Employment Elasticity in the Registered Manufacturing Sector of India

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Abstract: *In recent years it is much debatable topic among the scholars that whether the growth of the country is enough to provide sufficient employment to its people, especially in the registered manufacturing sector. This paper is an attempt to study growth pattern of the employment for registered manufacturing industries with respect to its value added for the period of 1993-94 to 2016-17. Data has been taken from Annual Survey of Industries and by using technology-based classification, it aims at investigating whether the growth of economy is helping in distributional equity or not. In first part of this analysis a "jobless growth" scenario has been observed mainly due to capital intensification of the manufacturing industries, notably in low-technology group industries. Productivity level has increased but at the cost of employment being mostly labour saving. Second part of this study found more inclusive growth, with more employment opportunities being created along with a significant increase in productivity.*

Key words: Employment Elasticity, Growth, Registered Manufacturing, Industry.

INTRODUCTION

Historically, all the developed countries have demonstrated a linear path of structural transformation; the process in which an economy gradually transforms from traditional services to the modern services. Classical economists like Kuznets (1966) and Kaldor (1976) also hold a similar view on this and argued that industrialization plays a crucial role in development of a nation. To increase living standard of the country's people, it is essential to increase share of the manufacturing sector in total value added as well as in total employment.

One of the Sustainable Development goals is also aiming, ``to promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries" (goal 9.2). The role of the manufacturing sector; particularly registered manufacturing sector in India is very crucial to achieve sustained and inclusive growth at least during the first stage of transformation from primary to traditional activities. In this view the present study aims to analyse growth pattern of employment for registered manufacturing industries with respect to its value added. It investigates whether growth is following distributional equity or not, so that each social group of the country can be benefited equally through increase in economic prosperity and the living standard.

METHODS & MATERIALS

Employment elasticity regarding output expresses economy's capacity to generate employment. The data source of the present paper is Annual Survey of Industries (ASI) published by Center for Statistical Organization (CSO). The elasticity has been estimated using Arc-elasticity method for the period from 1993-94 to 2016-17. For a comparative analysis, the whole period has been divided into two sub-periods: Period I (1993-94 to 2003-04) and Period II (2004-05 to 2016-17). On the basis of the ASI data for different industries of the registered manufacturing sector, all two-digit 22 industries have been classified into three groups (Table1) based on its technical use (Alivelu et al., 2015).

Table-1

Technological Classification of the Registered Manufacturing Sector of India

Low-Technology Industry Group		Medium-Technology Industry Group		High-Technology Industry Group	
NIC-2 digit Code	Industry	NIC-2 digit Code	Industry	NIC-2 digit Code	Industry
15	Food and Beverages	19	Leather	24	Chemicals
16	Tobacco Products	23	Coke and Petroleum	29	Machinery
17+18	Textiles and Apparel	25	Rubber	30+31+32+33	Electrical Machinery
20+36	Wood and Furniture	26	Non-Metals	34+35	Transport
21+22	Paper and Publishing	27+28	Basic and Fabricated Metals	-	-

Source: UNIDO Classification

Employment elasticity shows the responsiveness of the change in employment with respect to change in value added during a given time period. It shows how much change in employment would occur as a result of one unit change in value added and can be analyzed with the help of following formula of arc elasticity:

$$ E = \frac{(L_1 - L_0) \,/\, L_0}{(Y_1 - Y_0) \,/\, Y_0} $$

Where; E =Employment Elasticity, L_1=Employment in current year, L_0=Employment in previous year, Y_1=Output in current year and Y_0=Output in previous year. According to this approach three main interpretations are possible (Ali et al., 2017):

E < 0	Decrease in employment but increase in output
1 > E > 0	Increase in employment as well as in output
E >1	Employment growth but decrease in output

E < 0 denotes to growth sans employment (Kannan & Raveendran, 2009) and shows a decrease in employment while value added is growing. Transformation of a production process towards modernization demands technological investments and increased capital intensity where by more capital is substituted for labour. Consequently, productivity and growth take place; but without producing any job. In literature it is often referred to as jobless growth situation (Kannan & Raveendran, 2009 and Bhat, 2013).

1 > E > 0 is an expectable case; which exhibits that employment growth is less than proportionate to the output growth. This means that technological up gradation or capital deepening are also contributing to employment growth. The last case of E >1 shows that growth in employment has surpassed that of value added. It is the case found in agriculture sector in which marginal productivity of additional workers is zero or near to it.

Estimating employment elasticity with respect to gross value added will give us a clear view of growth pattern of employment, which will indicate whether growth is inclusive for a particular economy. Industry-wise disaggregate analysis will help to identify industries with varying elasticity. A positive elasticity (ranging between 0-1) implies that the growth of the registered manufacturing sector or of a particular industry is producing jobs. A value close to zero indicates poor growth in jobs; but an efficient utilization of available labour resources, implying strong growth in labour productivity; while its value near to unity is indicative of higher labour-intensive growth (Kapsos, 2005). Negative value of elasticity shows labour displacement due to modernization of the sector or the industry, which results in diminishing capacity to produce employment in relation to value added growth.

RESULTS & DISCUSSION

It can be observed from table 2 that the growth in the registered manufacturing during period I (1993-94 to 2003-04) was productivity driven. During this period employment elasticity was negative 0.02, suggesting that growth in value added was more due to increase in labour productivity, resulting in a negligible growth in employment. Hence, the period has been identified as the jobless growth era in literature. In other words employment elasticity was highly sensitive to the growth, exhibiting 1 percent increase in value added lowers employment on an average by 0.02 percent in the sector. However, the degree of this sensitivity was not identical across manufacturing industries.

A close examination of table 2 reveals highest employment share is in the industries comprising low-tech group whereas their share in value added is the lowest leading to lower labour productivity growth. Except for wood & furniture, all industries in this category are experiencing very low but positive employment elasticity. Paper industry is experiencing negative employment elasticity. Significant capitalization of these industry groups can be observed as can be seen through high growth of GFCS. What is striking here is that all five industries of low-tech group which together had an employment share of approximately 50 percent in total manufacturing, have accounted for an employment elasticity of only 0.11. Even this low value is mainly due to the higher elasticity in wood & furniture industry.

Textiles industry, which was not only highest (21%) contributor to employment but also third largest (13%) contributor to the manufacturing value added, has recorded an employment elasticity of just 0.06. That means a unit increase in output increases employment by 0.06 percent only, which is very close to zero. These statistics are exhibiting that the textile industry has efficiently used their labour resources. This statement is also endorsed by its significant level of labour productivity. One thing also has to be noticed that wood & furniture industry was the only one having witnessed inclusive growth even during this job-less growth period. The fallout, however, is the declining labour productivity in case of this industry.

As can be seen, the medium tech industries group is experiencing highest growth in value added and labour productivity across all the three categories. Its employment growth though positive is meager at 0.02. Negative employment elasticity of -4.10 in the leather industry can be seen. Here the case is unique as this decline in elasticity was a result of a negative growth in value added instead of employment; rather employment has witnessed a mild growth. Consequently, it has experienced lowest labour productivity during this period. On the other hand, some industries have registered a very low but somewhat better elasticity ranging between 0.03 in

coke & petroleum and 0.17 in rubber industry. High value added growth and labour productivity is found in coke and petroleum products. Rubber products, however, are exhibiting an ideal scenario of high value-added growth combined by high employment growth and better productivity levels. Its employment elasticity is highest across all the industries in this group. Excepting the leather industry and Basic & Fabricated metals all other industries in this category are portraying an ideal growth scenario in terms of output and employment.

Table 2

Elasticity of Employment with Respect to Output by Tech-Based Classification of the Registered Manufacturing Sector from 1993-94 to 2003-04

Sr. No.	NIC-2004 (2-digit Industry Group)	Share of Employment	Share of Value Added	Growth in GFCS	Growth in Employment	Growth in GVA	Employment Elasticity	Labour Productivity
1	2	3	4	5	6	7	8	9
1	Food (15)	16.87	9.47	12.51	0.34	2.85	0.12	3.49
2	Tobacco (16)	6.24	1.58	15.43	0.83	7.24	0.11	6.28
3	Textiles (17+18)	20.90	13.06	12.24	0.21	3.72	0.06	4.59
4	Wood (20+36)	2.15	1.39	15.24	3.76	6.32	0.59	1.15
5	Paper (21+22)	3.93	3.82	12.56	-0.28	10.05	-0.03	1.04
A.	**Low-Tech Industry Group**	**50.08**	**29.32**	**12.36**	**0.37**	**3.51**	**0.11**	**3.53**
6	Leather (19)	1.78	0.93	11.03	1.09	-0.27	-4.10	0.29
7	Coke and Petroleum (23)	0.91	6.66	21.56	0.73	23.55	0.03	13.75
8	Rubber (25)	3.25	4.42	12.64	3.13	17.97	0.17	5.68
9	Non-Metals (26)	5.93	5.34	12.00	0.98	8.52	0.11	4.90
10	Basic & Fabricated Metals (27+28)	11.58	16.12	8.38	-0.73	8.01	-0.09	5.30
B.	**Medium-Tech Industry Group**	**23.44**	**33.47**	**10.77**	**0.21**	**10.05**	**0.02**	**6.94**
11	Chemicals (24)	7.97	15.11	9.07	-0.88	1.21	-0.72	0.46
12	Machinery (29)	6.25	6.19	11.42	-0.49	4.89	-0.10	5.61
13	Electrical Machinery (30+31+32+33)	5.77	7.88	12.57	-0.93	5.25	-0.18	3.58
14	Transports (34+35)	6.49	8.03	14.84	-0.65	13.54	-0.05	9.00
C.	**High-Tech Industry Group**	**26.48**	**37.21**	**10.62**	**-1.26**	**4.82**	**-0.26**	**3.85**
	Registered Manufacturing	**100.00**	**100.00**	**10.91**	-0.14	5.90	-0.02	4.55

Source: Annual Survey of Industries.

Growth data on gross fixed capital stock also confirms the fact that during this period capital base of the manufacturing sector and their industries has deepened, notably in the low-tech group of industries; which was a consequence of the 90's reforms. Economy was moving towards a higher value-added growth scenario at the expense of employment. Consequently, employment elasticity has declined and even turned negative in some cases. Besides this, external shocks of Asian crisis of 1997-98 and downward business cycles of Europe and America also forced producers to adopt machine-based processes through a replacement of labour by capital (Bhat, 2013). All these circumstances together have driven the manufacturing sector and its industries towards labour-displacement, resulting in a job-less growth in the first selected sub-period.

Sub-period II (2004-05 to 2016-17) of the study is more inclusive than period I, as growth dividends during this period are comparatively well distributed among the population (see table 3). In other words, during this period growth and productivity are also accompanied by higher employment opportunities and the manufacturing sector seems to have adopted a relatively more labour-intensive growth model. During this period employment elasticity of the registered manufacturing was 0.49 which was a marked improvement over negative 0.02 during period I. This highly elastic employment of the sector was the result of individual performances of all the industries in terms of employment except tobacco; ranging between 0.02 in tobacco to 0.83 in basic and fabricated metal. Here one thing has to be noticed that growth in employment has increased significantly across the board; this is accompanied by a commensurate increase in value added growth, albeit with some structural redistribution.

Medium-tech industry group has been identified as the highest employment generator with employment elasticity of 0.64 during 2004-05 to 2016-17 against only 0.02 during 1993-94 to 2003- 04. Basic & fabricated metals industry has registered a highly elastic employment of 0.83 which was negative 0.09 in period 1. All other industries in this group also saw an improvement in their employment elasticity, most surprising being the case of the leather industry.

Leather industry has seen significant diversification in recent years with the demand being driven by fashion industry, especially footwear. With a sufficient raw material base and a skilled labour force, India has graduated from being a mere raw material exporter to that of the finished goods. This surprising improvement was the outcome of its improved performance in all three aspects- growth, employment and productivity as well. Being employment intensive, this industry can play a crucial role in overall development.

Table 3

Elasticity of Employment with Respect to Output by Tech-Based Classification of the Registered Manufacturing Sector from 2004-05 to 2016-17.

Sr. No.	NIC-2004 (2-digit Industry Group)	Share of Employment	Share of Value Added	Growth in GFCS	Growth in Employment	Growth in GVA	Employment Elasticity	Labour Productivity
1	2	3	4	5	6	7	8	9
1	Food (15)	14.09	6.61	12.21	2.86	9.58	0.30	4.87
2	Tobacco (16)	3.97	0.85	10.41	0.07	2.98	0.02	2.03
3	Textiles (17+18)	19.99	9.90	10.06	4.49	9.48	0.47	4.53
4	Wood (20+36)	2.85	1.30	12.81	6.77	11.68	0.58	3.25
5	Paper (21+22)	3.41	2.41	10.76	3.49	7.75	0.45	3.55
A.	**Low-Tech Industry Group**	**44.32**	**21.07**	**10.97**	**3.47**	**8.75**	**0.40**	**4.50**
6	Leather (19)	2.29	0.75	12.36	8.31	12.28	0.68	4.04
7	Coke and Petroleum (23)	0.97	15.14	14.48	6.16	15.03	0.41	4.57
8	Rubber (25)	4.14	4.35	12.11	7.51	13.98	0.54	5.86
9	Non-Metals (26)	7.03	5.30	12.50	7.09	11.42	0.62	1.00
10	Basic & Fabricated Metals (27+28)	12.51	12.73	12.56	5.98	7.19	0.83	-1.21
B.	**Medium-Tech Industry**	**26.94**	**38.26**	**12.78**	**6.65**	**10.36**	**0.64**	**1.71**
11	Chemicals (24)	9.46	16.47	12.83	8.51	17.11	0.50	3.65
12	Machinery (29)	5.79	6.27	12.82	6.84	13.08	0.52	5.58
13	Electrical Machinery (30+31+32+33)	5.72	7.07	9.62	5.91	10.71	0.55	3.68
14	Transports (34+35)	7.78	10.85	15.39	8.54	12.84	0.66	2.40
C.	**High-Tech Industry Group**	**28.75**	**40.66**	**12.88**	**7.27**	**13.35**	**0.54**	**3.64**
	Registered Manufacturing	**100.00**	**100.00**	**12.34**	**5.30**	**10.89**	**0.49**	**3.79**

Source: Annual Survey of Industries.

As far as high-tech group of industries are concerned, this category has also experienced positive employment elasticity of 0.54 during 2004-2017, which was negative 0.26 during 1993-2004. Productivity level remained almost the same; but, growth in value added and employment has witnessed a significant increase. Its four industries which were negatively elastic in terms of employment and showed job displacing growth in period I have recorded positive elasticity in period I. In this view chemical industry has progressed well from -0.72 to 0.50. Highest growth in value added is now observed in Chemicals in the high-tech group instead of Coke and Petroleum in the mid-tech group. As a result, the former group has recorded highest growth in value added collectively. This is also accompanied by the highest growth in employment and second highest level of labour productivity. Thus, the inclusive growth in high tech industries augurs well for Indian industry striving towards world class level of manufacturing along with providing sufficient employment opportunities to the additional labour force. Similarly, electrical machinery increased from -0.18 to 0.55, transport from -0.05 to 0.66 and machinery improved from -0.10 to 0.52 during the same periods.

Low-tech group of industries have seen a decline in the shares of output and employment in period II; but continue to provide jobs to almost 44 percent of the manufacturing workers. The five industries together; especially textiles (20%) and food & beverages (14%) are highest job providers. In spite of this the employment elasticity observed here is relatively less as compared to the other two groups. Except tobacco industry all other industries in the group have registered an increase in their respective employment elasticity.

These results show that capital deepening of the 90s has translated into significant capacity creation so that employment generating growth was made possible even in medium- tech and high-tech industries.

Analyzing the same variables for the entire period from 1993-94 to 2016-17 yields results which are placed in the table 4. Category wise results reveal that low-tech industry group is the highest employment provider as their share in employment was highest among all categories. However, overall growth in terms of value added, employment and productivity level are more in medium-tech and high-tech group industries.

Employment elasticity is found to be positive but not too high across the board during the entire period averaging at 0.34 for the registered manufacturing sector as a whole. In its fourteen different industries, elasticity ranges between 0.08 in tobacco industry to 0.76 in leather industry. Important industries in terms of elasticity above 0.50 are Leather (0.76) and wood industry (0.58), exhibiting a good employment potential during the entire period. This is due to diversification and relative comparative advantage arising out of lower wages. Other important industries having employment elasticity above 0.40 are chemicals in High-tech group and non-metals and basic and fabricated metals in the medium- tech group.

Table 4

**Elasticity of Employment with Respect to Output by Tech-Based Classification of the
Registered Manufacturing Sector from 1993-94 to 2016-17.**

Sr. No.	NIC-2004 (2-digit Industry Group)	Share of Employment	Share of Value Added	Growth in GFCS	Growth in Employment	Growth in GVA	Employment Elasticity	Labour Productivity
1	2	3	4	5	6	7	8	9
1	Food (15)	15.36	7.92	12.34	1.77	6.65	0.27	4.43
2	Tobacco (16)	5.01	1.18	12.59	0.40	4.83	0.08	4.32
3	Textiles (17+18)	20.41	11.35	11.01	2.63	6.98	0.38	4.16
4	Wood (20+36)	2.53	1.34	13.87	5.46	9.35	0.58	2.92
5	Paper (21+22)	3.65	3.06	11.54	1.85	8.75	0.21	3.25
A.	**Low-Tech Industry Group**	**46.96**	**24.85**	**11.58**	**2.12**	**6.47**	**0.33**	**4.20**
6	Leather (19)	2.06	0.83	11.78	5.17	6.82	0.76	2.25
7	Coke and Petroleum (23)	0.94	11.25	17.56	3.80	18.74	0.20	11.86
8	Rubber (25)	3.73	4.38	12.35	5.61	15.72	0.36	4.48
9	Non-Metals (26)	6.52	5.32	12.28	4.43	10.16	0.44	3.90
10	Basic & Fabricated Metals (27+28)	12.08	14.28	10.74	3.06	7.55	0.41	2.68
B.	**Medium-Tech Group Industry**	**25.33**	**36.07**	**11.91**	**3.85**	**10.22**	**0.38**	**5.34**
11	Chemicals (24)	8.78	15.85	11.19	4.43	10.20	0.43	4.61
12	Machinery (29)	6.00	6.24	12.21	3.65	9.52	0.38	6.30
13	Electrical Machinery (30+31+32+33)	5.74	7.44	10.90	2.93	8.34	0.35	4.73
14	Transports (34+35)	7.19	9.56	15.15	4.55	13.15	0.35	6.45
C.	**High-Tech Industry Group**	**27.71**	**39.08**	**11.90**	**3.56**	**9.64**	**0.37**	**5.40**
	Registered Manufacturing	**100.00**	**100.00**	**11.72**	**2.93**	**8.72**	**0.34**	**5.44**

Source: Annual Survey of Industries.

FINDINGS & CONCLUSIONS

Above analysis shows that the period of 1993-94 to 2003-04 was not inclusive; termed as the period of labour-displacement. Many endogenous and exogenous factors have forced domestic producers to expand their capital base by substituting labour in the organized manufacturing, especially in low-technology based industries. However, the study found highest employment elasticity in wood & furniture industry across the board even during this job-less period. Textile industry has been identified as the most labour-intensive industry; even then it has a very low employment elasticity of 0.06. Employment elasticity for the leather industry was negative. In this respect, rubber industry registered somewhat better employment elasticity along with high value added and employment growth. High-technology group of industries witnessed employment-displacing growth, resulting from negative employment growth across the category.

Period II (2004-05 to 2016-17) proved to experience more inclusive growth than earlier period I. It shows that capital deepening of the 90s has translated into significant capacity creation so that employment generating growth was made possible, notably in medium-tech and high-tech group of industries. Medium-tech group was found to be highest employment elastic in all three categories. Basic & fabricated metal industry has recorded a very high employment elasticity of 0.83 which was negative in period I. Leather industry also has recorded a noteworthy spurt in its employment elasticity. Commensurately in low-tech group, tobacco industry was still found with lowest employment elasticity.

For the entire study period the registered manufacturing sector has recorded moderate employment elasticity of 0.34. Low-tech industry group was highest contributor to the total employment; whereas growth of medium-tech and high-tech industry groups was more in terms of value added, employment and productivity. Throughout the period leather and wood industry were found to be more inclusive than others as these have recorded highest employment elasticity across the board.

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