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Performance Measurement of Manufacturing industries in Ethiopia- An Analytical Study

Dr. K. Rama Mohana Rao
Professor, Department of Commerce and management Studies
Andhra University, Visakhapatnam, Andhra Pradesh, India
E-mail: kattaraorm@yahoo.com

Simon Zekarias Tesfahunegn
A Research Scholar in Andhra University
Department of Commerce and Management Studies, Visakhapatnam – 530003, Andhra Pradesh. India
E –mail: sumzek@yahoo.com

Abstract
Manufacturing sector is the heart and soul of many developed and developing country's economy. However, the growth and contribution of the sector to the Ethiopian Economy is at its infant stage. In this study, using time series data base of the central statistics Agency (CSA), the trend in the performance of the manufacturing sector is investigated taking labor productivity as a dependent performance indicator variable. The study covers 15 manufacturing industrial groups as categorized by the CSA. Based on performance reports and related literature reviews, factors that can affect the performance were identified and their influence was analyzed using fixed effects regression model. The result of the analysis indicated that there is overall improvement in the value added growth performance of machinery and equipment, food and beverages, footwear, luggage and handbags manufacturing categories. However, despite the textile and leather industries of Ethiopia have resource based competitive advantage, their performance growth rate is not promising. The human capital, capital intensity, and the firm size (economies of scale) were found as major determinants of the performance of the sector. The average labor productivity of the sector showed incremental growth because of improvements in the educational and skill level of labor forces which has resulted from the intensive government efforts in addressing technical and vocational educations to all citizens. In Ethiopia, there is huge demand for products of manufacturing sectors, hence industries which are producing at large scale using their maximum capacities have shown improvement in their labor productivity.
Keywords: value added, labor productivity, performance, manufacturing

1. Introduction

Production structure, as reflected by the relative contribution of the economic sectors to the overall national income of a country, is one of the key indicators of the degree of industrialization of an economy. In highly industrialized economies, the contribution of agriculture to the national income is very small and is estimated to be less than 5 percent, while the share of industry is about six times greater. For least developed countries such as Ethiopia, agriculture plays the dominant role of the economy. Ethiopia's economy is dominated by Smallholder agriculture that provides over 85 percent of the total employment and foreign exchange earnings and approximately 45 percent of the Gross Domestic Product (GDP). The contribution of industry to GDP at constant 1980/81 factor cost was only 11.4 percent in which large and medium size manufacturing accounted for 6.2 % and small scale industry and handicrafts represented 2.5% while agriculture and service accounted for 45.1 % and 46.5% respectively ([1]MoFED, 2003/2004). This shows that in Ethiopia economy, the contribution of the manufacturing sector is minimal instead the agriculture and service industry dominates the Economy.

Ethiopia began its first series of economic reform programs in 1992. The reform programs aimed at reorienting the economy from a command to market economy, rationalizing the role of the state and creating legal, institutional and policy environments to enhance private sector investment. Different sectoral policies, strategies and plans were developed and implemented in an effort to make manufacturing industry play great role in the economy. As a result of the economic reforms and priorities given to the sector, its contribution to the economy has increased from 11.4 percent in 2003/2004 to 13.4 percent in 2010/11 and within the industry, the construction and manufacturing sub-sectors have registered high growth rate of 12.8 percent and 12.1 percent (MoFED, 2010/2011).

The fact that the contribution of the manufacturing sector to GDP is minimal exhibits the infant stage of manufacturing activities or industrialization in Ethiopia. This low contribution of the manufacturing sector for the GDP is the common feature of most developing countries that are especially found in Sub Saharan African countries. The share of the manufacturing value added (MVA) is one of the indicators which pave the way to

[1] MoFED- ministry of finance and Economic development of Ethioia

assess the sector's performance against other economies. Table 1 presents the performance of the Ethiopian manufacturing sector in comparison with other economies of the world

Table 1: Share of Manufacture Value Added (MVA) in GDP for Different Economies and Ethiopia at constant 1995 price

Country group	Share of MVA in GDP						Growth rate in MVA	Growth rate in per capita MVA
	1990	1995	2000	2001	2002	2003	(1998-2003)	(1998-2003)
Industrialized countries	20.4	19.5	19.5	18.8	19.0	19.2	1.9	1.5
Developing countries	20.5	21.5	22.9	22.8	23.3	23.7	5.7	4.1
South east Asian countries	23.3	25.7	28.0	27.9	28.4	28.8	7.8	6.4
African LDC	8.5	7.7	28.0	27.9	28.4	28.8	7.8	6.4
Ethiopia	7.0	7.0	6.0	6.0	6.	5.9	4.2	1.6

Source: UNDO, Industrial statistics year book, 2005

The share of MVA in GDP for Ethiopia is very low and even less than other African LDCs. In terms of the annual growth rate in total manufacturing value added (MVA) and annual growth rate in per capita MVA, Ethiopia's economy has achieved a growth rate of 4.2 and 1.6 respectively during the years 1998-2003, which shows its performance is poor as compared to other economies.

2. Literature review

The literature focused mainly on factors such as labor productivity, human capital, capital intensity, capacity utilization and firm size to assess the performance of manufacturing factories.

Bernolak, (1997) stated that labour productivity is an appropriate measure of firm's productivity if the work force is a dominating production factor of the industry. As a matter of fact, the small manufacturing industries in Ethiopia which has very limited capital except light machines is labor intensive and hence use of labor productivity as a measurement of performance becomes appropriate . There are many problems that are associated with measuring total factor and multi factor productivities ([2]OECD, 2001). For example, it is difficult to construct an index number that will serve as the input. It will mean adding hours done by labour to units of investments, the contributions of land, technology, etc. to get a single index. Even to quantify them all in monetary terms is very cumbersome. The construction of multi-factor productivity index is, therefore, not appealing. In its place partial productivity can be used. This estimates the ratio of total output to a single input, usually labour. Hence, in most discussions, especially in economics, productivity is taken to be synonymous with labour productivity. Gretton and Fisher, (1997) has also stated that labor Productivity is an indicator of technical efficiency because it shows the relationship between outputs and labour inputs given the technology within the firm or the industry. It is influenced by changing pattern of factor use and generally it can be analyzed in the context of multifactor productivity. Therefore, labour productivity can be regarded as a measure of overall productivity performance. Changes in output per employed person can be seen as the outcome of production, employment and capital investment decisions. As such the measure provides one means of summarizing the outcome of a range of different decisions. It is the manpower that manipulates all other productivity factors of a firm and hence it is rational to estimate the performance of firms by labor productivity

The productivity of manufacturing sector of a nation is affected by various factors like the skill level of its production work forces, level of technologies, the availability of resources, the infrastructural development level of the country and many other factors. In dealing with firm productivity, the most common factor included by many researchers is the human capital variables measured by education level, training, educational expenditure, literacy rate and so forth. Human capital attainment especially in terms of education and training plays an important role in determining firm's performance such as output, productivity and profit (Honig 2001, Blundell et al. 1999, Barron et al. 1989, Blakemore and Hoffman 1988). Mason and Finegold (1997) in the United States and Britain support the positive relationship between human capital and the firm's performance. They found that education and training are more important determinant of productivity as compared to physical capital. Firms with more educated workers are better able to sustain and control their present technology or adopt modern and new technology. They are more able to invest in human capital like training because knowledgeable workers learn and adapt faster and are more innovative (Bosworth and Wilson 1993, Bishop 1994 and Chapman and Tan 1990). Rahmah (2000), Labor productivity is very much related to skills among workers that can be acquired through Proper training. Workers who have attended training will be more efficient, productive and contribute to productivity growth. Workers with higher level of education and attended formal

[2] OECD is organization for economic and co-operation development

training tend to receive higher wages and they are also more likely to contribute to career development, research and development and further human capital accumulation. The relationship between human capital and productivity is much influenced by workers' wage rate (Blundell et al. 1999, Montague 1986). A higher wage rate received by the workers will encourage them to work harder and contribute to higher productivity. Workers with higher level of education and attended formal training tend to receive higher wages and they are also more likely to contribute to career development, research and development and further human capital accumulation and consequently they contributes to higher productivity growth. Therefore, it is very important for firms to have more educated workers to gain this added stimulus effect. The average wage could implicitly indicate the skill composition of an industry. The lower the wage share i.e the lower is the (skill adjusted) wage rate in relation to labour productivity the greater is the firm level competitive advantage that is expected to result in a higher competitiveness. *Hence it is hypothesized that, ceteris paribus, the wage share defined as a ratio of wage to value added per employee is expected to have a positive association with the productivity performance of an industry.*

Capital intensity which is closely related to Technical progress is another factor that can affect labor productivity. It was found in Japan that the contribution of capital to productivity growth was larger in the capital-intensive industry as compared with the labor-intensive industry indicating that use of modern technologies and huge machines improves the productivity of work forces (Hwang, 1989; Hishashi & Yokohama, 1991; Haskel and Martin, 1993). Kartz (1969) calculated residual factors to analyze the contribution of technological progress to output and labor productivity growth in Argentina and concluded that capital is a major determinant of labor productivity. Abdulkhadiri and Pickles (1990) also found that apart from technological improvement experienced, capital is still the main contribution to output growth. Another important determinant of productivity is capital-labor ratio. In fact, this ratio is frequently used as an indicator of level of technology where the higher capital-labor ratio is associated with higher level of technology. In the United Kingdom, for example, a study conducted on 81 firms, between the 1980-1986 periods, found that productivity increased by 4.7 per cent. Of this 2.2 per cent was due to the growth of capital-labor ratio (Haskel and Martin 1993). Further, their study revealed that a decrease in skilled labor by 2.63 per cent led to productivity reduction by 0.7 per cent each year. In other words, if there was no reduction in the number of skilled labor, productivity would have increased higher than 4.7 per cent to achieve 5.4 per cent. Hence, *In light of this, it is Hypothesized that an increase in capital intensity, significantly improves the productivity performance of the manufacturing sectors*

Trade theories state that scale of operation is an important source of cost competitiveness which helps to lower average costs and thereby improve competitiveness of a firm in the market. The three major sources of scale-based advantage are: economies in the production process due to the presence of increasing returns to scale, economies in the bulk purchases of materials and economies in marketing and selling costs. An economy in the bulk purchase is more important here. Given the fact that the manufacturing sector is material intensive, economies in the bulk purchase of materials are expected to be higher. Overhead marketing costs per unit decline with a rise in sales volume which in turn improves the performance of firms. Support for this assertion comes from export performance studies. Wakelin (1998) and Sterlacchini (1999) found non-linear relationship between plant size and export propensity in which both found an inverted-U shaped relationship. Wagner (2001) stated that although exporters are found among smaller firms, the probability that a firm is an exporter tends to increase with firm size. As the magnitude of production increases, the average costs are expected to fall, thereby increasing the firm-level competitiveness and, hence the productivity of the firms. Since the outlay on materials and the volume of sales are directly related to the magnitude of production, we consider the value of production as a preferred proxy for scale advantage (firm size). Hence, it is *hypothesized that there is a positive association between economies of scale in production and productivity performance of manufacturing sectors.*

Capacity utilization (maximum output rate) that a company can achieve in its manufacturing system is another important key-factor. Companies always need to match the capacity to the current demand rate from the customers. Idris and Rahmah (2009) stated that if capacity is higher than needed, some of the company's resources will not be used and in turn reduce productivity. If the capacity is lower than needed, another problem arises, namely, that the company cannot satisfy the demand. This situation can threaten the company's competitiveness in the long run if customers turn to alternative suppliers. Hence, firms need to work at an optimal production level based on market demand. Capacity utilization which is related with technical efficiency at industries level can be attributed to organizational factors such as the nature of management, plant layout, material handling, waste control and work methods (T.A. Bhavani & Suresh D. Tendulkar, 2010). Firms using their available resources with selected technologies more efficiently are able to produce at lower costs and hence improve their competitiveness in the market. Given the input prices, scale advantage and technology, a technically more efficient firm would obviously possess an additional cost advantage. *Hence,* Technical efficiency measured as the ratio of observed output to maximum producible output is *hypothesized to have a strong positive relationship with labor productivity*

3. Objective of the study

The study aims at analyzing the trend in the performance of manufacturing sector in Ethiopia in order to identify the factors that affect the performance and also to determine the degree of relationship between the performance determinant factors and performance of the sector.

4. Research Methodology

In this study, performance is measured in labor productivity per value added production. Hence, the trend in performance of manufacturing industries is investigated from the labor productivity in real value added production per employee point of view. The study has used survey data collected by CSA in 2010 and 2011. The CSA survey data includes manufacturing sectors which engage more than ten employees and hence this research also included manufacturing industries that engaged 10 and more persons. The range of collected data items include distribution of manufacturing industries across the state of the country, volume of fixed investment in the sector, gross and value added production levels, number of persons engaged and wages and salaries of employees. Other derivative data like capacity utilization, capital intensity, human capacity and economies of scale are also computed. The trend in labor productivity in real value added unit is measured as an indicator for industrial performance. In addition, the factors that determine the performance levels are identified and their relative influence on the performance is also analyzed. Fixed effect regression model is applied to analyze the trend in performance and its determinants. Fixed effect regression model is preferred for the purpose as it helps to analyze the net impact of the time variant variables by controlling (minimizing) the influence of the other time invariant variables (Green, 2003).

Model specification and estimation method for productivity performance

Panel data is used to econometrically estimate the Cobb-Douglas production function. The time series data show how parameters change over time. The form of the production function employed is the general log linear production model as given below.

$$InY_{it} = \alpha \sum_{k} \beta_k In\ X_{kit} + \sum_{t} \delta\, t + V_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where i, t and k are subscripts for cross-sectional units (industries), time and inputs, α, β_k, $V_{it,}$ and σ_t are parameters to be estimated, Y is output, and X_k are inputs

For simplicity and amenability, equation 1 can be rearranged for labor productivity as follows:

$$Ln\left(\frac{Y}{L}\right)_{it} = \alpha + \sum_{k} \beta_k\, In\, X'_{kit} + \sum_{t} \delta_t C_t + \lambda_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1.1$$

Where C_t is a dummy variable having a value of one for the i^{th} time period and zero otherwise, and X'_{kit} are inputs while the coefficients are elasticity's i.e response in Y as one unit change in X. A fixed effect regression model is used to determine the labor productivity performance of the manufacturing firms which is stated below.

$$In(VADPE) = \beta_0 + \beta_1 lnFS_{it} + \beta_2 lnCUL_{it} + \beta_3 lnHUC_{it} + \beta_4 lnCAPI_{it} + e_{it} \ldots\ldots\ldots (2)$$

Where

VADPE= vale added production per employee
FS= Firm size measured by log value of production level
CUPL= capacity utilization level measured by percentage of capacity utilization
HUC= Human capacity level, approximated by skilled adjusted wage share of the of the employees
CAPI= capital intensity level measured by the ratio of fixed assets to employees number
E_{it}**=** is an error term

5. Findings and discussion

5.1 Regional distribution of the manufacturing sectors

The regional distribution of large and medium scale manufacturing industries by industrial group is shown in Table2. The total number of large and medium scale manufacturing industries as reported by CSA in 2011/12 is 2,170 and has created job opportunities for 175,698 citizens. More than 40% of the manufacturing industries are located in Addis Ababa, the capital of Ethiopia, 23% in Oromiya state, 11% in Amhara and 9 % in Tigray regional government and the remaining 16% are found in the remaining 7 regions of the country. This shows that the distribution of the manufacturing industry is skewed to the capital city and its peripherals for better infrastructural and market access. The number of manufacturing sectors by industrial classification also indicates that the sector is dominated by few types of enterprises. For instance, as can be seen from the table 2, more than 31% of the manufacturing industries fall in the category of food products and beverages followed by non-metallic mineral products with more than 18% and the furniture industry with 12.5%. The Textile industry,

which can create large job

Opportunities for the abundant unemployed labor forces and uses local raw materials, covers only 1.71 percentages. The table below gives a detailed data on the regional distribution by establishment number, coverage percentage and total number of persons engaged in each industrial category. Name of the industrial group is annexed in the last page

Table 2: Distribution of large and medium scale manufacturing industries by regional states and industrial group 2011/2012 (readers should see annex for the name of the industrial group)

Industrial group	Distribution by Regional states											Total	Cover gage %	Total no persons engaged
	Tigray	Afar	Amhara	Oro Mia	Somallia	Benshangul	SNNP	GAMBELLA	HARRAR	Addis Ababa	Dire dawa			
1	44	-	70	181	7	-	62	1	7	275	39	686	31.6	67,471
2	-	-	-	-	-	-	-	-	-	1	-	1	0.05	1,342
3	3	1	2	13	-	-	3	-	-	14	1	37	1.71	13,436
4	-	-	1	6	-	-	1	-	-	31	1	40	1.84	5820
5	9	-	9	34	-	-	1	-	1	87	-	141	6.50	14,136
6	3	-	8	32	-	-	13	-	-	30	-	86	3.96	4,044
7	5	-	2	16	-	-	1	-	1	94	3	122	5.62	10,096
8	7	1	-	26	-	-	1	-	-	41	1	77	3.55	9,801
9	3	-	-	32	-	-	-	-	-	68	3	106	4.88	11,019
10	70	6	89	76	1	-	52	-	5	98	12	409	18.8	18,115
11	8	-	3	10	-	-	-	-	-	16	2	39	1.80	4963
12	28	-	8	30	-	-	15	-	-	56	4	141	6.50	6,266
13	-	-	-	2	-	-	-	-	-	4	-	6	0.28	653
14	2	-	1	1	-	-	-	-	1	3	-	8	0.37	1,626
15	18	-	47	47	5	2	85	-	7	56	4	271	12.5	6,898
TOTAL	200	8	240	506	13	2	234	1	22	874	70	2170	100	175,698
%	9	.3	11	23	.6	0.000	10.8	0000	1	40.03	3.22	100		

Source: Compiled from CSA (2011 & 2012) report

The category of food products and beverages that have largest share of the sector, include industries like production, processing and preserving of meat, fruits and vegetables, manufacture of dairy products, bakery products, manufacture of malt liquors and malt, manufacture of soft drinks and production of mineral waters. The second category that covers 18 percent of the sector manufactures other non-metallic mineral products including glass and glass products, clay products, cement, lime, plaster, and articles of concrete. Figure 1 shows the distribution of the manufacturing sector along the different states and two municipal administration cities.

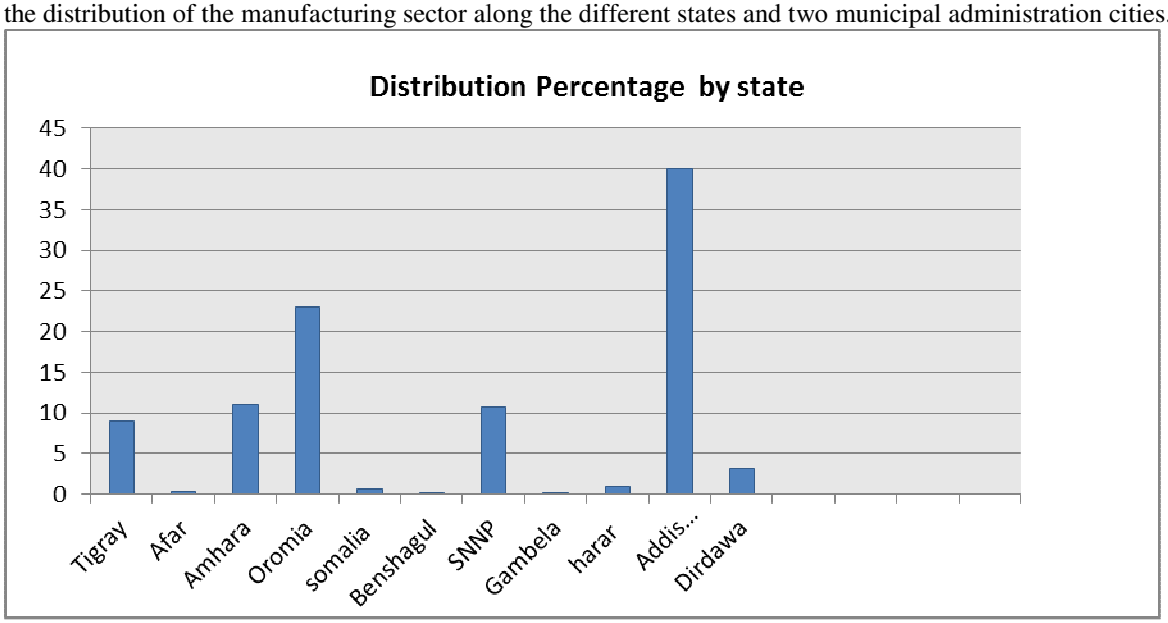

Fig1: Distribution of manufacturing sector by regional states.

5.2 Performance of manufacturing sector

The performance is assessed by using the value added production, labor productivity, labor cost per value added and the per capita ratio of the manufacturing sector.

5.2.1 Value added by industrial group

Value added is commonly used as a measure of output. It represents the wealth created through the organization's production process. In this case it is measured by the difference between sales and the cost of

materials and services incurred to generate the sales. It is computed by deducting purchase Cost of inputs, intermediate goods and services from total Sales. Where sales refer to revenue earned from products sold or services rendered by the organization and purchased goods include raw materials and intermediate products obtained from other organization. Based on this definition the value added by each industrial group at the national account concept is given in Table 3.

Table 3: Value added at the national account concept (at market price) by industrial group over a period of four years from 2007-2011.

Industrial group code	Value added in the national Account Concept (at market price) in 000s						
	2007	2008	2009	2010	2011	Total value added	Growth rate
1	2,792,055	3,876,933	4,718,007	6,854,566	12,288,032	30,529,593	34.01071
2	283,167	344,048	472,882	367,544	346,641	1,814,282	0.224157
3	311,283	185,022	521,126	907,567	388,953	2,313,951	0.249516
4	97,940	114,544	75,649	230,285	245,322	763,740	1.504819
5	257,955	366,216	314,469	404,512	1,377,233	2,720,385	4.339044
6	41,799	54,133	43,172	33,076	164,747	336,927	2.94141
7	369,239	470,942	591,877	755,666	1,013,965	3,201,689	1.746094
8	365,611	530,710	912,626	1,295,464	1,765,557	4,869,968	3.829059
9	354,673	445,516	701,171	1,217,011	1,103,742	3,822,113	2.111999
10	1,397,838	1,707,345	1,696,174	2,703,684	2,764,125	10,269,166	0.977429
11	325,723	280,055	417,784	413,524	845,823	2,282,909	1.596756
12	355,495	442,180	554,351	1,180,118	(569,976)	1,962,168	-2.60333
13	3,970	6,688	9,379	84,167	93,731	197,935	22.60982
14	347,419	168,299	155,004	344,562	254,192	1,269,476	-0.26834
15	131,382	162,072	251,198	543,586	359,924	1,448,162	1.739523
Total	7,455,691	9,154,705	11,434,869	17,335,333	22,442,001	67,802,464	

Source: Compiled from CSA (2011 & 2012) report

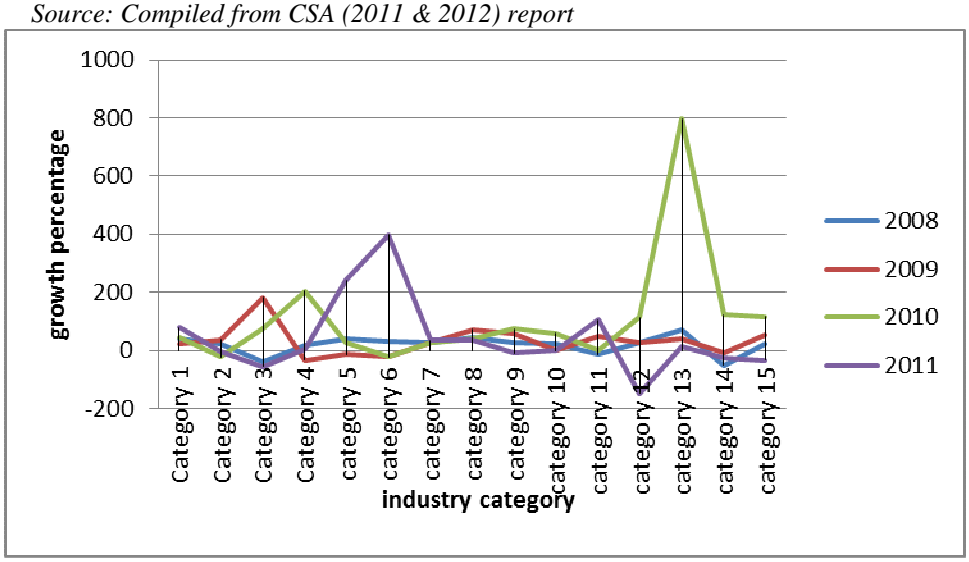

Figure2: Growth trend in value added by industry category.

As it is depicted in table-3 and figure-2, the value added by the manufacturing industries has shown some improvements over the past four years. During this period, on average the values added by this sector grew by 5% considering 2007 as a base year and the growth rate of machinery and equipment, food and beverages, the footwear, luggage and handbags, chemical and chemical products has shown better performance. The overall value added by the industry in the last five years is more than 67 billion birr and except the textile, fabricated metals and motor vehicles category the remaining group has shown progressive improvements. Despite the government investment incentive policy favors the textile industry believing that it is a work home for many citizens, its performance is not promising. Its growth rate during 2008 to 2011was found to be -40.56%, 81%, 74% and -57% respectively which is highly fluctuating and not predictable

Table 4: Trend in percentage distribution of value added by industrial group (at basic price)

industrial group code	2007	2008	2009	2010	2011	Average
1	36.48	38.55	37.18	34.95	33.11	36.054
2	2.86	3.64	4.92	(0.14)	0.91	2.438
3	4.22	1.45	4.80	6.26	0.94	3.534
4	1.21	1.22	0.86	1.69	0.86	1.168
5	3.10	4.38	2.89	2.34	4.58	3.458
6	0.65	0.67	0.41	0.07	0.48	0.456
7	5.50	5.45	5.68	4.89	3.00	4.904
8	4.86	5.99	8.90	8.10	5.30	6.63
9	4.56	4.46	5.90	7.38	3.04	5.068
10	22.10	23.22	16.42	19.24	8.46	17.888
11	2.86	2.46	3.40	1.52	2.12	2.472
12	5.46	3.95	4.59	6.93	35.11	11.208
13	0.06	0.08	0.08	0.49	0.27	0.196
14	4.00	2.42	1.57	2.33	0.63	2.19
15	2.08	2.09	2.39	3.96	1.18	2.34

Source: Compiled from CSA (2011 & 2012) report

The table(4) Portrays the percentage distribution of value added in the national account concept at basic price by industrial group and it indicates that on average 36% of the value added by manufacturing industries to the national account was contributed by food and beverages manufacturing industry, 17% by manufacturers of non-metalic mineral producers, 11% by fabricated metal products except machinery and equipment manufacturing industry, and only 3.5 % by the textile industry category. The details are also presented in figure 3.

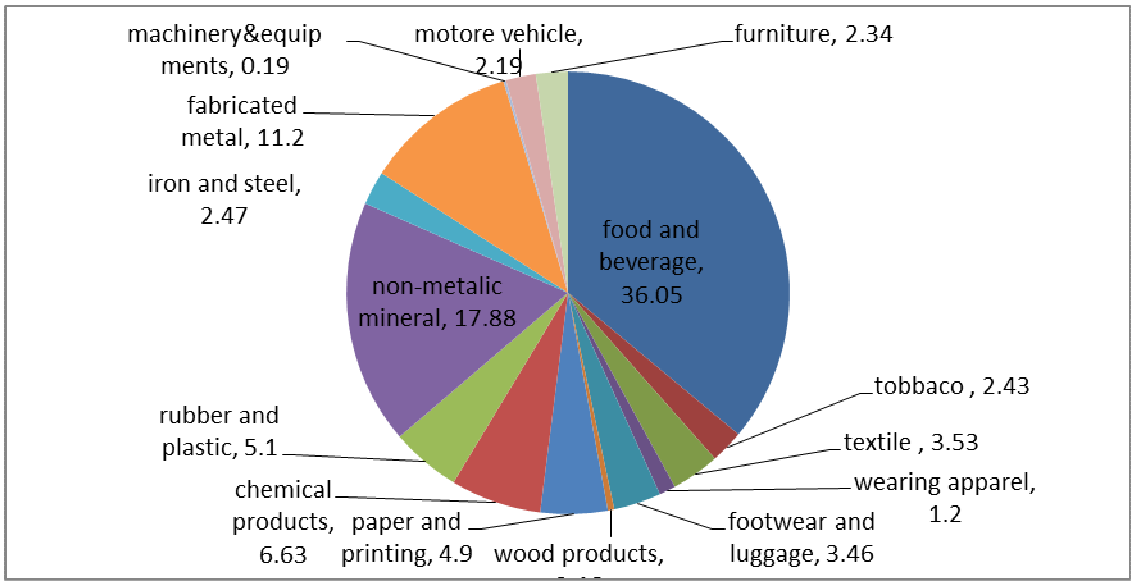

Fig 3: Value added Percentage share of the industrial group

5.2.2 Labor productivity

Ethiopia being one of the least developed countries, it has very limited capital but abundant work force and hence its industries are predominantly labor intensive instead of capital intensive. For this reason labor productivity becomes appropriate for measuring performance of manufacturing sectors. In this study, labor productivity is measured by the real value added production per engaged person in the manufacturing industry. Table 5 presents the real valued added per engaged person of the 15 manufacturing industrial groups included in the study.

Table 5 :Value added per person engaged by industrial Group

Industrial group	2007	2008	Growth rate%	2009	Growth rate %	2010	Growth rate%	2011	Growth rate%
1	49,818	54,750	9.90	63,631	16.22	65,596	3.09	117,605	79.28
2	176,234	171,595	-2.63	341,069	98.76	(16,018)	-104.70	166,671	1140.5
3	9,559	7,962	-16.71	22,549	183.20	33,197	47.22	16,473	-50.378
4	7,781	9,432	21.21	3,442	-63.50	16,259	372.37	36,586	125.02
5	18,111	29,964	65.44	25,470	-14.99	24,643	-3.24	79,907	224.258
6	15,797	12,242	-22.50	14,730	20.32	2,292	-84.43	29,336	1179.9
7	33,129	36,079	8.90	49,910	38.33	55,467	11.13	72,856	31.35
8	33,957	45,573	34.20	85,886	88.45	82,118	-4.38	133,984	63.16
9	29,352	30,111	2.58	38,185	26.81	60,332	57.99	67,608	12.05
10	95,683	77,775	-18.71	60,510	-22.19	107,986	78.45	115,108	6.59
11	73,260	109,565	49.55	154,073	40.62	42,699	-72.28	104,940	145.77
12	75,890	44,568	-41.27	59,007	32.39	77,795	31.840	-168,126	-316.11
13	17,840	24,864	39.37	37,337	50.16	64,238	72.04	102,406	59.41
14	62,021	82,802	33.50	72,343	-12.63	157,725	118.02	96,275	-38.96
15	17,178	16,510	9.90	22,226	34.62	52,465	136.05	42,237	-19.49
Average growth rate			10.86		34.44		43.95		24.09

Source: Compiled from CSA (2012) report

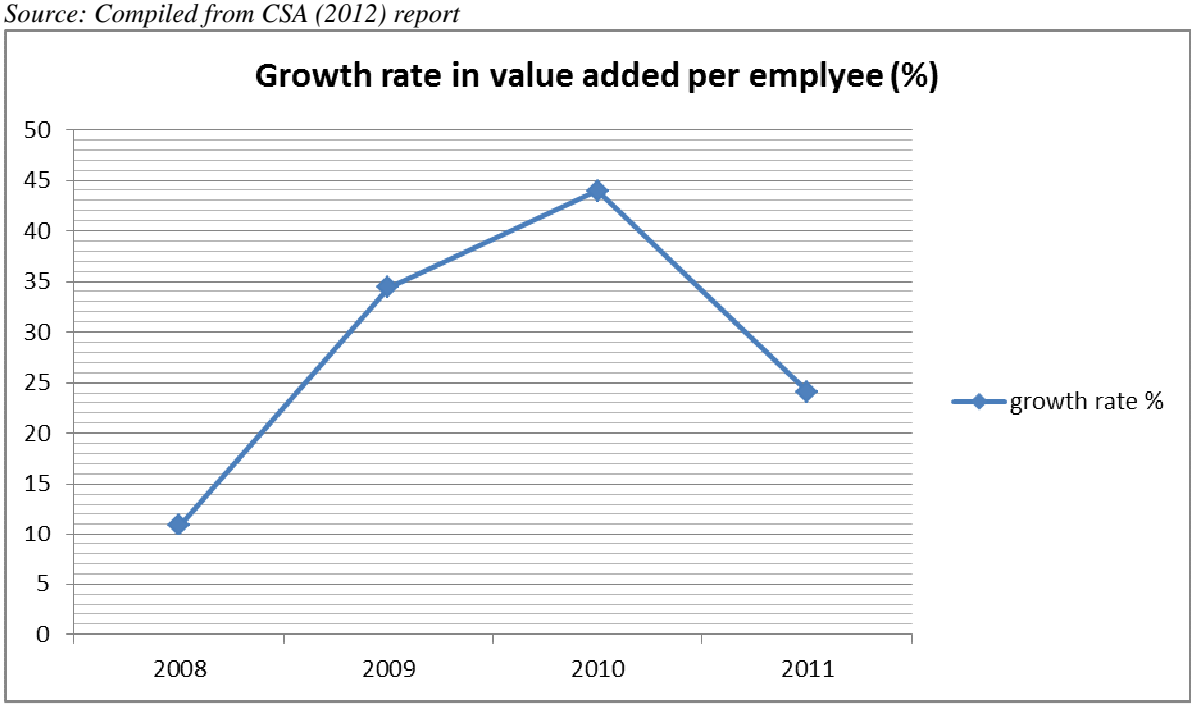

Figure 4: Growth rate in value added per employee

As it is depicted in table 5, the growth rate of the value added per engaged person of food and beverage industry, paper and printing, furniture, chemical and chemical products is consistent and it shows progressive increments every year while the labor productivity in the Textile industry is not stable. The textile industry, in which large numbers of employees are engaged, is not able to show consistency in its labor productivity performance. The performance of the other manufacturing category like basic iron and steel, other non-metallic mineral products, manufacture of footwear, luggage and handbags is not also consistent. For instance the performance of the footwear, luggage and handbags industry grow by 64.5% in 2008 but its growth rate in the two consecutive years 2009 and 2010 declined to negative though it has also shown a tremendous increment of 224% in the year 2011. Ethiopia has competitive advantage in Textile and leather industry because of cheap labor cost and large size of livestock. However, these opportunities are not yet exploited to the level required.

5.2.3 Labor cost per value added by industrial group (Wage share ratio)

Ethiopia's manufacturing industries competitive advantage is primarily availability of cheap labor cost. However, cheap labor cost alone doesn't guarantee firm competitiveness unless it is accompanied with improved labor productivity. It is the more productive labor force with relatively less wage share of its contribution to the value added that can give the actual competitive advantages for industries.

Table 6: The wage share ratio per value added by an employee

Industrial group code	2007	2008	2009	2010	2011
1	0.243	0.258	0.255	0.216	0.137
2	0.187	0.285	0.072	(1.324)	0.101
3	0.644	1.012	0.412	0.298	0.857
4	.032	1.012	0.914	0.511	0.261
5	0.473	0.340	0.438	0.450	0.164
6	0.519	0.587	0.609	4.795	0.433
7	0.351	0.431	0.319	0.290	0.233
8	0.367	0.296	0.164	0.196	0.147
9	0.280	0.304	0.271	0.224	0.218
10	0.102	0.166	0.193	0.114	0.132
11	0.216	0.189	0.233	0.370	0.200
12	0.167	0.290	0.245	0.215	(0.110)
13	0.470	0.338	0.319	0.244	0.200
14	0.233	0.277	0.344	0.126	0.353
15	0.410	0.442	0.409	0.191	0.267
Average wage share ratio	0.38	0.39	0.35	0.46	0.24

Source: Compiled from CSA (2011 & 2012) report

It is true that labor force with better education and skill are more likely to be productive and they demand proportionally higher wages and salaries. Hence, Wages and salaries of a firm can reflect the skill composition of industry workforce. The average wage share ratio implicitly indicates the skill composition of the industries. The lower is the skill adjusted wage rate in relation to the productivity; the greater is the competitive advantage that is expected to result in a higher performance of the industries. The trend in wage share ratio, especially the food and beverages, wearing apparel except fur apparel, footwear and luggage and the motor vehicle industries is declining. This result actual shows the true picture of Ethiopia's employer organizations and human capital developments. The declining trend in wage share per value added (table 6) indicates that the labor productivity of the industries is increasing while the salary and wage rates of the employee's remains stagnant. Because of the unreserved efforts made by the government, new vocational and technical colleges and universities are opened in all states of the country and this has considerably improved the educational and skill level and has ultimately improved the labor productivity of the industrial sector though it is not accompanied by a proportional increase in wages and salaries of the employees.

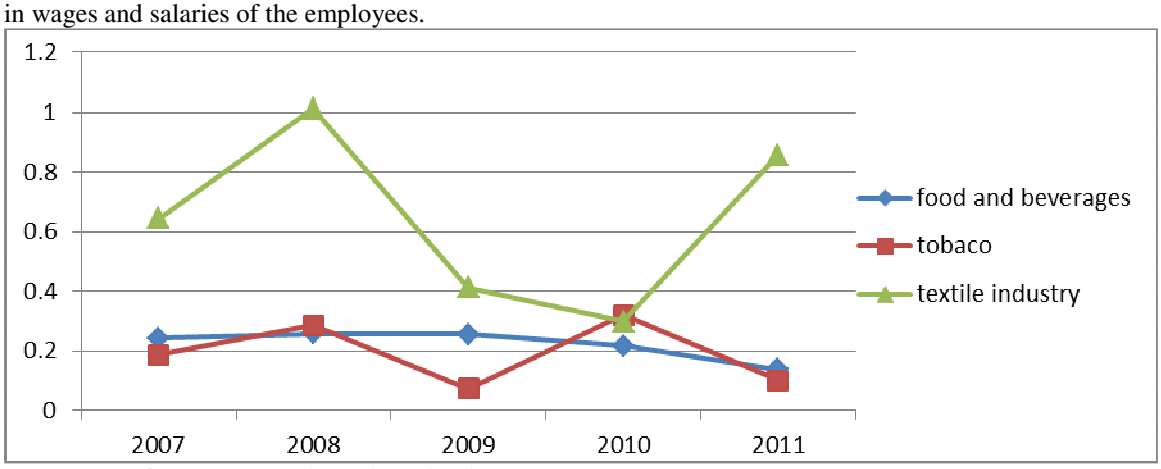

Figure 6: Growth trend of selected industries

The line chart (figure 6) for the first three industrial groups indicates that the wage share of the textile industry is inconsistent. For example the wage share of textile industries was about 60% of the value added but has increased to 100 and above in 2008 indicating that the contribution of valued added by an employee failed to cover at least his/her salary. In 2009, 2010 and 2011 the wage share per value added declined to 41%, 30% and 86%.

Table7 depicts major per capita indicators of manufacturing industries. All the per capita indicators displayed in the table shows an increasing trend over the past five years. That is wages and salaries per employee / paid to an employee have increased and gross value of production per employee has also risen over the same period. However, the growth rate is declining. This is especially true when it is compared with the growth rate of the value added per employees

Table 7: Per capita and ratio indicators of manufacturing industry (2008-2011)

Per capita/ ratio	2007	2008	2009	2010	2011
wage and salaries paid per employee	10,198	12,730	13,458	13,455	15,966
Growth rate%	base year	24.83	5.72	-0.0002	18.66
gross value of production per employee	149,173	174,399	193,722	227,342	359,229
value added* per employee	39,589	45,005	52,269	61,588	141,625
Growth rate%	base year	14	16.2	17.8	129.96
operating surplus per employee	29,334	32,223	38,485	36,926	57,655
value of fixed asset per employee	59,939	64,659	70,378	84,535	85,600

Source: Compiled from CSA (2011 & 2012) report
** in the national account concept at basic price*

5.2.4 Determinants of performance in manufacturing sector.

The determinants of labor productivity of manufacturing firms is analyzed using fixed effects regression model taking labor productivity as dependent variable and capital intensity, Firm size, capacity utilization and Human capital level as explanatory variables. As per the result of the fixed effects regression model, the performance of the sector can be explained by

Y= -52.78-10.29CAPI+3.56HUC+0.627CUPL+12 FS

Table8: Fixed effect regression model result on determinants of performance

```
. xtreg  lnvadpe lnfs cup huc lncapi, fe

Fixed-effects (within) regression               Number of obs      =        30
Group variable: industryca~y                    Number of groups   =        15

R-sq:  within  = 0.6133                         Obs per group: min =         2
       between = 0.0326                                        avg =       2.0
       overall = 0.0683                                        max =         2

                                                F(4,11)            =      4.36
corr(u_i, Xb)  = -0.9278                        Prob > F           =    0.0235

------------------------------------------------------------------------------
     lnvadpe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lnfs |   12.06794   4.621975     2.61   0.024     1.895041    22.24084
         cup |   .6269609   3.633057     0.17   0.866    -7.369343    8.623265
         huc |   3.569543   1.269736     2.81   0.017      .774874    6.364213
      lncapi |  -10.29864   4.214007    -2.44   0.033    -19.57361   -1.023675
       _cons |  -52.78569   30.43291    -1.73   0.111    -119.7681     14.1967
-------------+----------------------------------------------------------------
     sigma_u |  5.5863757
     sigma_e |  1.8290108
         rho |  .90318373   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(14, 11) =     2.19                 Prob > F = 0.0987
```

The findings of the fixed effect regression model indicate that the firm size, human capital, and capital intensity factors affect the labor productivity of the manufacturing industry significantly. The output of the model indicates that as the firm size of an industry increases by one unit the labor productivity of the firm increases by 12 units. In this study, industry size measures economies of scale in actual production and the result shows that firms with higher scale of production have higher labor productivity performance. This is because given the available technology and resource, if industries are producing at full capacity there will be less probability for labor force and other fixed assets of the industry to be kept without any productive work. Hence, the more is the actual production the better is the contribution of the labor to the value added production. This result shows that unlike the markets in developed countries, market in Ethiopia is not saturated and whatever is produced is being sold in the market without much difficulty.

It was hypothesized that as the capital intensity of industries gets large the labor productivity of the firms gets improved. However, the results of the fixed effect regression model have indicated the reverse situation. The result shows that as firms own more fixed capital assets per employee their labor productivity declines. This indicates that when industries are accumulating more capital in the form of fixed assets like huge

and modern machines, they start to give less emphasis to train and sharpen the skill of employees may be by adhering to the ideology of technology by itself will solve all problems. The capacity utilization factor is also found to have an influence on the labor productivity of firms despite it is insignificant at 5% level of significance.

The human capacity is also found to have a strong positive effect on the labor productivity of the firms as was hypothesized. The human capacity measures the skill composition of the labor forces and is estimated by the wage share per employee's value added. Skilled labor show better productivity performance and in turn expects to receive a significant level of compensation in the form of wage and salaries. The results of the fixed effect model has confirmed this hypothesis by indicating that the labor productivity of the manufacturing sector increases as wage share per value added by employee increases. Making employees benefited to the level of their contribution to the value added is really a win-win approach by which employees feel a sense ownership and create strong motivation for better performance to get better compensation. The industry in turn will be in a position to retain the productive labor forces that enable it to secure consistent and sustainable economic growth by capitalizing on the remaining value added portion after part of it is shared to employees.

6. Conclusion and recommendation

Distribution of the manufacturing industry in Ethiopia is skewed to the capital city and its peripherals for better infrastructural and market access. The majority of the manufacturing industries (40%) are located in the capital city, Addis Ababa. The number of manufacturing sectors by industrial classification also indicates that the sector is dominated by few types of industrial group. More than 31% of the manufacturing industries fall in the category of food products and beverages followed by non-metallic mineral products with more than 18% and the furniture industry with 12.5%. The textile industry, that can create large job opportunities for the abundant unemployed labor forces and uses local raw materials, covers only 1.71 percent. The policy makers need to identify industrial zone in all state governments and initiate investors to diversify their investment. This can help to easily utilize the abundant labor forces, raw materials and sale its products in the marginalized state local markets which in turn can help manufacturing sectors to improve their competitiveness in the global market. It can also help policy makers to minimize the migration of citizens from state towns to the capital city. Manufacturing sectors that can largely use local inputs should be initiated to increase their number, size and productivities.

The percentage distribution of value added in the national account concept at basic price by industrial group between 2007 and 2012 indicates that on average 36% of the value added by manufacturing industries to the national account was contributed by food and beverages manufacturing industry, 17% by manufacturers of non-metalic mineral producers, 11% by fabricated metal products except machinery and equipment manufacturing industry, and only 3.5 % by the textile industry category. Despite its small coverage now, Textile and apparel industry is one of the fit to the available local inputs industry in Ethiopia because it can largely use the huge potential for cotton production and labor forces.

On average the values added by the manufacture sector grow by 5%. Machinery and equipment, food and beverages, the footwear, luggage and handbags, chemical and chemical products has shown increasing growth rate. The overall value added by the industry in the last five years is more than 67 billion birr and except the textile, fabricated metals and motor vehicles category the remaining group has shown progressive improvements. The performance of other manufacture category like basic iron and steel, other non-metallic mineral products, manufacture of footwear, luggage and handbags also is not stable. Ethiopia has higher competitive advantage in foot wear, luggage and handbags category because it is rich in livestock ownership. However, the level of exploitation is still at insignificant level compared to its potential. Hence, Ethiopia needs to give emphasis to leather and textile industries on which it has strong natural resources endowed competitive advantage.

The findings of the fixed effect regression model, indicated that the firm size, human capital, and capital intensity factors affect the labor productivity of manufacturing sectors significantly. Industries with higher scale of production have higher labor productivity performance. Hence, the result shows that with the existing facilities, the more is the actual production the better is the contribution of the labor to the value added production.

The human capacity is also found to have a strong positive effect on the labor productivity of the sector. Skilled labors show better productivity performance and in turn expect to receive a significant level of compensation in the form of wages and salaries. The result of the fixed effect model has confirmed that the labor productivity of the manufacturing sector increases as wage share per value added by employee increases. Making employees benefited as per to the level of their contribution to the value added is really a win-win approach by which employees feel a sense of ownership and create strong motivation for better performance to get better compensation. The trend analysis has indicated that the labor productivity as measured in value added per person engaged is increasing. This is a reflection of the favorable government policies towards improving the

human capital of the country by opening many technical and vocational academic institutions at all the states of the country. This effort should continue as the human capital is the core determinant factor for the success or failure of an organization.

Ethiopia has low labor cost because it is a densely populated country with more than 80 million people. However the mere low labor cost may not give competitive advantage to the manufacturing firms unless it is backed-up by improvement in labor productivity. The country's population has a high percentage of young people. Hence, this young labor is easily trainable and can quickly adopt new technologies. This condition would secure the comparative advantage of the manufacturing industry to be competitive on international market.

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Annex: Industry category name and codes used to represent the 15 manufacturing classes

Industry code	**Industry category name (as per to CSA)**
1	manufacture of food products and beverages
2	manufacture of tobacco products
3	manufacture of textiles
4	manufacture of wearing apparel, except fur apparel
5	footwear, luggage and handbags
6	manufacture of wood & products of wood & cork except furniture
7	manufacture of paper, paper products and printing
8	manufacture of chemicals and chemical products
9	manufacture of rubber and plastic products
10	manufacture of other non-metallic mineral products
11	manufacture of basic iron and steel
12	manufacture of fabricated metal products except machinery and equipment
13	manufacture of machinery and equipment n.e.c.
14	manufacture of motor vehicle, trailer & semi trail,
15	manufacture of furniture