, basic precious and non-ferrous metals,and other fabricated metals) have experienced positive growth in employment elasticity. Within that plastic products industry (0.39) has reported the highest elasticity value, while coke and oven products industry has experienced the lowest elasticity value (-0.02) in the medium low-tech industrial group. During the post-crisis period (2008-2014), most of the industries have witnessed acceleration in the value of employment elasticity except refined petroleum product and building and repair of ships. Highest employment elasticity has been observed in non-metallic mineral products industry (0.73) followed by structural metal products industry (0.47).

At the aggregate level, the simple exponential growth rate of the medium low-tech industry has reported 6.4 per cent growth rate in output, whereas employment growth has been reported as 1 per cent for the entire period of the study (Table 6). At the industries level, plastic products and refined petroleum products have witnessed the highest employment

and gross value added growth rate of 2.8 and 8.1 per cent per annum respectively, whereas coke oven products (0.2) and rubber products (5.2) and building and repairs of ships (5.2) have witnessed lowest employment and gross value growth rate during same period.

Examining the results of the kinked exponential model, several differences have been observed in the pattern of employment and gross value added growth rates in the medium low-tech industry across the sub-periods. The employment growth of medium low tech industry has increased from 0.3 per cent in 1981-1990 (statistically insignificant) to 0.7 per cent in 1991-2007 and further to 3.8 percent in 2008-2014, whereas gross value added growth has declined to 6 per cent in 2008-2014 from the 6.5 per cent in the two periods; 1981-1990 and 1991-2007(Table 6). Among the industries, two industries namely plastic products and structural metal products have achieved the highest employment growth rates during 1991-2007 and 2008-2014 respectively. In terms of gross value added, plastic products (10.1 per cent), refined and petroleum products (8.1 per cent) and basic precious and non-ferrous metals (10.5 per cent) have achieved highest growth rate during 1981-1990, 1991-2007 and 2008-2014 respectively (Table 6).

Employment Elasticity in Low-tech Industries

Low-tech industry in Indian organized manufacturing sector includes: production, processing and preservation of meat, fish, fruit, vegetables, oils and fats; dairy product; grain mill products; other food product; beverage; tobacco; spinning and weaving and finishing of textiles; footwear; wood; paper and paper product; publishing and printing; furniture and jewelry. The low-tech industry has been treated as labor intensive.

Employment elasticity of low-tech industry has been reported negative during the pre-reform period after which it has increased to 0.14 during 1991-2007 and finally reached a low level of 0.02 during 2008-2014. Overall, low level of employment elasticity (0.12) during 1981-2014 characterizes this industry group as one providing high employment with low output growth (Table 5). At the disaggregate level, three industries have shown negative value of employment elasticity (spinning, weaving,and finishing of textiles, sawmilling,and planning of wood and publishing), two have achieved more than 0.50 value of employment elasticity (knitted and crocheted fabrics and wearing apparel) and the rest fifteen industries have shown less than 0.46 value of employment elasticity during the entire study period. During the sub-periods, six out of twenty industries have shown continuously increasing trend in the employment elasticity during three periods; 1981-1990, 1991-2007 and 2008-2014 (production, processing and preservation of meat, fish and fruit vegetables, other food products, beverage, dressing and dying of fur, printing and service activities and furniture); however, rest fourteen industries have shown severe ups and downs in the value of employment elasticity (Table 5).

Table: 5. Employment Elasticity of Low-tech Industries

Code	Industries	1981-90	1991-07	2008-14	1981-14
151	Processing and preservation of meat	-0.015	0.122*	0.218***	0.132*
152	Dairy product	0.205	0.134*	0.399*	0.23*
153	Grain mill products	0.163**	0.151*	0.05	0.154*
154	Other food products	-0.317*	0.04**	0.129*	0.016*
155	Beverages	0.217*	0.213*	0.341***	0.232*
160	Tobacco products	0.115	0.002	0.077	0.062*
171	Textiles	-0.195**	-0.115	0.117**	-0.065*
172	Other textiles	0.022	0.677*	0.396***	0.469*
173	Knitted and crocheted fabrics	0.327*	0.679*	0.409*	0.545*
181	Wearing apparel	0.332*	0.662*	0.195*	0.502*
182	Dressing and dyeing of fur	0.321	0.567*	0.794***	0.468*
191	Tanning and dressing of leather	0.258*	0.157*	0.585*	0.253*
192	Footwear	0.261*	0.336*	0.333***	0.378*
201	Saw milling and planning of wood	-0.479**	0.124	-0.074	-0.557*
202	wood, cork, straw	0.115**	0.073	0.157**	0.133*
210	Paper and paper product	-0.006	0.1298	0.083	0.17*
221	Publishing	-0.116***	-0.382	0.614***	-0.347*
222	Printing and service	0.07	0.162*	0.523	0.223*
361	Furniture	0.028	0.253*	0.476*	0.261*
369	Jewelry	0.101**	0.446*	0.24**	0.419*
	Low-tech Industries	-0.09***	0.141*	0.192*	0.127*

Notes: Same as in table 2.

Employment growth of the low-tech industry has been reported at 0.6 per cent and gross value added 5.2 per cent for the entire period of study (1981-2014).

Employment growth of the low-tech industry has been reported at 0.6 per cent and gross value added 5.2 per cent for the entire period of study (1981-2014). At industries level, highest employment growth have been seen in the knitted and crocheted fabrics (4.1 percent) followed by wearing apparel (3.9 percent) and furniture (3.1 percent), while highest gross value added growth have seen in the wearing apparel (7.6 per cent) followed by jewelry (7.4 per cent) and other textiles (7.1 per cent) during the whole period of study(Table 6).

Considering the results at sub-periods level, employment growth of low-tech industry has increased from -0.2 percent during 1981-1990 to 0.7 percent during 1991-2007 and further to 1.5 percent during 2008-2014, whereas gross value added growth of low-tech industry has declined from 6.7 per cent during 1981-1990 to 4.8 per cent during 1991-2007 and finally reached the level of 5.4 per cent during 2008-2014 (Table 6). At disaggregate level,six out of twenty industries have shown continuously increasing trends in the employment growth rate (production, processing,and preservation of meat, fish and fruit vegetables, other food products, beverage,sawmilling and

Table 6 Growth of Employment & Gross Value Added of Organized Manufacturing Sector

		Kinked Exponential Growth						Simple Exponential Growth	
Code	Industries	Employment			GVA			Employment	GVA
		1981-90	1991-07	2008-14	1981-90	1991-07	2008-14	1981-14	1981-14
321	Electronic Valves & Tube	4.2*	2.8*	1.8**	11.5*	8.1*	2.1***	3.0*	8.0*
322	Television and Radio Transmitters	-	-2.5*	4.0**	-	2.0**	6.1*	-1.0**	2.9*
323	Television and Radio Receivers	-0.8	-1.8*	-0.1	6.8*	3.9*	6.4*	-1.4*	4.8*
331+333	Medical Appliance & Instruments	1.3***	0.9*	2.6*	5.2*	5.3*	6.0*	1.2*	5.4*
332	Optical Instruments	2.3*	2.2*	-7.9*	6.5*	8.0*	-9	1.0*	5.6*
353	Aircraft and Spacecraft	1.6	-2.3*	6.7*	9.3*	1.7***	4.4	-0.4	3.5*
□	**High-tech Industries**	**2.7***	**0.1**	**2.2***	9*	4.9*	4.8*	**0.9***	5.7*
242	Other chemical products	1.2*	1.1*	2.9*	6.8*	6.0*	6.7*	1.3*	6.2*
243	Man-made fibers	-	-0.6	-0.1	-	0	5.8**	-0.5	1.3*
292	Special purpose machinery	0.2	-0.4**	3.6*	5.6*	4.4*	8.0*	0.1	5.1*
293	Domestic appliances	-1.9*	-0.7*	3.9*	3.3*	4.2*	10.0*	-0.4**	4.8*
311	Electric motors, generators	1.3***	-0.7**	7.4*	5.4*	4.2*	9.4*	0.6*	5.1*
312+313	Electricity distribution	0.4	0.7*	-1.0***	8.1*	4.9*	1.0	0.4*	5.0*
314	Accumulators and primary cells	-0.9***	0.1*	5.7*	5.3*	5.3*	7.3	1.2*	5.6*
315	Electric lamps	-	0	5.0*	-	4.0*	7.7*	1.1*	4.8*
319	Other electrical equipment	-0.3	3.1*	4.0*	3.5*	7.6*	7.0*	2.6*	6.8*
341	Motor vehicles	1.6***	-2.7*	5.5*	6.6*	4.5*	5.2*	-0.8*	5.0*
342	Bodies for motor vehicles	5.2	1.5*	6.2	10.2*	4.5*	14.5*	2.7*	6.8*
352	Railway and tramway locomotives	2.2	-6.8*	4.4***	6.0*	-0.8	8.3*	-3.7*	1.6*
359	Transport equipment	3.1*	1.0*	2.2*	8.8*	7.2*	4.6*	1.6*	7.2*
□	**Medium High-tech Industries**	**1.1***	**-0.1**	**3.6***	6.8*	5.1*	6.5*	**0.5***	5.6*
231	Coke oven products	1.8*	-0.2	0.7	6.2*	5.7*	7.7*	0.2**	6.0*
232	Refined petroleum products	0.1	2.2*	1.9**	9.0*	8.1*	6.5	1.8*	8.1*
251	Rubber products	1.4*	0.7*	3.2*	7.6	4.1*	7.8*	1.1*	5.2*
252	Plastic products	2.8*	2.6*	3.8	10.1*	6.6*	7.6*	2.8*	7.4*
261	Glass and glass products	-0.4	-0.1	1.8*	7.3*	5.1*	4.3*	0	5.4*
269	Non-metallic mineral products	0.5	0.8*	4.1	7.2*	5.7*	6.9*	1.1*	6.1*

271	Basic Iron & Steel	-1.0*	-0.2	3.8*	4.8*	6.2*	4.3*	0	5.7*
272	Basic precious and non-ferrous metals	1.0*	0.7*	1.6**	10.0*	6.7*	4.0*	0.9*	7.0*
273	Casting of metals		0.6**	4.6*		4.7*	10.5*	1.5*	6.1*
281	Structural metal products	0.9	0.1	5.7*	6.1*	5.1*	10.1*	0.9*	5.9*
289	Other fabricated metal products	0.1	2.4*	3.6*	6.7*	6.4*	6.9*	2.1*	6.5*
351	Building and repair of ships & boats	-3.7*	0.2	2.1**	-1.6	6.5*	8.3*	-0.3	5.2*
□	**Medium Low-tech Industries**	**0.3**	**0.7***	**3.8***	6.5*	6.5*	6.0*	**1.0***	6.4*
151	Processing and preservation of meat	0.2	0.6*	2.0*	7.5*	5.0*	6.1*	0.7*	5.6*
152	Dairy product	2.5*	0.9*	2.9*	9.9*	5.8*	4.9*	1.5*	6.5*
153	Grain mill products	1.4*	0.9*	0.5	6.9*	5.8*	8.7*	0.9*	6.4*
154	Other food products	-1.5*	0.4*	0.8***	7.9*	3.9*	4.7*	0.1	4.8*
155	Beverages	1.3*	1.4*	2.9*	8.3*	6.6*	5.7*	1.6*	6.8*
160	Tobacco products	1.5*	0.1	-0.8	8.3*	5.6*	3.0*	0.3*	5.8*
171	Textiles	-0.6*	-0.4	1.0*	5.5*	3.4*	5.1*	-0.3	4.0*
172	Other textiles	-1.7***	4.6*	3.5*	4.8	7.6	7.8*	3.2*	7.1*
173	Knitted and crocheted fabrics	2.4*	4.9*	2.2**	9.5*	7.6*	3.3**	4.1*	7.3*
181	Wearing apparel	4.6*	4.2*	1.1	13.9*	6.6*	4.0*	3.9*	7.6
182	Dressing and dyeing of fur	6.4*	2.0***	-5.5*	11.9*	4.2*	-1.6	1.9*	5.0*
191	Tanning and dressing of leather	1.6*	0.6*	4.3*	8.2*	3.8*	5.9*	1.2*	4.9*
192	Footwear	2.8*	1.8*	4.1*	10.2*	4.4*	8.1*	2.3*	5.9*
201	Saw milling and planning of wood	-1.9*	-2.3	0.1	3.2*	0.8**	8.9*	-1.9*	2.3*
202	wood, cork, straw	0.4	0.1	3.3*	5.8*	4.0*	8.8*	0.6*	4.9*
210	Paper and paper product	0.4***	0.8*	1.6*	7.3*	4.7*	4.4*	0.9*	5.1*
221	Publishing	0.1	-2	-5.7*	6.4*	4.3*	-2.1	-2.0*	3.9*
222	Printing and service	-0.4	0.8*	6.2*	5.1*	5.6*	10.9*	1.2*	6.1*
361	Furniture	-2.0*	1.8*	4.5*	1.8	6.6*	6.6*	1.4*	5.7*
369	Jewelry	1.7*	3.8*	1.8*	8.2*	7.6*	4.5*	3.1*	7.4*
□	**Low-tech Industries**	**-0.2**	**0.7***	**1.5***	6.7*	4.8*	5.4*	**0.6***	5.2*

Notes: Same as in Table 2

planning of wood, paper,and paper products, printing and service activities and furniture), while four have shown continuously declining trend in the employment growth rate (grain mill products, tobacco products, wearing appear, dressing and dyeing of fur) and employment in the rest ten industries have grown with severe fluctuations during three periods; 1981-1990, 1991-2007 and 2008-2014 (Table 6).

About the gross value added, nine industries have shown a continuous declining trend in the growth rate during three periods 1981-1990, 1991-2007 and 2008-2014 (dairy product, beverage, tobacco product, knitted and crocheted fabrics, wearing apparel, dressing, and dyeing of fur, paper,and paper products, publishing, and jewellery). Only two industries have shown an acceleration in the gross value added growth rate during the three periods 1981-1990, 1991-2007 and 2008-2014 (other textiles and printing and service activities) (Table 6).

Summary & Conclusions

The employment elasticity-which indicates the capacity of an economy or sector to generate employment opportunities for its labor force has come down dramatically in the organized manufacturing sector. However, a small improvement has been observed in the employment elasticity of the organized manufacturing sector particularly during the post-crisis period (2008-2014) may be due to labor reforms undertaken by several Indian states at ground level. The states, which have relaxed labor laws more have experienced higher growth in employment compared to the states which have relaxed fewer labor laws (Goldar, 2011).

Growth achieved in the medium low-tech industry during the pre-reform period and the post-reform period is attributed to gains in employment.

Furthermore, after investigating the employment elasticity across different categories of industries, it has been observed that medium low-tech industry has experienced acceleration in the employment elasticity over the period. This suggests that growth achieved in the medium low-tech industry during the pre-reform period and the post-reform period is attributed to gains in employment. Therefore, Medium low-tech industries like coke oven, refined petroleum, rubber, plastic, glass and glass products, non-metallic, basic iron and steel, casting of metals, basic precious and non-ferrous metals structural metal products, other fabricated metal products and building and repairs of ships should be given higher priority in the employment generation agenda. Results also suggestthat the low and fluctuating nature of employment elasticity in high-tech and medium high-tech industrial groups during the study period indicate that growth achieved in both the industrial groups attributed to gains in productivity.

Furthermore, it is worthy to note that, employment elasticity of low-tech industry at an aggregate level has been ob-

served stagnant over the period of study. However, industries like production, processing, and preservation of meat, fish and fruit vegetables, other food products, beverage, dressing and dying of fur, printing and service activities and furniture industries under low-tech industry group have experienced continuously accelerating growth in employment elasticity.

Hence from the policy point of view, it is pertinent to increase the productivity and employment in those industries which have experienced continuously increasing employment intensity of growth,particularly in medium and low-tech industrial group. This is possible only by lowering the labor law regime, increasing economic freedom and ease of doing business, and enhancing infrastructure facilities especially for low-tech industry and medium low-tech industry groups in India. Since labor-intensive industries belong to the low-tech industry and medium low-tech industry groups which contribute significantly in terms of employment in the organized manufacturing sector, a greater focus on these industries will enable productive absorption of surplus unskilled labor in India

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