DETERMINANTS OF MANUFACTURING INDUSTRIES PRODUCTIVITY: THE CASE OF FIRMS FINANCED BY DEVELOPMENT BANK OF ETHIOPIA

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JANUARY, 2018

ADDIS ABABA ETHIOPIA

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A Thesis Submitted To St. Mary's University School Of Graduate Studies In Partial Fulfillments Of The Requirements For The DEGREE OF MASTER OF DEVELOPMENT ECONOMICS

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APPROVAL SHEET

Determinants of Manufacturing Industries Productivity: the case of Firms Financed by Development Bank of Ethiopia

Yibeltal Yayeh

APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I, the undersigned, declare that this thesis is my original work and prepared under the guidance of my advisor **SISAY DEBEBE (PhD)**. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full's to any other higher learning institution for the purpose of earning any degree.

Name Signature

Yibeltal Yayeh _____

St. Mary's University, Addis Ababa **January, 2018**

ENDORSEMENT

This thesis has been submitted to St. Mary's University School of Graduate Studies for examination with my approval as a university advisor.

SISAY DEBEBE (PhD) _____

Advisor Signature

St. Mary's University, Addis Ababa **January, 2018**

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ACRONYMS

AACCSA	Addis Ababa Chamber of Commerce and Social Associations
ADLI	Agricultural Development Lead Industrialization
AU	African Union
CEO	Chief Executive Officer
CSA	Central Statistics Agency
DBE	Development Bank of Ethiopia
UNECA	Economic Commission for Africa
EEF	Esmée Fairbairn Foundation
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
IMF	International Monetary Fund
MOFEC	Ministry of Finance and Economic Cooperation
MVA	Manufacturing Value Addition
NBE	National Bank of Ethiopia
NBS	National Bureau of Standards
NEPAD	New Partnership for Africa's Development
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
SAP	Systems, Applications and Products
SMEs	Small and Medium Enterprises
SNNPR	Southern Nation, Nationalities and Peoples Region
TFP	Total Factor Productivity
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
US	United State
WIDER	World Institute for Development Economics Research

ABSTRACT

Manufacturing sector is the heart and soul of any economy. However, the growth and contribution of the sector to the Ethiopian Economy is at its infant stage. Thus, in this study the determinant factors of manufacturing industries productivity is investigated by using panel data from manufacturing industries financed by Development Bank of Ethiopian (DBE). The study covers 388 operational manufacturing industries financed by DBE and categorized them in 14 sub sectors based on the manufacturing industries classification criteria of CSA. Based on performance data of the industries and related literature reviews, factors that can affect the performance on manufacturing sector were identified and their influence was analyzed using fixed effects regression model. The result of the data analysis indicated that there is overall improvement in the value added performance by 3.59% average annually growth. However, the performance trend is not similar for all industries and industries like footwear, luggage and handbags and tanning and dressing of leather has performing very well while the performance of some industries including textile, garment and wearing apparel which have resource based competitive advantage in our country are not promising. The fixed effect regression result prevailed that human capital and the ratio of imported to total consumed raw materials were the major determinants for productivity of the manufacturing industries. Moreover, the impact of capital intensity and capacity utilization level has limited effect on industries productivity even if it has positive relation. Therefore, in order to improve the performance of manufacturing industries, the industrial firms and the government should improve the educational and skill level of labor forces which has a multiple effect on industries productivity through intensive government efforts in addressing quality and skills of citizens on universities, technical and vocational educations. The firms should also improve the employee compensation trend since it is one factor for human capital development. In addition the government and the bank should initiate firms who engaged on manufacturing sector whose raw material can easily available at the local market.

Keywords: Value added, labor productivity, performance, manufacturing, industry

1. INTRODUCTION

1.1. Background of the study

Manufacturing is a wealth-creating sector of an economy, and closely connected with engineering and industrial design and engaged on providing important economic outputs that can support the national development of a nation. Manufacturing process may involve mechanical or chemical transformation of materials or substances into new products. In other words, manufacturing is a process that makes products from raw materials by using manual labour or machines and it is usually carried out systematically with a division of labour. In a more limited sense, manufacturing is the fabrication or assembly of components into finished products on a fairly large scale bases and manufacturing does not include cottage industries. Manufacturing industry refers to those industries which involve in the manufacturing and processing of items, creation of new commodities or value addition on existing commodities through mechanical or chemical transformation (National Planning Commission, 2015).

Accordingly, manufacturing industries can play the major roles in achieving economic growth and standard of in the world. Economists and other nonacademic researchers referred that manufacturing is a wealth-producing sector of any country, whereas a service sector tends to be wealth-consuming sector (Teshome, 2014). In order to easily understand the contribution of the manufacturing sector to the world economy, we can see the output level of top twenty manufacturer countries in appendix 1. From this we can see that manufacturing industries takes an important share of world economy and it is a sector that engaged in the creation of new wealth in the form of value addition that can be one important measurement of manufacturing industries performance (Solomon, 2015).

Manufacturing is critical and is probably the most important engine of long-term growth and development. As countries transform from primary agricultural-based economies to manufacturing based economy, more sustainable revenue for growth is obtained (AACCSA, 2014).

When we see the history of manufacturing industry in Ethiopia it goes back to 1920s with a simple processing technology that produces agriculture-based products. But the formal institutionalization effort or the establishment of the manufacturing sector in the country was started on the late 1950's and early 1960's when the imperial government developed a new policy to shore up the economy by attracting foreign investments to the economy mainly on the manufacturing sector. The new policy brought about a series of incentives including tax exceptions, remittance of foreign exchange, duty free imports and exports, tax exemptions on dividends and financial support from the Ethiopian Investment Corporation and the Development Bank of Ethiopia. Furthermore, the government introduced protective measures for industries by instituting high tariffs on aimed at banning the importation of commodities that might adversely affect the market share of domestically produced goods. The products that had received such protection included sugar, textile, furniture and metal products. The government was also taking part in the sector by directly investing in industries especially those had high capital costs. The government investment was almost in all industrial groups such as the food and beverage, paper and pulp, glass and bottle, tire, cement industries, textile industries, etc. In spite of this, the manufacturing sector is still in its infant stage dominantly focusing on semi-processing sub sectors. Several mutually reinforcing factors have conspired to hinder the emergence of a stronger manufacturing base economy in the country. The performances of the various sub-sectors of manufacturing industries have generally been far from the target set on the GTP (Solomon, 2015; UNDP, 2017).

Still now the government of Ethiopia has tried to formulate the means in changing those factors by using the country's different competitive advantages in the sector, such as cheap and easily trainable labor force, development of infrastructures, improvement of raw material and utility supplies. In addition, the government has designed favorable policy framework to manufacturing industries development as it proposes the key to drive the country's economy growth and development through vertical and horizontal links on the rich resource base of agricultural and minerals (AACCSA, 2014). But actually the performance of manufacturing industries in the country is performing far behind from the expectation and the potentials of the country. Even though the overall productivity of manufacturing sector in our country is very poor, the underperformance of industries with better comparative advantage like leather & leather product and textile & garment makes the problem more complicated. Accordingly, the study tried to

assess and identifies the major determinant factors of manufacturing industries performance and productivity in the country.

The challenges in creation of a competitive industrial sector is not the problem for only our country Ethiopia but all Africa countries and it has been hindered by poor infrastructure (energy, transport, communications, etc.), resulting in higher production and transaction costs. Investing massively in infrastructure, including energy, will create an enabling environment for industrialization to take place on the continent (Economic Commission for Africa, 2013).

1.2. Statement of the Problem

Ethiopia has set a goal to transform the country to an industrialized economy and increase the per capita income of its citizens to middle-income levels by 2025. For this end the country has launched successive strategic plans with a special priority on the manufacturing sector. The target set for the industrial sector during the PASDEP period is to register an average annual growth rate of 11.5% and thereby increase the sector's share in the overall GDP from 13.6% in 2004/05 to 16.5% by the end of 2009/10. The average growth rate achieved in PASDEP period was 10%. The industry sector share of real GDP reached 12.9% at the end of the plan period (FDRE ministry of trade, 2013). Moreover, the government of Ethiopia with the industrial development strategy has planned to bring about structural change in the economy through industrial development. Specifically it is aimed at by increasing the share of the industry sector as % of the GDP from the current 13% to 27% by 2025, and also increasing the share of the manufacturing sector as % of the GDP from the current 4% to 17% by the year 2025 (Ministry of Industry, 2013).

This clearly indicates good performance of the sector as compared with the set target but the problem comes when we compare with the needs of the peoples. The performance of the manufacturing sector is still goes beyond the needs of the society with respect to income distribution and employment creation and also the most prioritized manufacturing sub sectors has been registering less productivity against higher expected potentials. For example as per the surveys by the CSA show almost 50% companies engaged in manufacturing sector in Ethiopia suffer from low productivity as low as 34% of its potential on average and also the productivity

of the priority areas of the manufacturing sector in the country like garment and leather are far below their potentials (Addis Standard, 2013).

As the view of Amanuel (a writer in capital newspaper) with referring to World Bank, even though the number of employments and investments in the manufacturing sector had shown slightly changed in the past years still the level of productivity is below average. In addition World Bank report of the fourth Ethiopia economic update indicates that the performance of the manufacturing sector is heterogeneous among firms; foreign owned, publicly owned, and older firms appear more productive than domestic, private, young firms. Although labor productivity in Addis Ababa compares well with firms in peer countries with same level of development, this appears to reflect higher capital intensity rather than more efficient production (World Bank, 2015).

The other manifestation for the stated problem is that even though the wage rate in the country is lower, less than $1,100 per worker per year as per the world bank 4th Ethiopia economic update report, manufactured goods are not competent in the international market mainly because of lower level of productivity. Hence, the export of Ethiopia is still dependant on primary goods. When we see the performance of manufacturing industries which are financed by Development Bank of Ethiopia (DBE), the focus of this study, as revealed in the annual report of the bank for the fiscal year ended on June 30, 2016 most giant manufacturing projects are failed to perform as per their plan and the bank's expectation. Review of the follow up report on these projects indicates that most of DBE financed manufacturing projects has limited level of productivity and their valued additions are valued to be less than 10%. The value of production per each employee per year is also far behind the firms' expectation.

Therefore, the main question is that how the trends of manufacturing industries performance and level productivity especially those are financed by DBE and what are the major determinant factors that lead manufacturing industries particularly those financed by DBE to low level of productivity.

1.3. Research Question

The main aim of this research is examining the level of productivity of manufacturing industries particularly those are financed by DBE and also to identify the major determinant factors that

hinders industrial firms to improve the level of productivity. Therefore, this research tried to answer the following questions;

- Is the manufacturing industries financed by DBE are performing as per the target set by the firms
- What is the performance level of manufacturing industries in Ethiopia particularly those financed by DBE
- What are the major factors determining the manufacturing industries performance and productivity
- How much value addition is made by the manufacturing industries in Ethiopia especially those are financed by DBE

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this study is to examine the productivity level of manufacturing industries financed by DBE and identify the major determinant factors of manufacturing firms productivity those are financed by DBE.

1.4.2. Specific Objectives

The specific objectives of this study were:

- To evaluate the performance and productivity levels of manufacturing industries.
- To measure the amount of value addition made by the manufacturing industries financed by DBE;
- To identify the major factors that determines the performance and productivity of manufacturing industries;
- To evaluate the better performer industries and examine their productivity or performance sustainability in respect to utilizing (in whole or in part) its value chain or potentials in the country.

1.5. Significance of the Study

Manufacturing sector is the heart and soul of any economy, both developed and developing country's economy. Manufacturing is critical in employing a huge part of the labour force and

producing materials of strategic importance and internationally competent products with well value added level.

Hence, the government of Ethiopia has given great priority for the sector. In regarding to this DBE has extended huge amount of public financial resources to the sector to enhance the intend objective of wealth and employment creation. However, the performance of manufacturing is lagged behind the target. Even though there is an overall improvement in the productivity and value addition of the manufacturing industries, the level of their performance is not promising. Above all there are prioritized manufacturing sectors selected by the government based on their comparative advantage to the country and also are granted huge amount of money through project and machinery lease financing schemes from DBE. Among these government priority manufacturing industries most are not performed as per the expectation of the government. For example the productivity of manufacturing industries like textile and leather industries in Ethiopia are performing below the potential and continuous to go with their inefficient performance.

Accordingly assessing the productivity of the sector and identifying the major determinant factors that contribute for the improvement of the manufacturing sector productivity is crucial to exert efforts for future strategies and actions. As a result, this study tries to identify and assess the performance of the manufacturing industries and aimed to indentify the potential determinants of the manufacturing firms' productivity and contributed for low level of productivity. Thus, the finding of this research may serve as a starting point for further assessment of government policy makers and also this study will serve for the other researchers as a reference. Finally, the research findings may be used by the stakeholders, firms and bank for their respective measurement of the manufacturing industries performance and appropriate remedy to solve the challenging environments in the sector..

1.6. Scope and Limitation of the Study

This study focused on manufacturing industries financed by DBE particularly for those industries which are prioritized by the government by their comparative advantage to the country. Since DBE is the forefront public owned financial institution engaged on financing development oriented government priority projects in the midpoint of the country and its easily accessible to the researcher. Therefore, this study did not include other industries established with the support

of other commercial banks and other sources of finance. DBE, as specialized financial institution, is engaged in financing of government priority sectors with a more concern to export oriented and manufacturing industries. In addition in recent years of its operation it starts financial services through Machinery lease financing modality. Thus, the scope of the research is limited to manufacturing industries financed by DBE with financing modalities, project financing and machinery leasing.

The study has limitation on the availability of data from industries and stakeholders as well. The other limitation of the study is come in reviewing different literatures both at national and international level since the measurement of manufacturing sector performance has different based on the interests of the authors, some measures by only fiscal employment creation and some other measure by export earning level while others by the level of value addition. Therefore, the most important problem of the study is accessing data and relevant literatures that can clearly measure the manufacturing industries productivity level and the major determinants for the industries better productivity.

1.7. Organization of the Study

This paper is organized into six chapters. The first chapter discusses about the background of the study, statement of the problems, objectives, research questions, scope and limitation of the study and significance of the study. Chapter two deals with the review of the related literatures and chapter three concerned with the methodology that was used in this specific study during the research. The next Chapters, four and five deals with data analysis, presentations & interpretations and econometric result analysis respectively while the last chapter deals in conclusion and recommendation of the study.

2. REVIEW OF RELATED LITERATURES

2.1. Definition and General Overview on Manufacturing Industries

As per the report of Ethiopia National Planning Commission (2015) the Manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The establishments are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. They include all intermediate processes required for the production and integration of a product's components.

The planning commission report (2015) state that manufacturing is a process involves the mechanical or chemical transformation of materials or substances into new products. In other words manufacturing creates new products from raw materials and inputs by the using of manual labour or machines and is usually carried out systematically with a division of labour. Economist has referred as a wealth-creating sector of an economy, and closely connected with engineering and industrial design and provides important and significant support for national economy. Manufacturing industry refers to those industries which involve in the manufacturing and processing of items, creation of new commodities or industries those can value addition on existing commodities. Manufacturing industries came into being with the occurrence of technological and socio-economic transformations and were widely known as industrial revolution (Planning Commission Report, 2015).

2.2. Measurements of Manufacturing Sector Performance

Most of developing countries experienced a low level of productivity. This is usually due to inadequate availability and quality of factors and resources that contribute to the productivity. Productivity itself can reflect the performance of an economy unit. In general, productivity is the ratio between the outputs to inputs used in production. By definition, productivity performance reflects the relative growth of factor inputs and outputs in a certain period. In his study, Fuglie (2004) states that an increase in factor productivity is equivalent to an outward shift in a production function, which is caused by an increase in the amount of output per unit of input (DawaAji, 2012).

In simple term, productivity is efficiency in production: how much output is obtained from a given set of inputs. As such, it is typically expressed as an output–input ratio. Most of definitions of productivity use input and output or simply define productivity as a measure of translating inputs to output (BesaXhaferi, n.d.)

In the process of productive translating of inputs in outputs we may be interested in technology that the company uses, the demand and the elasticity of the demand for the goods produced, the skills of the labor input and their respective learning curve. In the firm level being productive may be understood as incentivizing employees to work efficiently while in the macro level studies on productivity we may be interested in GDP and employment. While firms increase productivity there may be three possible scenarios:

- Increasing technological unemployment because of investment in technology
- Increasing the employment because of more qualitative and more costly products
- Ensure stability of employment by reacting with proportional changes

This suggest us that just being productive itself does not mean that we will be able to have straightforward benefits so any institutional change should be looked with caution (BesaXhaferi, n.d.)

When we see the measurements of productivity of a firm there may be a single factor productivity measurement or multi factor performance measuring. Single-factor productivity measures reflect units of output produced per unit of a particular input. Labor productivity is the most common measure of this type, though occasionally capital or even materials productivity measures are used. Of course, single factor productivity levels are affected by the intensity of use of the excluded inputs. Two producers may have quite different labor productivity levels even though they have the same production technology if one happens to use capital much more intensively, say because they face different factor prices (Journal of Economic Literature, 2011. p .330).

Because of this, some researchers use a productivity concept that is invariant to the intensity of use of observable factor inputs, total factor productivity (TFP) (it is also sometimes called multifactor productivity). Conceptually, TFP differences reflect shifts in the isoquants of a production function: variation in output produced from a fixed set of inputs. Higher-TFP

producers will produce greater amounts of output with the same set of observable inputs than lower-TFP businesses and, hence, have isoquants that are shifted up and to the right. Factor price variation that drives factor intensity differences does not affect TFP because it induces shifts along isoquants rather than shifts in isoquants. TFP is most easily seen in the often-used formulation of a production function where output is the product of a function of observable inputs and a factor-neutral (alternatively, Hicks-neutral) shifter like:

$Y_t = A_t F (K_t, L_t, M_t)$, Where

Y_t: is output,

$F(\cdot)$: is a function of observable inputs

K_t: is capital

L_t: is labor

M_t: is intermediate materials and

A_t: is the factor-neutral shifter. In this type of formulation, TFP is At. It captures variations in output not explained by shifts in the observable inputs that act through $F(\cdot)$ (Journal of Economic Literature, 2011).

In addition, performance of firms or the productivity manufacturing industries can affected by many factors and can be measured by using Vector of outputs and inputs. It may also measure with the estimation of a cost function and factor demand as method of computing productivity index of a firm (BesaXhaferi, n.d.).

However, 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 . Dr. K. Rama MohanaRao (2015) on his journal published on journal of investment, poverty and development states that measuring total factor and multi factor productivities will lead many problems. He revealed 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 (Dr. K. Rama MohanaRao, 2015).

Dr. K. Rama MohanaRao with reference to 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.

Rama MohanaRao, (2015) published a journal article on Performance Measurement of Manufacturing industries in Ethiopia, an analytical study on the performance of manufacturing industries. The study was conducted by using survey data collected by CSA in 2007 and 2011 manufacturing sectors which engage ten or more than ten employees all over the country. 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. However, the productivity of labor 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.

Moreover, 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. Mason and Finegold (1997) 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. Rahmah (2000), explain that 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 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 (Dr. K. Rama MohanaRao, 2015).

As elaborated by Dr. K. Rama MohanaRao on his International Peer-reviewed Journal published on Journal of Poverty, Investment and Development (Vol.7, 2015), 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 (Abdulkhadiri, 1990).

Trade theories state that scale of operation or firm size 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 (Dr. K. Rama MohanaRao, 2015).

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 (Idris and Rahmah (2009).

In general, the performance of manufacturing industries can be measured by using different variables like the value added production, labor productivity, labor cost per value added and the per capita ratio of the manufacturing sector, human capacity, capital intensity, firm size and capacity utilization level. In addition to these variables the productivity of labor is affected by various factors such as level of technologies, the availability of resources, the infrastructural development level of the country and many other factors. But the most common factor included by many researchers is the human capital variables or the skill level of its production work forces 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. Moreover, capital intensity which is closely related to technical progress is another factor that can affect labor productivity and also trade theories state that scale of operation or firm size is an important source of cost competitiveness which helps to lower average costs and thereby improve competitiveness of a firm in the market. researchers has also found that capacity utilization (maximum output rate) that a company can achieve in its manufacturing system is another

important key-factor since companies always need to match the capacity to the current demand rate from the customers.

2.3. Performance of manufacturing Industries in Ethiopia

2.3.1. Structure of manufacturing sector in Ethiopia

The history of Ethiopian manufacturing industry is more or less related to the post Ethio- Italy war. In the second half of 1940s, there was very few manufacturing industry, which accounted for only 1% of the national income. Industrialisation really begun in the 1950s and was consolidated in the following three successive five-year developments plans. There are different types of manufacturing sector in Ethiopia. Large and medium scale manufacturing, small scale manufacturing and cottage and Handicraft manufacturing. The structure of manufacturing sector in refers to ownership is also different as it based as public own and private owned manufacturing industries. In addition the manufacturing industries in Ethiopia is initiated by both domestic investors and foreign direct investments from different countries of the world (Wodajo and Senbet, 2013)

The structure of manufacturing firms in Ethiopia viewed in terms of type of ownership is dominantly private investor especially after governmental changes since 1991. The study viewed that overall, nearly 61 percent of the surveyed firms have begun operation after 1991. While only a few public firms have been established after 1991, the number of private firms has more than doubled (123%) over the 15-year period (1991-2005), with an average growth rate of about 8 percent a year. The slow growth of public firms reduces the overall large and medium scale manufacturing industry growth rate to an average of 53 percent in 15 years (or3.5% a year) (Wodajo and Sembete, 2013).

2.3.2. Trends of manufacturing sector in Ethiopia

Trends refer to the change of data and other statistical characteristics through time and it is measured based on time series data. When we see the number of manufacturing industries in our country Ethiopia it has been showed an increasing trend. The number manufacturing industries in the country by the year 1980 was only 408but after ten years, in 1990, the number of manufacturing sector declined to 28 mainly due to economic policy change and lack of market

incentive. This clearly indicates that the number of manufacturing sector was declined by 41 percent in between 1980 and 1990 and around 120 manufacturing sector became out of the market within ten years (Teshome, 2014).

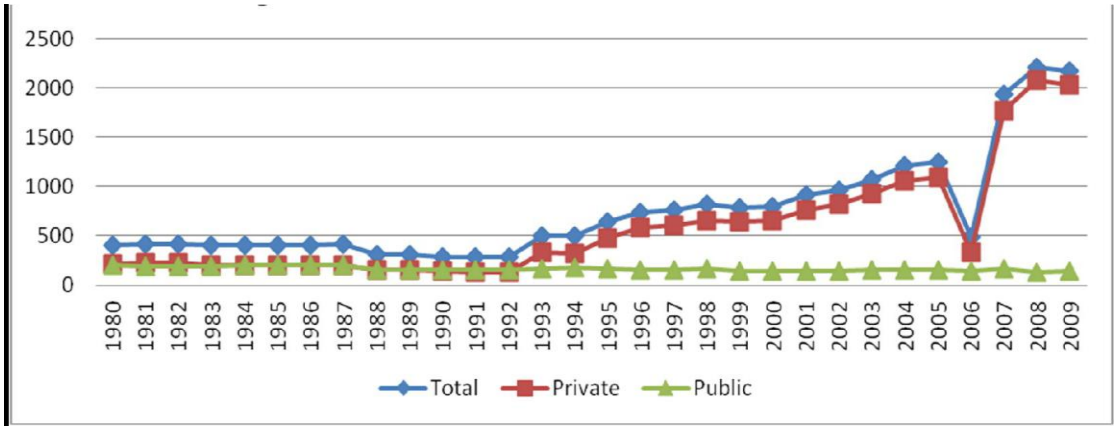

Figure 2.1: Total number of manufacturing industries in Ethiopia.
Source: Teshome Adugna, 2014

But as per the data of CSA as reported in 2011/12 the total number of large and medium scale manufacturing industries is 2,610 and has created more than job opportunities for 175,698 citizens. Among the large and medium manufacturing processors, which total 2,610 manufacturers, 670 establishments are in the food and beverage subsector and employed more than 67,000 people, followed by non-metallic mineral products, metal and engineering products, wood and paper products, rubber and plastic products, chemical and chemical products, leather and leather products and textile products industries with 544, 433, 196, 154, 143, 141 and 104 total establishments for each and 17,230, 13,238, 14,064, 10,984, 9,801, 14,019 and 19,233 total jobs created again by each categories for the year 2012/2013 (2005 E.C.) according to CSA report (AACCSA,2014).

2.3.3. The distribution of manufacturing sector in Ethiopia

When we see the distribution of manufacturing sector in the country in the previous years it was not even distributed and skewed to the capital city, Addis Ababa and Oromia regional state, Finfine vicinity special zone. The study made by Teshome Adugna showed the distribution of manufacturing sector in Ethiopia in 1995 was mainly centered to the capital city and the number of manufacturing sector in Addis Ababa city was 438. This was around 68 percent of the total

manufacturing sector in the country. Following Addis Ababa 11 Percent of the industries was located in Oromia regional state and then Amhara national regional state had owned 6 percent the industries taking the second and third shares. In general the four regions (Addis Ababa, Amhara, Oromia and SNNRS) take around 90 percent of the total manufacturing sector in the country. In 2009 the number of manufacturing sector in Addis Ababa city administration has reached 875 which are 40 percent of the total manufacturing sector and as compared to 1995, the share of Addis Ababa, declined by 20 percent. Moreover, the number of manufacturing sector in Oromia National Regional State was increased to 451 with a share of 21 percent. SNNRS took the third place in 2009 with 292 number of manufacturing sector. In this year the share of SNNRS reached 18 percent. There is slight change on the distribution of manufacturing sector during the study period due to various incentives given by the government for private sector to invest in each regional state. But still in 2009, the share of the manufacturing sector taken only by four regions (Amhara, Oromia, Addis Ababa and SNNRS). These four regions took 90 percent of the number of manufacturing sector in Ethiopia (Teshome Adugna, 2014).

Another study made by Dr. K. Rama Mohana Rao indicates that 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 and it shows a good progress in addressing all regional sates.

In addition to the above researches another study made by two researchers also confirmed the uneven distribution of manufacturing industries among regional states of the country and it is aggravated more in the current years. The study confirmed that the distribution of manufacturing firms is highly skewed when disaggregated by various regions of the country. It should be noted that the disparity in the regional distribution of firms is not a new phenomenon since it is observed both before and after 1991. However, the skewness has become more acute after 1991 as revealed by higher percentage increases in the number of newly established firms in some regions than others. For instance, the 550, 113 and 100 percent net increases in the number of manufacturing firms in Tigray, SNNP and Harari, respectively, in 15 years contrast with the 27 and 0 percent increases in Addis Ababa and Gambella, respectively, for the same time period.

Whereas in Afar region only one private manufacturing firm has become operational after 1991, resulting in a 67 percent net decline compared to the number of firms before 1991. The distribution of manufacturing sector affects the sustainable economic development in the country. Even if the availability of resources determine the distribution of manufacturing sector, the nature of the manufacturing concentration affect the income distribution and efficient utilization of national resources (Wodajo and Sembete, 2013).

2.3.4. The growth of Manufacturing sector and National economy

Manufacturing sector and economic growth have positive relationship. The higher growth of manufacturing sector enables the fast growth of national economy and development in most developed countries. The growth of the national economy is measured by the total market value of output produced in the country and also the manufacturing growth rate was measured by the market value of the manufacturing output. In 1999, the growth rate of manufacturing and economic growth was around 13 percent for both manufacturing and national economy of Ethiopia. However, in 2001 both the manufacturing and national economy experienced a decline of 2 percent as compared to the previous year 2000 and in this year even if the agricultural sector which is considered as the backbone of Ethiopian economy has declined by 10 percent the national economy could not decline by proportional rate. Rather the economic growth declined proportional to the decline rate of the manufacturing sector. In 2005 the manufacturing sector experienced 24 percent growth which enabled the economy to grow by 18.2 percent. The continuous growth of manufacturing sector since 2005 has made the national economy to experience stable and continues double digit growth rate in the country. When the agricultural sector achieved 3 percent lower growth in 2009, the national economy was increased by 12 percent due to the higher growth rate of manufacturing sector in the country (Teshome Adugna, 2014).

The manufacturing sector uses for the transformation system of production in terms of technological transformation. Manufacturing provides greater opportunities to accumulate capital, exploit economies of scale, acquire new technologies and more fundamentally foster embodied and disembodied technological change. Large economies show exactly the opposite trend: manufacturing accounts for a much higher share and value-added gains towards high-

productivity activities with larger opportunities for innovation and value-added expansion would thus become the core of structural change and more broadly economic development. Once structural change is understood from this latter perspective, manufacturing becomes one of the main engines of economic growth, and thus any shift of resources from low-productive activities (such as rural agriculture or urban informal services) towards more productive health creating industries. Manufacturing entails an important structural change bonus, in what some authors have labeled "growth enhancing structural change" (McMillan and Roderick 2011). The literature presents several arguments to support the idea that manufacturing is the main engine of economic growth. Perhaps the most influential came from Nicholas Kaldor in the 1960s. In his view the capacity to generate dynamic, increasing returns and thus greater productivity through expanded production was at the core of manufacturing (Getu, 2014).

Industrialization leads the country to higher technology and then to higher productivity and using of resources efficiently. Advanced manufacturing is generally characterized by relatively high levels of skills and technology requirements and encompasses sectors such as automotive, electronics and others mostly has significant share to the economy. These sectors are often driven by private manufacturing investors who own the proprietary knowledge involved and who subcontract original equipment manufacturing. (National Industrial Policy Frame Work, South Africa 2012)

Manufacturing in industrializing countries is geographically highly concentrated and also accounting for 70.9 percent of total production in five leading economies in 2012, up from 52.7 percent in 1992. The high and sustained MVA growth in China over this period 11.4 percent on average is behind its emergence as the factory of the world: in 2012, 50 percent of industrializing- country manufactured goods were produced in China. Of all other large industrializing-economy manufacturers, only India 7.4 percent average annual MVA growth kept pace with China's expansion. It gained MVA share to become the second leading manufacturer among industrializing economies, superseding Mexico and Brazil, which saw their MVA (Manufacturing value added) shares fall by more than half from 11.7 percent and 10.5 percent in 1992 to 5.7 percent and 4.9 percent in 2012. Turkey's steady MVA growth (4.5 percent on average a year over 1992–2012) enabled it to preserve its position as the fifth largest manufacturer among industrializing economies. This clearly indicates the importance of

manufacturing industries development for the growth of the overall economy of any country and it helps the country to develop in all rounded economic activities because manufacturing is the way for industrialization (Industrial Development Report 2013).

However, the industrial sector of Ethiopia is still in its early stage of development with weak operation resulting in unsatisfactory performance. This problem has its roots in the overall weakness of the country's economy. There are shortages of skilled personnel, lack of market, inadequate finance, obsolescence of machinery and equipment and low level of local technological development (Alemayehu, 2011). Though there is recent upsurge of the manufacturing sector, its role in the overall economic growth is small relative to the agriculture and service sectors. The manufacturing industry contribution to GDP has never exceeded 15% in all the regimes. The share of Ethiopian manufacturing in GDP rose from a low of 11.57% in 1960-64 to 15% in 1970-74 (Alemayehu and Befekadu, 2005). This good performance in the manufacturing industry during the Haileselassie regime was due to the policies regarding investment in infrastructure. The 3 five year development plans and the promotion of ultra modernism at the expense of conservatism were at the core of the policies that helped enhance the sector. During the Derg regime reasons like nationalization, control of resources and the command economy itself led to the decline in the share of industry to GDP and to be stagnant at about 12% for the period 1974-1991 (Betelhem, 2012).

2.4. Empirical Literatures Review

2.4.1. Review of International Literatures

Several researchers have conducted on the performance, productivity, challenges and major determinants of manufacturing industries in different countries of the world and these studies have applied different methodologies to measure the productivity level of manufacturing industries and the major determinants for the firms' productivity improve.

A research made by UK commission for employment and skills (2015) indicates the performances of manufacturing enterprises operating in the UK in 2013 are mainly determined by skills and performance of the labor forces. A high proportion (44 per cent) of the manufacturing workforce holds high-level qualifications (qualifications at Level 4 and above).

This clearly indicates that human capital is the most determinant for the performance of manufacturing sector in UK (UK commission for employment and skills, 2015).

But another research made by Adil Mohommad on manufacturing sector productivity in India for the period between 1990 and 99 revealed that the growth of labor productivity in the manufacturing sector has decline. One possible cause may be a shift in the product mix, from labour-intensive to more capital intensive goods, which is supported by the observed increase in the rate of capital accumulation. Another explanation may be that Indian industries were relatively over-manned in the pre-reform era, especially in public sector enterprises, whereas the greater play of market forces led to an adjustment towards a more efficient level of labour in existing industries. Moreover, the study confirms the reduction in labor in manufacturing industries lead to an increase in productivity of labor or output per labor has increased as capital intensity increases which means that the manufacturing industries are dominantly capital intensive and it has significant impact on manufacturing industries performance (Adil Mohommad, 2010).

A research in Tanzania conducted on enterprises employing ten or more people between 1967 and 1973 confirmed that the increase in the contribution of manufacturing coincided with an increase in both absolute and relative labour productivity (Samuel Wangwe, et al. 2014).

But as explained on the study state-led initiative, however, weakened the manufacturing sector due to currency overvaluation which affects export and leads in shortage of foreign exchange for importing intermediate inputs for the industries. This implies that importation of raw materials has significant impact on the performance of manufacturing industries (Samuel Wangwe, et al. 2014).

A research made by Wodajo T. and Senbet D. confirms the productivity of manufacturing sectors is also strongly related to access to inputs intermediate goods. The study found a consistently positive and significant relationship between firm productivity and supply of intermediate goods or raw material access. They conclude that inadequate access to essential inputs and raw materials will undermine and hurt firm productivity (Wodajo T. and Senbet D, 2013).

Regarding firm size and productivity, Biesebroeck (2005b) found that the size and productivity of firms in nine Sub-Saharan African countries and other advanced countries is positively and significantly related. In these countries, when the firms enter at a relatively smaller scale then their productivity will be lower. Manufacturing firms with lower scale of production may not survive and exit the market early on even though there are firms who could survive with small size or production scale especially in Africa where small firms rarely reach the level of the biggest firms in the industry. Generally, the largest firms display higher level of productivity, growth rate and significant contribution to economic growth. The study confirms that significant number of firms up to 60% of new firms that enter the market with lower scale of production exited within 3 years special if there are firms producing with large economic scale. Thus, firs those are operating in less production scale or lower in production size are performing lower value addition and are less compitatnt to continue on the market (Gebreyesus Mulu, 2008).

A study made in Kenya, indicates that the size of manufacturing companies has significant impact on their performance level. The constant impact on return to scale (CRS) indicates that the manufacturing company has reached the best scale when it has better size of production. The study shows an increasing in company size has more than proportionate increase in output level. The result of the study shows that the firm size can enhance the efficiency of large-sized Kenya manufacturing companies (Admasu Shiferaw, 2017).

2.4.2. Review of Empirical Literatures made in Ethiopia

The determinants and productivity of manufacturing industries performance in Ethiopia has also assessed from different empirical researches and other literatures. Accordingly, a survey made by AACCSA (2014) on Ethiopian manufacturing sector productivity analysis found that production capacity (firm size), availability of material inputs and capacity utilization are the most determinants of manufacturing industries performance. The study identifies shortage of foreign currency to import raw material and intermediary goods are the main problems of the manufacturing firms in Ethiopia. So improving availability of material and inputs is one of the ways for achieving better industries performance. Although the country's major natural resource base and competitive advantage is its rich agricultural potential, it has not been utilized for the development of the industrial sector and even manufacturing industries hugely consuming

agricultural inputs such as agro-processing, textile and leather industries faced chronic raw material supply shortage and lower productivity. Ethiopia is also known to possess a wide variety of mineral resources. However, their utilization is yet to be realized, mineral exploration and exploitation still being at its infancy. This thwarted the expansion of manufacturing industries based on mineral resources and also resulted for lower productivity on those who are already established (AACCSA, 2014).

Similarly, the survey report on manufacturing sector made by national planning commission reveals the ratio of the cost of imported raw materials to the total cost of all industrial raw materials consumed by industrial manufacturing firms has significant impact on the performance of manufacturing industries. As per the survey data collected from both public and private manufacturing industries for the years 2003 – 2007 E.C, almost half of the raw materials consumed by the manufacturing industries were imported over the past two years. The survey result shows the performance of manufacturing industries is dependency on the ratio of imported to total consumed raw materials over the period of five years and it indicates that the machinery & equipment, rubber and plastic, and the chemical and chemical products manufacturing industries consumed more imported raw materials than the others over the period of the five years under consideration. This result has similar with the data for this study in some extent (National Planning Commission, 2015).

Inadequate quantity and poor quality raw material supply which is one of the major determinants for almost all products of the manufacturing industries except cement and to an extent, chemicals. Access to raw material is inadequate and often delayed for most enterprises even those uses locally available inputs like textiles and garments, leather and leather products, food and beverage and other. The cultivation of agricultural raw materials including organic cotton is also inadequate. Paradoxically owing to the absence of an assured domestic market partly as a result of insufficient linkages between farmers unions and manufacturing industries. In addition raw material import procedures for foreign sourced inputs are very long and bureaucratic. This all summed to have negative relation and significant impact on the performance of manufacturing industries (UNDP, 2017).

On the other hand, Rama MohanaRao (2015) also confirms that the growth rate of the value added per engaged person, which is the measurement of manufacturing sector performance is significantly affected by human capital level. 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 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 but not accompanied by a proportional increase in wages and salaries of the employees (Dr. K. Rama MohanaRao, 2015).

The result of the study implicitly shows that the human capacity has dominant impact with positive effect on the labor productivity of the firms. The human capacity measures the skill composition of the labor forces and is estimated by the wage share per employee's value added as stated above. The study shows that when 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 (Dr. K. Rama MohanaRao, 2015).

Similarly, the study made by UNDP (2017) on Ethiopian manufacturing sector performance confirmed the availability of a broad base of human capital is essential for the sustainability of

growth and performance improvement of manufacturing firms in a competitive market. Depth of universal primary education and literacy levels ensure that on-the-job learning and cognitive skills of the workforce should be well present and advanced for better performance of manufacturing industries. Then investing enterprises find it easier to upgrade the skills of such workers, to use new and advanced technology and to continuously improve productivity for the continuous growth of efficiency and competitiveness in the sector. In general the study has indicated that human capital (i.e. human capital augmented labor) and workers experience are found to have significant contribution at all to the level of productivity of manufacturing firms (UNDP, 2017).

Another study on the productivity of manufacturing sector in Ethiopia prevails that one of the major challenge for Ethiopian manufacturing is the ability to create jobs. The employment share of manufacturing remains below its 5% contribution to GDP and this low employee level resulted in poor performance of the sector. Using industry-level data from 72 counties Shiferaw and Hailu (2016) find that developing countries need to achieve exceptionally high growth in manufacturing value added to achieve modest growth in employment. This signifies that the manufacturing industries and employment level has direct relation (Admasu Shiferaw, 2017).

The other determinant factor for the performance of manufacturing firms' performance is firm size and capacity utilization level. The survey report of AACCSA (2014) signifies firm size or plant capacity and capacity utilization rate as confirmed from the samples manufacturing firms 87% the respondents in the sample reported that they are not producing in full capacity and this resulted for their poor performance. Topmost respondents' reasons mentioned for underutilization of plant capacity are presence of shortage of imported inputs, quality of labor and poor maintenances skill employees and market problem. From this we can understand that capacity utilization rate and firm size has its own effect on the performance of manufacturing industries (AACCSA, 2014)

According to CSA's Quarterly Manufacturing Industry Business Survey report published on National Bank of Ethiopia (NBE) fourth quarter bulletin (2013), revealed that low level of capacity utilization have remained the typical features of the Ethiopian manufacturing sector and states as one of the problems for poor performance of manufacturing sector in the country.

According to the survey a relatively high degree of capacity utilization was observed in of manufacturing of wood and wood products and cork (85.8 percent) while manufacturing of furniture exhibited low capacity utilization (40.7 percent) which is found to be one of the least performing industries. The main reasons for the observed under capacity utilization rate differ from time to time. Nevertheless, shortage of raw materials and lack of demand /market/ are depicts as the main reason for under performance which persistent other similar studies.

Another study made by Måns Söderbom (2011) on firm size and structural change, the study found a substantial heterogeneity in economic performance across firms and emphasizes a strong association between …firm size and value- added per worker. The study found a strong association between value-added per worker and firm size level the analysis result indicates positive and significant relation by using correlation medal (Måns Söderbom, 2011).

Furthermore, the finding of fixed effect regression model by Dr. K. Rama MohanaRao indicates that firm size is one of the 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 and significant at 5% level of confidence interval. 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. In addition this result shows that unlike the markets in developed countries and even other study like AACCSA, market in Ethiopia is not saturated and whatever is produced is being sold in the market without much difficulty. Therefore, market cannot be a problem for the manufacturing industries of Ethiopia which is really against study made by AACCSA but consistent with this study (Dr. K. Rama MohanaRao, 2015). In general, capacity utilization level and firm size are significant and positive impact on manufacturing productivity and performance hence market cannot be a challenges for Ethiopian manufacturing sector since the production amount can easily sold at the local and/or international market.

Based on the review of empirical literatures the other determinant factor for the performance of manufacturing sector is capital intensity level. A survey result on manufacturing industries performance initiated by AACCSA shows that total value of fixed capital assets in Ethiopian manufacturing sector estimated is one of the factors for the performance of manufacturing industries. This is because in recent years firms are an able to cover the costs of such industries both incurred for fixed and operating costs. However, when the capital intensity of a firm increases the performance level has increase more than proportionately. Accordingly the study recommends the improvement of domestic banks which are the major sources of finance for most projects in Ethiopian manufacturing industries about 62% the capital requirement (AACCSA, 2014).

Another research made by African Development Bank eastern Africa's manufacturing sector productivity assures that the structure, capabilities and relevance of technology; including, R&D and innovation should be developed for better performance of the manufacturing industries. The study indicates that this all are lead by the capital level of firms in line with the availability of skill and experienced manpower. To this end firms should use modern technology foresight and stimulate linkages between industry and science and technology infrastructure (R&D laboratories and universities) mainly requires human and fiscal capital (African development bank, 2014). In general when the capital intensity of industries gets large the labor productivity of the firms gets improved.

However, a Journal of Poverty, Investment and Development done by Dr. K. Rama MohanaRao, indicates that the reverse. As per the finding of the study on the the fixed effect regression model 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. This labor skill reduction will end in idleness of then capital and then resulted for poor performance of the firms (Dr. K. Rama MohanaRao, 2015).

2.5. Summary of Empirical literature review

The review result for both national and international literatures on the productivity, performance and productivity determinants of manufacturing industries indicate that human capital is the dominant factor in determining the performance and productivity level of manufacturing firms around the globe. Moreover, most of the studies also confirmed the significance of raw material availability measure by the ratio of imported to total consumed intimidate goods. When raw materials are available in the local market with a required level of quality standard firms can access at a right time without complicated procurement procedures with appropriate cost. Thus, the ratio of imported to total consumed raw materials determines the easily access of required inputs for manufacturing industries. In addition, firm size, capacity utilization level and level of capital intensity also has positive and significant impact on the performance and productivity of manufacturing industries.

Similarly, most of the researches made on the productivity of Ethiopian manufacturing industry found this positive and significant relationship for all variables i.e. human capital, wage share, ratio of imported to total consumed raw materials, firm size, capacity utilization level and capital intensity level. But some other studies found that capital intensity level has negative relation with firms productivity may be due to the accumulation of idle capital. Meanwhile the other variables have either positive relation or/and insignificant impact on the firms productivity. These studies concluded that when firm size and capacity utilization level significantly and positively affects the manufacturing firms performance we can understand that the there is no problem of market for the industrial products or the market for such industries output is still unsaturated and firms can sell whatever they produce without complicated market problem. On the other hand the positive and significant relation between human capitals, wage share and manufacturing industries productivity signifies a skilled and better compensated manpower can feel sense of ownership and enables them to work hard for the sustainability of the firm which can achieve a win-win approach for the employees and firms.

3. RESEARCH METHODOLOGY

This chapter deals with the methodology that used to answer the research questions of this study. It comprised research Design, procedures of data collection, data analysis procedures and techniques, types and sources of data, variables of the study, model selection and specification etc. They are explained along with their various steps and procedures with the rationale behind employing them in the context of this particular study.

3.1. Research Design

In an attempt to answer the proposed research questions, the study has employed econometric analysis based on the panel data collected from all manufacturing industries financed by DBE. The data has collected from the firm's financial and fiscal performance report and also some data has be extracted from stakeholders database like DBE's project follow up report manufacturing survey report and planning commission assessment on manufacturing industries performance. On this study the researcher has collected data on the total sales of firms, total costs incurred for sold goods, number of employees and the sum of wages, salaries benefits incurred by firms, ratio of imported to total consumed raw materials, capacity utilization level, total fixed or capital investment, etc. then the collected data has organized in the form that can be easily used for econometric analysis. Then the study has used econometric model to analysis the data collected from these secondary sources.

3.2. Data Type and Sources

For the completion of this study only secondary data which has quantitative characteristics are used. The main sources of data are the industries' annual financial and fiscal report in the period under consideration (2012-2016). In addition Development bank of Ethiopia (DBE) project follow up report for each and every manufacturing industries and annual fiscal report of the bank for the operating years of 2014, 2015 and 2016 are accessed. The other data sources, in some extent, include the Ministry of Finance and Economic Cooperation (MOFEC), Central Statistical Agency (CSA) and National Planning Commission.

3.3. Method of Data Analysis

This study dominantly has employed quantitative methods of data analysis techniques. The study has applied descriptive statistics analysis methods such as mean, standard deviation,

minimum, maximum, growth trend analysis (percentages). In addition the study has used statistical analysis tool of fixed effect regression model by using stata12. Other descriptive analyses and tests were also used for evaluation the manufacturing industries performance and performance trends during the period under consideration.

3.4. Manufacturing Industries Productivity Measurement and Econometric Model

In this study, the performance of manufacturing industries is measured by labor productivity per value added production. The reason for selecting this method, as stated by Bernolak, (1997), labour productivity is an appropriate measurement of firm's productivity especially if the work force is the industries dominating factor of production. As a matter of this fact, the small manufacturing industries in Ethiopia which has very limited capital except light machines can be referred as labor intensive. Hence, using labor productivity as a measurement of industries performance becomes more appropriate. However, we many face different problems in using other productivity measurement methods like that of total factor and multi factor productivities measurements associated with their respective nature. For example, it is difficult to construct an index number that will serve as measurement of other inputs in using the total productivity. In other words, hours done by labour to units of investments are easily measurable but the contributions of factors of production such as land, technology, infrastructures, etc. are difficult to set a single index. Even to all quantify in monetary or measurable terms is very cumbersome. The construction of total factor and multi-factor productivity index is, therefore, not appealing. In its place partial productivity can be used that estimates the ratio of total output to a single input, usually labour. Hence, in most labor intensive industries with low level of capital accumulation, productivity is taken to be synonymous with labour productivity.

Accordingly, the performance trend of manufacturing industries those are financed by DBE is investigated from the labor productivity in real value added production per employee point of view and measured as value added per employees' wage. The study has used data from 2012 to 2016 for five years. The data are collected from all manufacturing industries financed by DBE that employees at least 6 persons as requirement to get finance from the bank and currently has an outstanding loans amount. The study uses value added production levels, number of persons engaged and wages and salaries of employees, capacity utilization, ratio of imported to total

consumed raw material, capital intensity, human capacity and economies of scale are included as independent variable to determine the performance of manufacturing industries.

The trend in labor productivity in real value added unit is measured as an indicator for industrial performance. In addition, the other factors that determine the performance levels are identified and their relative influence on the performance is also analyzed. Fixed effect regression econometric 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).

3.5. 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 general form of Cobb-Douglas production function will be

$$Y = AL^{\beta}K^{\alpha}$$

But when it changed in the form of the general log linear production function production model can be given as;

$$\ln Y_{it} = \alpha + \sum_{\kappa} \beta k \ln X_{kti} + \sum_{t} \sigma_{t} + V_{it} \ldots\ldots\ldots\ldots (1)$$

Where i, t and k are subscripts for cross-sectional units (industries), time and inputs, α, βk, 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:

$$\ln(\frac{Y}{L})_{it} = \alpha + \sum_{\kappa} \beta_{k} \ln X'_{kti} + \sum_{t} \sigma_{t} c_{t} + \lambda_{it} \ldots\ldots\ldots\ldots (1.1)$$

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 input X.

A fixed effect regression model is used to determine the labor productivity performance of the manufacturing firms, the model for the study will be specified as follows:

$$\ln\ln(VADPE) = \beta_0 + \beta_1 \ln FS_{ti} + \beta_2 \ln CUL_{it} + \beta_3 \ln HUCL_{it} + \beta_4 \ln CIPI_{it} + \beta_5 \ln RITCRM_{it} + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where

VADPEW= value added production per employee wage

FS= Firm size measured by log value of production level

CUL= capacity utilization level measured by percentage of capacity utilization

HUCL= Human capacity level, approximated by skilled adjusted wage share of the of the employees

CIL= capital intensity level measured by the ratio of fixed assets to employees number

RITCRM= ratio of imported to total consumed raw material

$\mathbf{e}_{it}$= is an error term

3.6. Explanation of Variables

A. Dependent variable (Value added production per employee)

In business, the difference between the sale price and the production cost of a product is the unit profit. In economics, the sum of the unit profit, the unit depreciation cost, and the unit labor cost is the unit value added. Summing value added per unit over all units sold is total value added. Total value added is equivalent to revenue less intermediate consumption. Value added is a higher portion of revenue for integrated companies, e.g., manufacturing companies, and a lower portion of revenue for less integrated companies, e.g., retail companies. In production the value addition has two shares, the first component is a return to labor and the second component is a return to capital.

Value-Added Productivity per Employee is an indicator that measures the 'value-added' per employee and is an outstanding measure of the extent to which you are utilizing your employee's

strengths. The general formula for the Value added per employee is operating profit added to salaries, wages and payroll expenses and then divided by the average number of employees. Value-added productivity measurement is a capacity tool to establish the productivity performance of an organization. Therefore value addition per employee is considered as performance measurement of manufacturing industries especially in industries which are labor incentive as in the case of our country.

B. Independent (Explanatory) variables

1. Firm Size

Firm size is commonly used as an important firm characteristic and used as a measurement of performance. Firm size commonly implies the level of output produced in a given period of time mostly in a year. In this study the firm size is measured by the log value of production level for the period under consideration. Theoretically the relation of firm size and performance level of value addition per employee which considered as the measurement of industries performance (dependant valuable) it is expected to be direct. In other word when the level of production value of the company increases the level of industries performance also increase. The finding of fixed effect regression model on manufacturing industries performance analysis made by Dr. K. Rama Mohana Rao (2015) has confirms this theory and firm size has significant positive effect on the manufacturing industries performance.

2. Capacity utilization level

The capacity utilization rate measures the proportion of potential economic output that is actually realized. Capacity utilization is an important operational metric for businesses, and it's also a key economic indicator when applied to aggregate productive capacity. A company with less than 100% utilization can theoretically increase production without incurring expensive overhead costs associated with purchasing new equipment or property. Economies with extra slack can absorb significant increases in production without pushing past previous highs. The concept of capacity utilization is best applied to the production of physical goods, which are simpler to quantify. Capacity utilization levels give insight into the overall slack that is in the economy or a firm at a given point in time. It is calculated as (Actual Output)/ (Potential Output) multiplied by 100. Theoretically capacity utilization rate and manufacturing g industries will have positive relationship since the firms can increase production without incurring expensive overhead costs associated with purchasing new equipment or property. However, the effect of capacity utilization rate based on the

fixed effect regression result of Dr. K. Rama Mohana Rao (2015) was not significant on the performance of manufacturing industries.

3. Human capacity level

Human Capital is a measure of the skills, education, capacity and attributes of labor which influence their productive capacity and earning potential. Human capital is defined as the knowledge, skills, competencies and other attributes embodied in individuals or groups of individuals acquired during their life and used to produce goods, services or ideas in market circumstances. Human capital many be individual human capital – the skills and abilities of individual workers and human capital of the economy which the aggregate human capital of an economy, which will be determined by national educational standards. This is the mainly determinant of manufacturing industries performance since it represent one of the production components directly, the component of return to labor. Different studies including Dr. K. Rama Mohana Rao (2015) manufacturing performance analysis on Ethiopian manufacturing sector indicates that human capital and productivity has positive relation and also the study found similar and significant relationship.

4. Capital intensity level

Capital intensity is the amount of fixed or real capital present in relation to other factors of production, especially labor. At the level of either a production process or the aggregate economy, it may be estimated by the capital to labor ratio, such as from the points along a capital/labor isoquant.. The use of tools and machinery makes labor more effective, so rising capital intensity (or capital deepening") pushes up the productivity of labor. Capital intensive societies tend to have a higher standard of living over the long run.

Calculations made by Solow claimed that economic growth was mainly driven by technological progress (productivity growth) rather than inputs of capital and labor. However recent economic research has invalidated that theory, since Solow did not properly consider changes in both investment and labor inputs and capital investment has significant effect on manufacturing industries performance, as the capital intensity of industries gets large the labor productivity of the firms gets improved. But, the results of the fixed effect regression model of Dr. K. Rama Mohana Rao (2015) 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 adheringto the ideology of technology by itself will solve all problems.

5. Ratio of imported to total consumed raw material

Intermediate goods or producer goods or semi-finished products commonly named as raw materials are goods, such as partly finished goods, used as inputs in the production of other goods including final goods. A firm may make and buy the raw materials. In the production process, intermediate goods either become part of the final product, or are changed beyond recognition in the process. Intermediate goods are not counted in a country's GDP, as that would mean double counting, as the final product only should be counted, and the value of the intermediate goods made by accompany is included in the value of the final good. The sources of raw materials may be international or local market. An important role of international trade is the exposure of firms to new goods. But it also has a problem of time wasting in procurement and it needs high working capital than local available raw materials. But as per manufacturing industries survey report of CSA, in Ethiopia raw material importation has negative relation with manufacturing industries.

4. RESULT AND DISCUSSIONS

Introduction

This chapter presents the results of the data guided by the objectives of the study and tried to present empirical evidence to agree or controvert. The study has tried to show what was the distribution and diversification of the manufacturing sector financed by DBE in the country among different regions and different sub sectors during the same time horizon (i.e. 2012-2016) that we were conducting the study. It could help to compare certain facts of the sector with what was happening with similar former studies at national level.

4.1. Distribution of Manufacturing Industries

4.1.1. Regional Distribution of the Manufacturing Industries

The regional distribution of manufacturing industries financed by DBE are assessed by categorizing them in to 14 sub sectors as shown in the Table 4.1 below. The total numbers of operational manufacturing industries financed by DBE as reported on the annual report of the bank are totally 388 (fiscal year report of DBE, June 2016). These projects have created about 56,760 job opportunities.

Table 4.1: List of manufacturing industries financed by DBE by sub sector and region

Sub Sector	Oromia	Amhara	SNNPR	AA	Harari	D/Dawa	Afar	E/Somali	B/Gumz	Total
FOOTWEAR, LUGGAGE AND HANDBAGS	6	2		4						14
BASIC IRON AND STEEL	9	1		2		2				22
CHEMICALS AND CHEMICAL PRODUCTS	10	3	1	9						29
FABRICATED METAL PRODUCTS	7	3	1	1	1					20
FOOD PRODUCTS AND BEVERAGES	32	18	12	12		6	2	2	1	94
FURNITURE	9	1	4	1						17
MACHINERY AND EQUIPMENT	6	5	1	4						17
MOTOR VEHICLES,TRAILERS & SEMI-TRAILER	1	1		4						7
NON-METALLIC MINERAL PRODUCTS	8	5	2	6					3	39
PAPER, PAPER PRODUCTS AND PRINTING	4	1	2	3						14
RUBBER AND PLASTIC PRODUCTS	17	2	4	16						49
TEXTILES	8	5	4	2		1				21
WEARING APPAREL	7	3	2	13						32
TANNING AND DRESSING OF LEATHER	7	3	1	1						13
Total	**131**	**53**	**34**	**78**	**1**	**9**	**2**	**2**	**4**	**388**

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

From the total manufacturing industries the highest share, about 34% of the manufacturing industries are located in Oromia regional state followed by the capital of Ethiopia, Addis Ababa city with a total share of 20.1%. On the other hand Tigray and Amhara regions are place 3rd and 4th with a total share of 19.1% and 13.7% respectively while the SNNPR has owned 8.8% of the total manufacturing industries. The other five regional governments has shared the remaining 4.6% except Gambella region where is no manfucturing industries financed by DBE. This shows that the distribution of the manufacturing industry is skewed to the central part of Ethiopia (Oromia regional state and Addis Ababa city) and it is mainly for better infrastructural and market access. This is strongly agreed with the finding Dr. K. Rama MohanaRaoon on his research titled as Performance Measurement of Manufacturing industries in Ethiopia published on the Journal of Poverty, Investment and Development, who was discussed the national data for manufacturing industries (An International Peer-reviewed Journal, 2015). The details of regional distribution of manufacturing industries in Ethiopia particularly those are financed by DBE are presented in the figure 4.1 below.

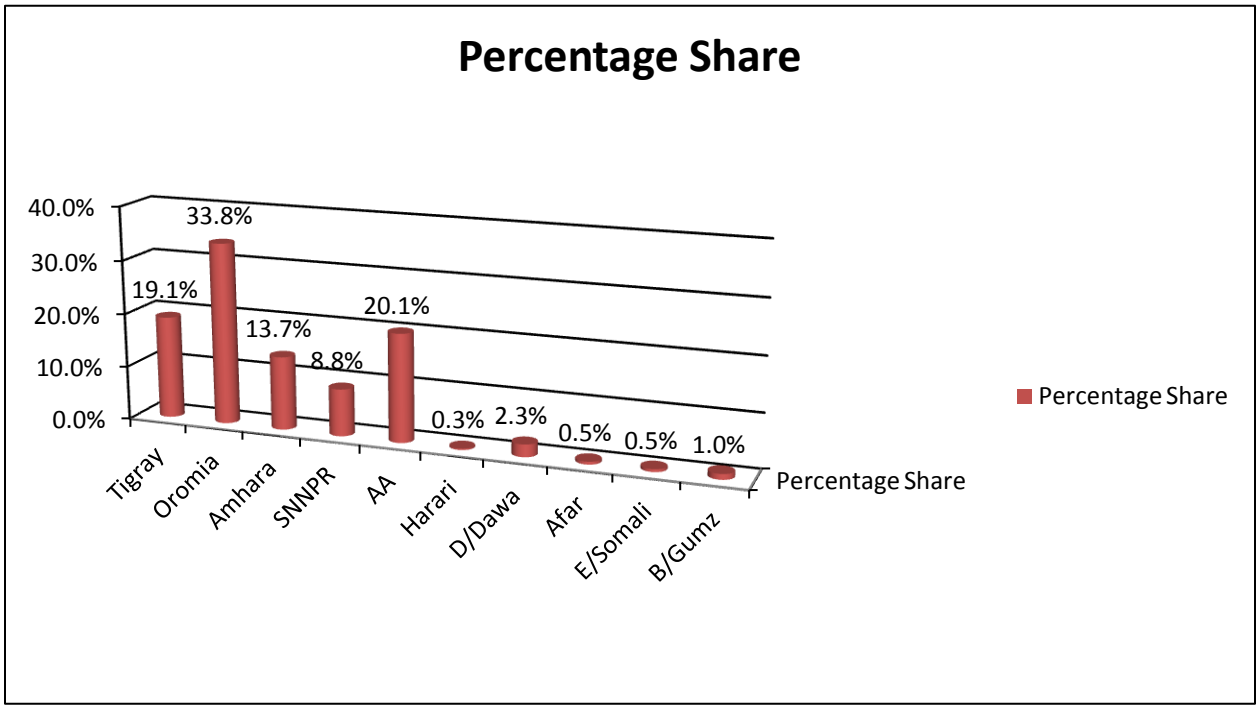

Figure 4.1 regional distributions of manufacturing industries financed by DBE

4.1.2. Sector Distribution of Manufacturing Industries

The classification of manufacturing sectors in to sub sectors (categorized in to 14 sub groups based on CSA classification criteria) also indicates that it is not evenly distributed and there are some dominating sub sectors established in all regions but in contrary to this some sub sectors are really available only in few regions. For instance, as can be seen from the table 4.2, about 24.2% of the manufacturing industries fall in the category of food products and beverages which is the dominate sub sector. This data is in line with the find of AACCSA (2014) and Dr. K. Rama MohanaRaoon (2015) on their respective studies of the performance of manufacturing sectors.

Table 4.2: distribution of manufacturing sector by sub sector

Sub Sector	Number of Projects	Percentage Share
footwear, luggage and handbags	14	3.6%
basic iron and steel	22	5.7%
chemicals and chemical products	29	7.5%
fabricated metal products	20	5.2%
food products and beverages	94	24.2%
furniture	17	4.4%
machinery and equipment	17	4.4%
motor vehicles, trailers & semi-trailer	7	1.8%
non-metallic mineral products	39	10.1%
paper, paper products and printing	14	3.6%
rubber and plastic products	49	12.6%
textiles	21	5.4%
wearing apparel	32	8.2%
tanning and dressing of leather	13	3.4%
Total	**388**	100%

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

However, as it can be seen from the above table the second high sub sector from the manufacturing industries is rubber and plastic products manufacturing with a total share of 12.6% which in not agreed with the national data of Dr. K. Rama Mohana Raoon which has non-metallic mineral products but agreed with AACCSA study and it come at third with a percentage share of 10.1%. When we see the fourth and five dominant sub sectors of manufacturing sector financed by DDBE, we find that wearing apparel (garment) and chemicals and chemical products with a share of 8.2% and 7.5% respectively. But the textiles industry which was one of the

dominant sub sector in the national data of Dr. K. Rama Mohana Raoon come 7th next to basic iron and steel manufacturing (5.7%) with a total share of 5.4%.

4.2. Performance of Manufacturing Sector

The performance of manufacturing industries is assessed by using the total value added production in the give time horizons, labor productivity or value addition per labor, labor cost per value added (wage share ratio) of manufacturing sector, firm size measured by the production scale, capacity utilization level of industrial firm, capital intensity or level of capital investment and the ratio of imported to total consumed raw materials used by the industries. Accordingly, the performances of manufacturing sector financed by DBE are thoroughly examined by using the most dominant variables.

4.2.1. Value Addition

Value added is commonly used as a measure of output or performance. It represents the wealth created through the firms' production process. In this case it is measured by the difference between sales and the cost of sales incurred to generate the sales. It is computed by deducting purchase cost of inputs, raw materials (intermediate goods) and services from total sales where sales refer to revenue earned from products sold by the firms and purchased goods include raw materials and other intermediate products used in production process. Based on this definition the levels of value addition by the manufacturing industries financed by DBE are presented on the following table.

Table 4.3: Value Added production of manufacturing industries financed by DBE by sub Sector

Sub Sector	Value added in the national account (at market price) in 000s Birr						
	2012	2013	2014	2015	2016	Total	% share
basic iron and steel	1,006,893	1,056,615	785,049	1,077,532	1,054,444	**4,980,533**	4.67%
chemicals and chemical products	355,119	358,833	278,878	285,458	270,382	**1,548,670**	1.45%
fabricated metal products	412,529	453,518	486,268	529,756	506,265	**2,388,336**	2.24%
food products and beverages	1,033,818	1,194,262	1,244,885	1,333,255	1,365,796	**6,172,016**	5.79%
footwear, luggage and handbags	2,175,550	2,235,642	2,652,239	2,910,412	3,047,119	**13,020,962**	12.21%
furniture	2,280,177	2,002,444	1,500,856	1,663,476	1,882,399	**9,329,352**	8.75%
machinery and equipment	2,284,874	2,370,776	2,680,495	2,523,380	2,615,305	**12,474,829**	11.70%
motor vehicles, trailers & semi-trailer	70,683	83,497	87,737	80,714	84,335	**406,965**	0.38%
non-metallic mineral products	310,998	385,480	370,171	388,516	423,916	**1,879,081**	1.76%
paper, paper products and printing products	215,891	230,121	287,598	271,801	299,195	**1,304,605**	1.22%
rubber and plastic products	1,878,649	1,782,391	2,203,439	2,206,410	2,313,083	**10,383,972**	9.74%
tanning and dressing of leather	140,714	175,642	177,581	202,220	234,399	**930,557**	0.87%
textiles	6,399,466	5,904,999	5,728,711	6,398,846	6,910,975	**31,342,997**	29.39%
wearing apparel	1,803,740	1,854,030	2,099,720	2,347,406	2,394,284	**10,499,180**	9.84%
Total	**20,369,100**	**20,088,249**	**20,583,628**	**22,219,183**	**23,401,896**	**106,662,057**	100.00%

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

As it can be seen from the above table the highest share of value addition in the manufacturing sector is made by textile industry while it was the 7th in the share of manufacturing industries financed by DBE. This is because as we know the textile sub sector is the most priority area of the current government and hence the government gives a multiple of incentives to the sector. Moreover, the textiles sector in Ethiopia is the most attractive sector because of cheap labor cost and good potential of raw materials. The third reason for this high level of value addition is scale of economic since most of the textile industries are producing higher volume than other industries. Accordingly, different multinational companies has coming to the country to invest in the sub sector of textile manufacturing and the government has been constructing industrial park with a priority for thi sub sector. The next sub sector which shared the higher value addition is the footwear, luggage and handbags and machinery and equipment with a share of 12.21% and 11.7% of the total value addition respective but it is by far from the share of textile industries.

Furthermore, the trends of value addition by sub sector during the period under consideration has shown progress except chemicals and chemical products and furniture which register a decrease

on average but the growth trend was not sustainable and it goes through up and downs over the past five years. During this period, on average the values added by manufacturing sector financed by DBE has grown by 3.9% considering 2012 as a base year and the average growth rate of tanning and dressing of leather, paper, paper products and printing, footwear, luggage and handbags, non-metallic mineral products and wearing apparel are the top five performer in value addition improvements. The overall value added by the industry in the last five years is more than 106.6 billion birr of which most of the value addition is goes to textile industries, because the government investment incentive policy favors to it believing that it is a work home for many citizens, but in opposite to its high share its improvement or growth trend is below the government expectation with an average growth rate of 2.25%. Its growth rate during 2012 to 2013 was found to be negative 7.73% and 2.99% respectively but in the next two years the growth rate has been registered a positive growth with 11.7% and 8% respectively. This indicates that the trend of value addition in the sub sector is highly fluctuating and not predictable which is also similar with the national data of Dr. K. Rama MohanaRaoon and AACCSA performance analysis. The detail of growth trends of manufacturing industries performances is shown in the figure below.

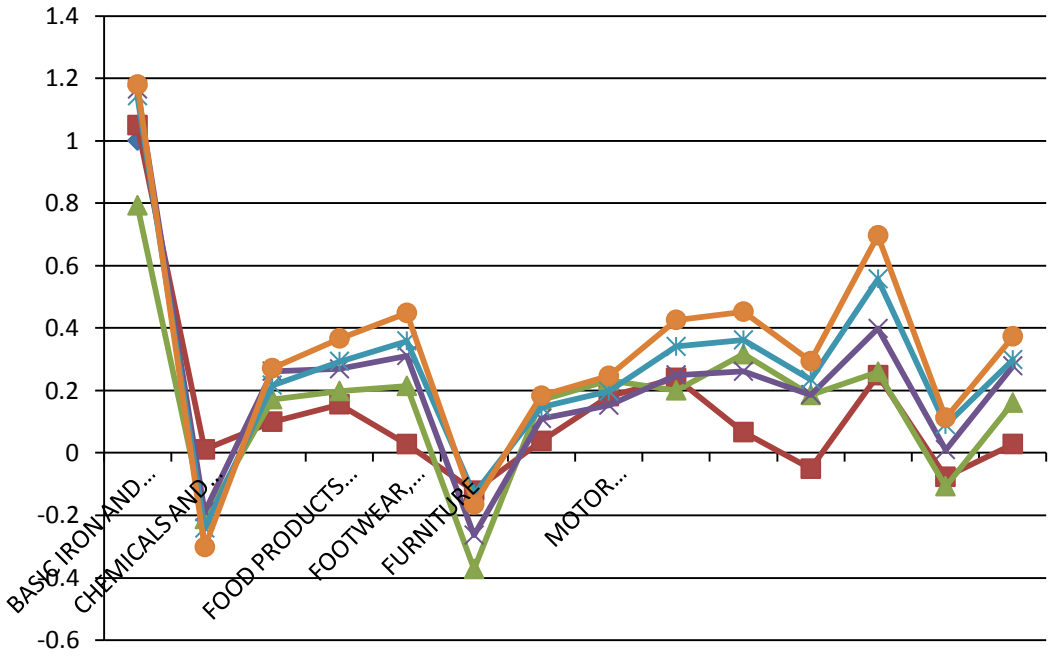

Figure 4.2 performance or value addition growth trend of manufacturing industries by sub sector

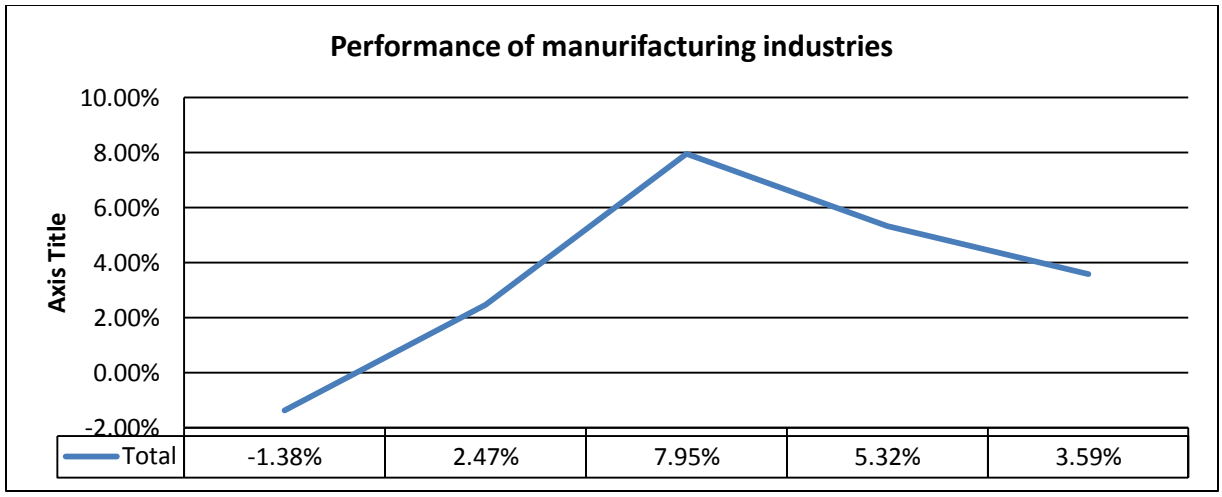

Figure 4.3 performance manufacturing industries financed by DBE in average value added

4.2.2. Labor productivity

Ethiopia being one of the least developed countries, it has very limited capital but abundant work force and hence its industries are assumed to be 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 value added production per engaged person in the manufacturing industry. Table 4.4 presents the valued added per engaged person of the manufacturing industrial financed by DBE.

Table 4.4 Average value addition per employee by industrial sub sector

Sub Sector	Average Value added per person (an employee) (at market price) in 000s				
	2012	2013	2014	2015	2016
basic iron and steel	676	879	628	706	691
chemicals and chemical products	276	260	261	266	271
fabricated metal products	338	359	350	374	367
food products and beverages	388	413	420	463	495
footwear, luggage and handbags	261	232	313	323	324
Furniture	466	448	412	436	444
machinery and equipment	327	355	362	346	408
motor vehicles, trailers & semi-trailer	361	385	392	384	389
non-metallic mineral products	540	577	584	608	619
paper, paper products and printing products	529	564	638	622	665
rubber and plastic products	352	366	395	407	428
tanning and dressing of leather	521	568	579	620	695
Textiles	443	441	426	441	483
wearing apparel	331	353	351	373	373
Total	**5,809**	**6,200**	**6,110**	**6,370**	**6,652**

Source: Annual report of DBE for the fiscal year ended June, 2016 and project follow up report

When we see the growth trend of value addition per singe employee it was about 4% on average taking 2012 as a base year. However, during the period under consideration the highest value addition per employee was done by tanning and dressing of leather with 8% average growth rate followed by footwear, luggage and handbags, food products and beverages and paper, paper products and printing products manufacturing with an average growth rate of 7%,6% and 6% respectively. According to the researcher discussion with one of the lending units of the bank, the relative newness of the modern industries to the country which allowed labor innovation and have the potentials for intermediate goods in Ethiopia enables these industries to made higher value addition per employee as compared to the other sub sectors and they also state that the sub sectors can also grow more if the government and firms can exert the maximum effort in the sector. The details of the growth trend of manufacturing sector value added production per employee is shown in the table and figure below.

Table 4.5: value addition per employee growth trend of manufacturing industries financed by DBE

Sub Sector	**Growth of Value added per person (an employee) (at market price) in 000s**				**Average**
	2013	**2014**	**2015**	**2016**	
basic iron and steel	30%	-29%	12%	-2%	3%
chemicals and chemical products	-6%	0%	2%	2%	0%
fabricated metal products	6%	-3%	7%	-2%	2%
food products and beverages	7%	2%	10%	7%	6%
footwear, luggage and handbags	-11%	35%	3%	0%	7%
furniture	-4%	-8%	6%	2%	-1%
machinery and equipment	9%	2%	-5%	18%	6%
motor vehicles, trailers & semi-trailer	7%	2%	-2%	1%	2%
non-metallic mineral products	7%	1%	4%	2%	4%
paper, paper products and printing products	7%	13%	-3%	7%	6%
rubber and plastic products	4%	8%	3%	5%	5%
tanning and dressing of leather	9%	2%	7%	12%	8%
textiles	0%	-4%	4%	9%	2%
wearing apparel	6%	-1%	6%	0%	3%
Average	**5%**	**2%**	**4%**	**4%**	**4%**

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

As clearly shown in the table above and figures below the value addition per employee is relatively sustainable even though it was shown a declining trend in the year 2014 as compared to the previous year. But when we see the sector level labor productivity growth trend the leading industries are tanning and dressing of leather, footwear, luggage and handbags, food

products and beverages and paper, paper product and printing products manufacturing and the bottom performer industries are furniture, chemicals and chemical products, textiles and motor vehicles, trailers & semi-trailer industries. The textile industry, in which large numbers of employees are engaged and has a higher gross value addition, is not able to show consistency in its labor productivity performance and its average growth rate for the period under consideration is only 2%. As per the annual report of DBE, the reason for this low productivity of textiles industries is that poor quality and less availability of raw material supply and less capacity utilization rate because of demand fluctuation in the international market for textiles products.

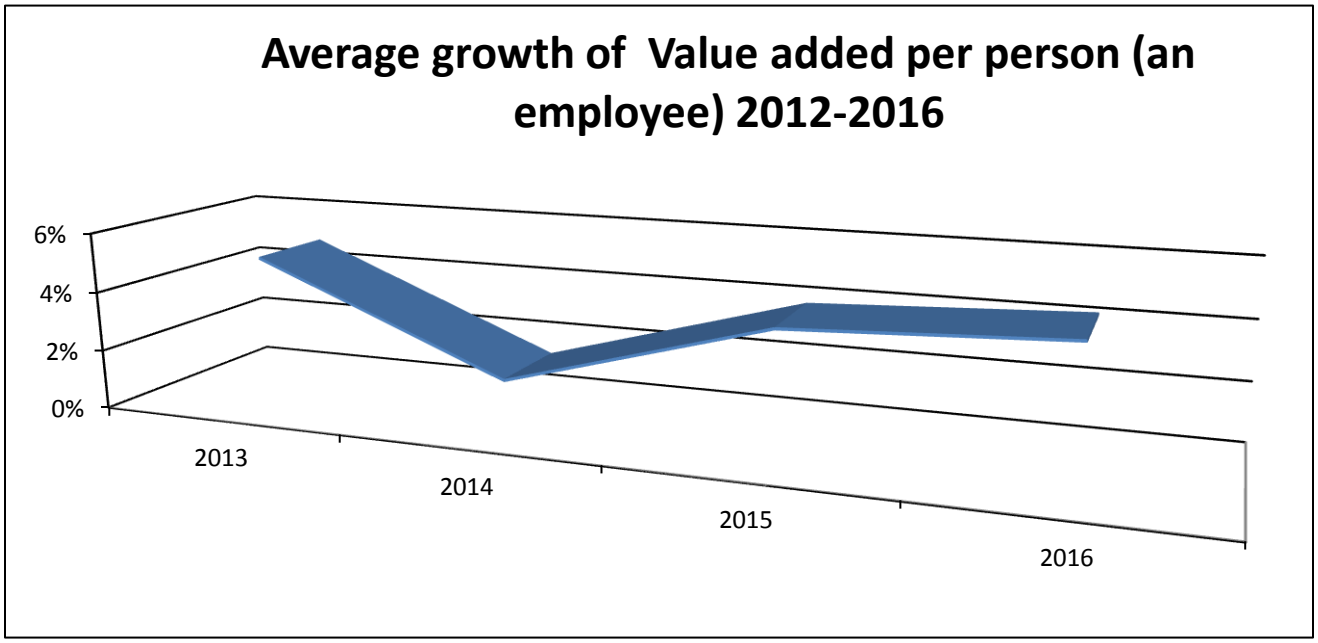

Figure 4.4 performances of manufacturing industries in value added per person from 2012-2016 on average

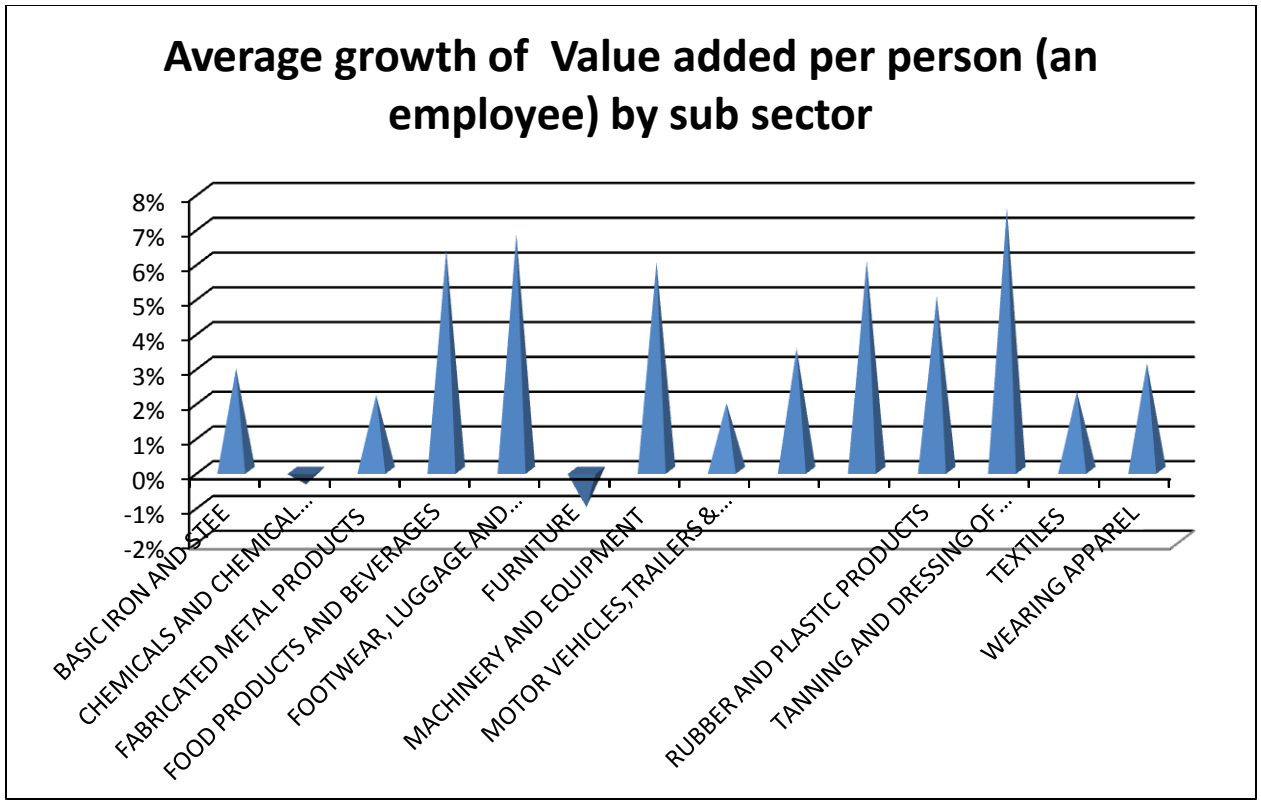

Figure 4.5 average performances of manufacturing industries in value added per person from 2012-2016 by sub sector

4.2.3. Labor cost per value added (Wage share ratio)

Theoretically the relative or comparative advantage of Ethiopian economy in general and the manufacturing industries in particular is primarily the availability of cheap labor. However, cheap labor alone doesn't guarantee firm competitiveness unless it is accompanied with improved labor productivity. An economy should have higher labor force productivity and value addition with relatively to the wage cost in order to have actual competitive advantages for industries. In this regard the average wage ratio of manufacturing industries financed by DBE is 0.16 which means with every one birr value addition the industries has paid 16 cents on average. When we see the wage ratio in sub sector wise the tanning and dressing of leather has incurred the least cost while rubber and plastic products has incurred the highest cost. The detail of wage share ratio of the manufacturing sector financed by DBE is presented in the table and figure below.

Table 4.6: Labor cost per value added (Wage share ratio) of manufacturing industries financed by DBE

Sub Sector	Average Labor cost per value added (Wage share ratio)					Average
	2012	2013	2014	2015	2016	
basic iron and steel	0.059	0.058	0.070	0.064	0.069	**0.064**
chemicals and chemical products	0.148	0.176	0.178	0.183	0.187	**0.174**
fabricated metal products	0.163	0.165	0.164	0.165	0.175	**0.167**
food products and beverages	0.124	0.112	0.123	0.116	0.109	**0.117**
footwear, luggage and handbags	0.177	0.192	0.168	0.176	0.182	**0.179**
furniture	0.182	0.192	0.217	0.207	0.210	**0.201**
machinery and equipment	0.099	0.100	0.118	0.116	0.111	**0.109**
motor vehicles, trailers & semi-trailer	0.114	0.114	0.119	0.128	0.131	**0.121**
non-metallic mineral products	0.102	0.098	0.098	0.092	0.090	**0.096**
paper, paper products and printing	0.146	0.146	0.132	0.142	0.139	**0.141**
rubber and plastic products	0.419	0.458	0.414	0.416	0.417	**0.425**
tanning and dressing of leather	0.050	0.041	0.044	0.042	0.042	**0.044**
textiles	0.239	0.257	0.270	0.269	0.260	**0.259**
wearing apparel	0.103	0.109	0.137	0.124	0.154	**0.125**
Average	**0.15**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

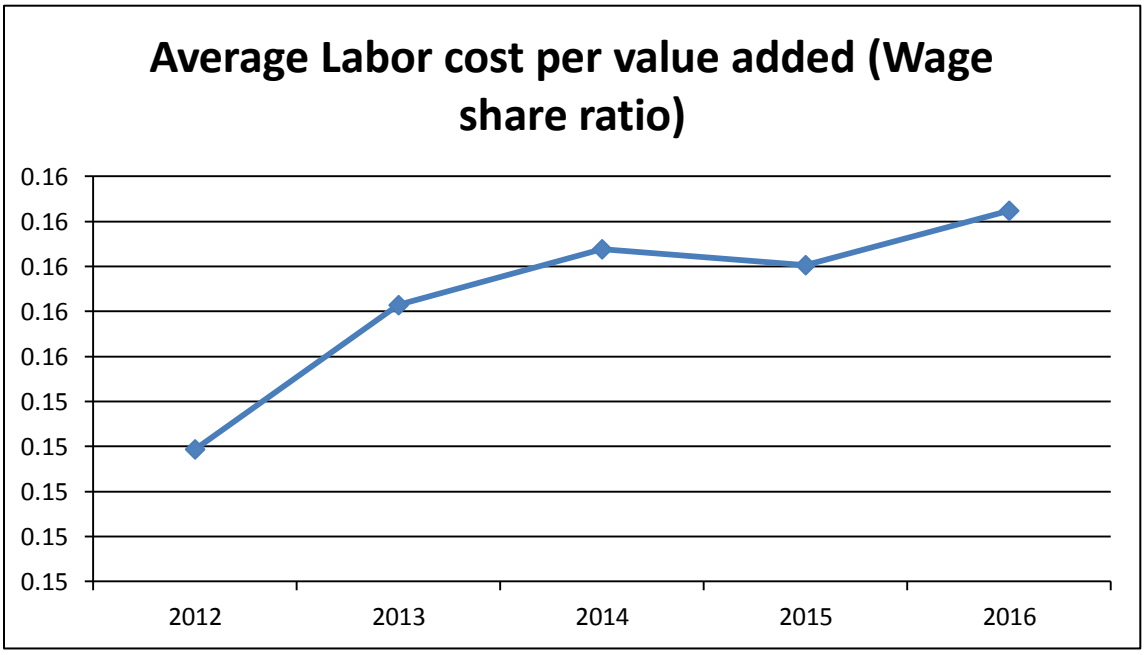

Figure 4.6 average wage share ratio or labor cost per value addition for industries financed by DBE from 2012-2016

4.2.4. Ratio of imported to total consumed raw material

The thorough functioning of manufacturing industries affirms a steady supply of raw materials & other inputs for smooth and continual of production. However, the source of raw materials may be foreign and/or local market. As per the manufacturing industries survey report of CSA 2015, the sources of raw materials is considered as one major determinant or challenges of manufacturing sector performance measured by the ratio of the cost of imported raw materials to the total cost of all industrial raw materials consumed by manufacturing industries.

Accordingly, on average about half of the raw materials consumed by the manufacturing industries were reported to have been imported over the past five years. But the ratio was not consistent during the period under consideration and it also varies among sub sectors. When we see the trends of raw material consumption ratio (imported/total consumed) it has show continuous decrement from year to year but not for all economic sub sectors. The manufacturing industry which consumes high imported raw material is motor vehicles, trailers & semi-trailer manufacturing with 86% followed by machinery and equipment and fabricated metal products manufacturing with 85% and 78% respectively while the minimum imported raw materials is used by garment and wearing appeals and textile with a share of 26.8% and 24% respectively. The details of ratio of imported to total consumed raw material and its growth trend is shown in the following table and figure respectively.

Table 4.7: Ratio of imported to total consumed raw material for manufacturing industries financed by DBE

Sub Sector	Average Ratio of imported to total consumed raw material (RITCRM)					Average
	2012	2013	2014	2015	2016	
basic iron and steel	0.659	0.607	0.606	0.599	0.533	**0.601**
chemicals and chemical products	0.641	0.705	0.652	0.621	0.688	**0.661**
fabricated metal products	0.712	0.799	0.703	0.812	0.853	**0.776**
food products and beverages	0.356	0.206	0.258	0.324	0.294	**0.288**
footwear, luggage and handbags	0.414	0.358	0.413	0.392	0.368	**0.389**
furniture	0.271	0.321	0.458	0.360	0.357	**0.353**
machinery and equipment	0.719	0.841	0.920	0.916	0.860	**0.851**
motor vehicles, trailers & semi-trailer	0.857	0.812	0.894	0.824	0.933	**0.864**
non-metallic mineral products	0.523	0.449	0.415	0.349	0.296	**0.406**
paper, paper products and printing	0.578	0.514	0.404	0.369	0.345	**0.442**
rubber and plastic products	0.657	0.647	0.568	0.537	0.505	**0.583**
tanning and dressing of leather	0.354	0.274	0.346	0.293	0.294	**0.312**
textiles	0.278	0.297	0.301	0.209	0.257	**0.268**
wearing apparel	0.160	0.256	0.189	0.290	0.305	**0.240**
Average	**0.58**	**0.53**	**0.52**	**0.49**	**0.44**	**0.50**

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

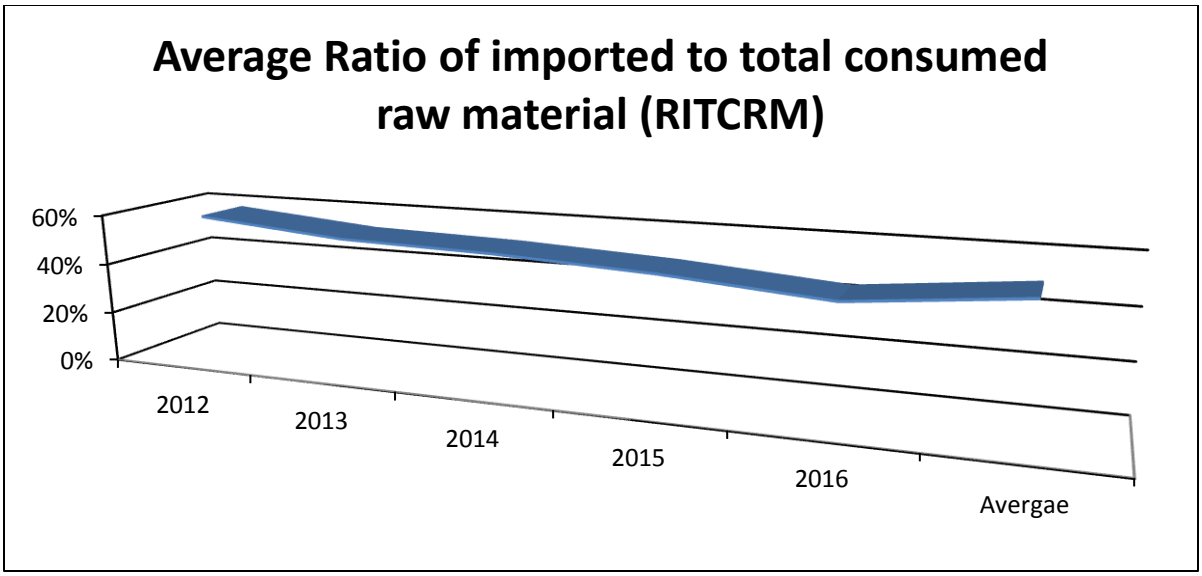

Figure 4.7 Average Ratio of imported to total consumed raw material (RITCRM) by sub sector and year

4.3. Descriptive Statistics Summary

To conclude this chapter, data analysis and discussion, we seen the summary statistics of the manufacturing industries financed by DBE based on the major variables (No of employees, total cost of labor (wage and salary), total Sales, total Cost of sales, fixed Investment, value addition, value addition per employee (VADPE), production Level or firm size (FS), capacity utilization Level (CUL), human capacity level (HUCL), capital intensity level (CIL), ratio of imported to total consumed raw material (RITCRM)and wage share ratio and by using the data from 2012-2016. The summary statistics of the variables is presented in the table below.

Table 4.8: summary of descriptive statistics of the variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
NOES	1940	346.9531	1333.32	5	10568
TCL	1940	11635.16	38973.35	136.51	288683.9
TC	1940	267479.4	619051	3688.11	4470737
FI	1940	94267.41	249966.9	511.43	1968044
VAD	1940	67020.5	154803.7	929.22	1120726
LNVADPE	1940	446.1734	241.7571	84.4	1174.1
LNFS	1940	2899.055	7239.38	0.12	44391.31
LNCUL	1940	0.7197165	0.1841518	0.19	1.09
LNVADPW	1940	10.71856	4.953865	3.24	25.9
LNCIL	1940	4956.166	5041.218	218.56	37500
LNRITCRM	1940	0.5318711	0.209314	0.06	0.98
LNHUCL	1940	0.1194948	0.0619583	0.04	0.31

Source: own computation

4.4. Econometric Analysis

4.4.1. Model selection test

As we are discussed before on chapter three dealing with any panel data requires appropriate model selection among the two common econometrics regression models, (i.e. fixed effect estimators and random effect estimators) used for such types of data. For this decision the Hausman test is conducted where the null hypothesis is that the preferred model is random effect or fixed effect is not the correct model and the alternative hypothesis is fixed effects model is thje correct model. It is basically tests whether the unique errors (ui) are correlated with the repressors'; the null hypothesis is they are not.

From the Hausman test result, we selected the fixed effect model which is conditional upon the values of αi. Verbeek, (2004) with P value < 0.05 mean fixed effects regression is more appropriate or we can reject the null hypothesis which is random effect econometric regression model is the correct model for panel data.

4.4.2. Determinants of performance in manufacturing sector (Results Analysis)

After conducting the necessary tests for the model, the result from the regression are presented. As it can be seen from the result tables below most of the explanatory variables used in the fixed regression model are found to be statistically significant at 95% level of confidence interval. The coefficients of the estimation are shown in the table below but the detail on tests and regression results are depicted in the annexes. Based on the regression result the model for labor productivity can be written as:-

$$(\boldsymbol{VADPE}) = -110.5 + 18.1CUL + 415.8LnHUCL + 0.0044LnCIL + Ln47.8VADW - 74.6Ln\text{RITCRM}$$

Table 4.9: Econometrics model result

Variables	Coef.	Std. Err.
LNFS	0.0000369	0.000285
LNCUL	18.10624*	11.31452
LNVADPW	47.76026***	0.9066908
LNCIL	0.0043559***	0.0004118
LNRITCRM	-74.5905***	10.54785
LNHUCL	415.7955***	73.08312
_cons	-110.4877	20.94943
sigma_u	0	
sigma_e	84.227528	
rho	0	
F (4.1930)	49.09***	

*Note: ***, ** and * represent statistically significant at 1%, 5% and 10%*

Labor productivity which is considered as performance measurement of manufacturing industries is measured as value added production per employee and on the econometric analysis it is regressed as dependant variable. The independent variable or determinants of value addition per employee are firm size (FS) measured by log value of production level, human capacity level (HUCL) approximated by skilled adjusted wage share of the of the employees, capital intensity level (CIL) measured by the ratio of fixed assets to employees number, ratio of imported to total

consumed raw material (RITCRM), value addition per wage (VDPW) and capacity utilization level (CUL) measured by percentage of capacity utilization.

Accordingly, all variables expect firm size and capacity utilization level are statistically significant at 99% level of significance. However, capacity utilization level is significant only at 90% level of significance while firm size is not significant on this fixed effect regression model. In other words the finding of the fixed effect regression model indicate that human capacity level approximated by skilled adjusted wage share of the of the employees, ratio of imported to total consumed raw material, and value addition per wage are significantly determine the labor productivity of the manufacturing industries at 99% significance level but the determinant effect of capacity utilization on labor productivity of the manufacturing industries is significant only at 90% level of significance. Moreover, capital intensity level, measured by the ratio of fixed assets to employees' number, influence the labor productivity of firms and significant at 99% level of significance despite its impact is very limited.

The output of the model indicates that as the human capacity level of an industry increases by one unit the labor productivity of the firm can increases by 415.8 units. It is obvious that human capital is one of the most factors which can increase the productivity of manufacturing industries. The human capacity measures the skill composition of the labor forces. Skilled labor can achieve 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. Similarly, the value addition per each employee benefit paid has significant effect on labor productivity and the model estimates that when a firm made one unit change on it the productivity can increase by 47.76 units. This is because labor incentive has a multiple effect on the industries productivity improvement.

It was hypothesized that as industries increase the capacity utilization level the labor productivity of the firm gets improved. The result of fixed effect regression indicates similar relationship and as capacity utilization rate increase by one unit then labor productive can increase by 18.11 units even though it is insignificant at 95% significance level but significant only at 90% significance level.

But we can clearly see that capital investment has limited effect on the productivity of manufacturing industries and it increase only 0.0044 units when capital intensity level increase by a unit. This may be because of the classical economic theory stated that in order to have competitive advantage any economy should use abundant resource which will incur less cost that should be human capital rather than fiscal capital for the case of our economy as the government of Ethiopia reputedly announced. In other words the human capital has high determinant power than fiscal capital investment since the labor cost in our country is very low as compared to the latter even if it has also positive effect on the productivity of labor. Solow growth model also claimed that economic growth was mainly driven by technological progress (productivity growth) rather than inputs like capital which is consistent to the result of the model.

However, the ratio of imported to total consumed raw material (RITCRM) has negative impact on the performance of labor productivity and manufacturing industries performance and a one unit increment on the ratio of imported raw material can result a reduction of labor productivity by 74.59 unit. This is mainly because if industries are importing their raw materials from international market, they faced a lot of challenges like shortage of foreign currency and shortage of working capital which will indirectly influence the productions and productivity of manufacturing industries.

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Distribution of the manufacturing industry in Ethiopia is skewed to the central part of Ethiopia (Oromia and Addis Ababa city) and its peripherals for better infrastructural and market access. Out of the 388 manufacturing industries financed DBE, the majority of the manufacturing industries or more than 209 (53.9%) are located in Oromia regional sate and Addis Ababa city.

The classification of manufacturing industries by industrial sub sector also indicates the presence of dominant sub sector in the bank's financial service. Accordingly, the dominant industries are manufacturing of food and beverage and rubber and plastic products. This sub sectors together shared 38.8% of the manufacturing sector financed by the bank. However, there are sub sectors which got less shares of the bank's financial service those have relatively better productivity such as tanning and dressing of leather and paper, paper products and printing with a shares of 0.87% and 1.22% respectively.

The finding on this study show that textile and footwear industries are the most top sub sector in gross value addition by contributing 29.39% and 12.21% of the value addition made by the manufacturing sectors financed by DBE respectively. However, in terms of productivity per labor these industries are among the least performers with a value of 438 and 324 respectively. But the top productive industries based on value added per employee are tanning and dressing of leather, basic iron and steel and paper and paper product manufacturing industries with a value addition of 695, 691 and 665 respectively. Moreover, the least productive industries are chemical and chemical processing and footwear, luggage and handbags industries with a value addition per employee of 271 and 324 respectively. Besides, the growth trend of productivity for the period under consideration also indicates that textiles industry is below the expectation by 2.25% average growth and this rate is the third thinnest growth rate next to chemical and furniture industries which registered a negative average growth rate in the last four years. In addition, tanning and dressing of leather, footwear, luggage and handbags and non-metallic mineral product industry categories have registered incredible growth rate of productivity measured by labor value added with 13.93%, 8.96% and 8.51% respectively.

As per the manufacturing industries survey report of CSA 2015, the sources of raw materials is considered as one major determinant or challenges of manufacturing sector performance measured by the ratio of the cost of imported raw materials to the total cost of all industrial raw materials consumed by manufacturing industries. Accordingly, the data analysis on the manufacturing sectors financed by DBE shows that motor vehicles, trailers & semi-trailer manufacturing industries consumes higher ratio of imported raw materials with a share of 86% followed by machinery and equipment and fabricated metal product manufacturing with 85% and 78% respectively. But the minimum imported raw materials are used by garment and wearing appeals and textile with a share of 26.8% and 24% respectively.

Hypothetically the value addition per employee on textile, garment & wearing appeals and footwear, luggage & handbags industries is assumed to be high but actually it is found below the expectation implies that in this finishing industries the human capital development and innovation in these sectors is not improved. The fixed effect regression model indicates that among the stated determinant factors human capacity level and ratio of imported to total consumed raw materials are significant factors at 99% confidence level but level of capacity utilization has positive relation to labor productivity of firms despite it is insignificant even at 5% level of significance but at 90%.

The result of the model indicates that when human capacity level of an industry increases by one unit the labor productivity of the firm can increases by 415.80 units. It is obvious that human capital is one of the most factors which can increase the productivity of manufacturing industries. Human capacity measures the skill composition of the labor forces. Skilled labor can achieve better productivity performance and in turn expects to receive a significant level of compensation in the form of wages and salaries. The result 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 can feel a sense ownership and create strong motivation for better performance in order 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. Similarly, the value addition per each employee paid benefit has significant effect on labor

productivity and the model estimates that when a firm made one unit change on the benefit of employees' labor productivity can increase by 47.76 units. This is because labor incentive has a multiple effect on the industries productivity improvement.

The model also predicts that capital intensity or better capital investment has positive effect on the labor productivity since it can improve the working effectiveness of each employees but the determinant value on it is limited since labor has lower cost than capital investment in the country verified by Solow growth model claimed that economic growth was mainly driven by technological progress (productivity growth) rather than inputs like capital. In other words the human capital investment has high determinant power than fiscal capital investment since human capital can bring innovation, technological changes and also labor cost in our country is very low as compared to the latter even if it has positive effect on the productivity of labor.

Among the determinants of manufacturing industries performance measured by labor productivity the model result estimates the ratio of imported to total consumed raw material is found to be vital but it has negative impact on the performance of labor productivity and manufacturing industries. Based on the fixed effect regression of the model a one unit increment on the ratio of imported raw material can result a reduction of labor productivity by 74.59 units. This is mainly because if industries are importing their raw materials from international market, they faced a lot of challenges like shortage of foreign currency and shortage of working capital which will indirectly influence the productions and productivity of manufacturing industries.

The result of fixed effect regression also indicates that similar relationship with capacity utilization rate and labor productivity and industries performance and when capacity utilization rate increases by one unit labor productive can increase by 18.11 even though it is insignificant at 5% significance level but significant only at 90% confidence level.

Thus, the fixed effect regression model estimation result confirms that the major determinants of manufacturing industries are absence of skilled manpower, poor wage and benefit package by industrial firms, poor availability of raw material and shortage of working capital and foreign currency manifested by the ratio of imported to total consumed raw material. Based on the model estimation when the ratio of imported to total consumed raw material increase by one unit then the productivity of the industry many reduce by 74.59 units and availability of raw material may hindered the productivity of firm if it come from import which takes a long period of time

because procurement & transportation process and foreign currency shortage. In addition shortage of working capital also affects shortage of raw materials since a firm with poor working capital cannot have sufficient stock to mitigate the shortage of raw materials. However, the model result shows that capital intensity has no significant impact on the performance of manufacturing industries even though it has positive influence on it. Hence, we can say that capital investment may not challenge the performance of manufacturing industries as much as the other factors listed above.

5.2. Recommendation

In line with the above conclusions, the researcher proposes the following major issues to be considered by the concerned bodies, Development Bank of Ethiopia, the Government, the firms and other stakeholders in order to enhance the performance of manufacturing industries and achieve the targets of the government in transforming the country to the domination of secondary economy. These include:

- Most of the manufacturing industries are skewed to the central part of the country in Addis Ababa city and Oromia Region of Finifine Surrounding special zone which resulted in labor migration, non economic computation among industries and addition costs for output distribution to the rest part of the country. Thus, policy makers need to identify industrial zone in all regional states and initiate investors to diversify their investment. This can help to easily utilize the abundant labor forces, raw materials and they can sale their product in the marginalized states of the 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 and central part of the country.
- The sub sector distributions of manufacturing industries financed by DBE are also concentrated in some industrial groups like food and beverage and plastic and rubber product manufacturing. Despite, the bank's financial support to the potential industries like textile, garment and wearing apparels, footwear, luggage and handbags, etc which can use the locally available inputs (such as cotton and leather) and can largely absorb the huge amount of labor forces are not significant. Therefore, the bank should address these potential industrial groups in its financial service to help the industries in particular

and the country in general through achieving better productivity. This can also minimize the risk of portfolio concentration by diversifying the lending sectors of the bank.

- The productivity of manufacturing industries during the period under consideration indicates that the potential industrial groups have been performing below the expectation. Therefore, the firms should improve the employee wage and benefit packages since it is one the main determinant factor for industries performance.
- Manufacturing sectors that can largely use local inputs should be initiated to increase their number, size and productivity since using local raw materials and inputs has significant impact on the performance of manufacturing industries.
- Capacity utilization level, even though significant only at 10% confidence interval, has potential impact to determine manufacturing industries performance. Thus, the bank should strengthen its technical and financial service to improve the capacity utilization level firms financed by the bank.
- The findings of the fixed effect regression model indicated that human capital, ratio of imported to total consumed raw materials and capacity utilization level are the major factors that affect the labor productivity of manufacturing sectors. Therefore, the government should working on human capital development and at the same time industrial firms should improve their employee compensation package. In addition the government and the bank should initiate industries which use intermediate goods available in the local market and firms should improve their capacity utilization level.

In general the fixed effect regression model estimation result confirms that the major determinants of manufacturing industries are absence of skilled manpower, poor wage and benefit package by industrial firms (measured by human capacity level), poor availability of raw materials in the local market, shortage of working capital and foreign currency manifested by the exaggerated ratio of imported to total consumed raw material. Therefore, the government, the bank, industrial firms and other stakeholders should working in alleviating the challenges in related to human capital, raw material availability and capacity utilization level.

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ANNEXES

Annex 1: Summary statistics

```
. xtsum
```

Variable		Mean	Std. Dev.	Min	Max	Observations
year	overall	2014	1.414578	2012	2016	N = 1940
	between		1.581139	2012	2016	n = 5
	within		0	2014	2014	T = 388
company	overall	194.5	112.0345	1	388	N = 1940
	between		0	194.5	194.5	n = 5
	within		112.0345	1	388	T = 388
noes	overall	346.9531	1333.32	5	10568	N = 1940
	between		10.00937	334.8814	360.518	n = 5
	within		1333.29	-8.564948	10565.03	T = 388
tcl	overall	11635.16	38973.35	136.51	288683.9	N = 1940
	between		878.7294	10832.99	12842.9	n = 5
	within		38965.42	-1024.531	289486.1	T = 388
ts	overall	334499.9	773683.8	4617.33	5591463	N = 1940
	between		24201.98	314964.5	370307.2	n = 5
	within		773380.8	-28600.74	5604242	T = 388
tc	overall	267479.4	619051	3688.11	4470737	N = 1940
	between		19651.93	251085.3	296500.7	n = 5
	within		618801.3	-23265.68	4481421	T = 388
fi	overall	94267.41	249966.9	511.43	1968044	N = 1940
	between		11076.76	80555.15	109353.1	n = 5
	within		249770.4	-14454.29	1952959	T = 388
vad	overall	67020.5	154803.7	929.22	1120726	N = 1940
	between		4584.994	62885.3	73806.54	n = 5
	within		154749.4	-5335.056	1122821	T = 388
lnvadpe	overall	446.1734	241.7571	84.4	1174.1	N = 1940
	between		29.1513	413.2618	487.2542	n = 5
	within		240.3462	69.31923	1189.664	T = 388
lnfs	overall	2899.055	7239.38	.12	44391.31	N = 1940
	between		353.9529	2367.236	3318.205	n = 5
	within		7232.451	-418.9698	44193.8	T = 388
lncul	overall	.7197165	.1841518	.19	1.09	N = 1940
	between		.0612255	.6376031	.7940464	n = 5
	within		.1758166	.2486598	1.031856	T = 388
lnvadpw	overall	10.71856	4.953865	3.24	25.9	N = 1940
	between		.1682665	10.45851	10.8866	n = 5
	within		4.951577	3.141294	25.73196	T = 388
lncil	overall	4956.166	5041.218	218.56	37500	N = 1940
	between		606.3886	4243.695	5840.734	n = 5
	within		5011.942	-655.3587	36615.43	T = 388
lnritcrm	overall	.5318711	.209314	.06	.98	N = 1940
	between		.0545505	.4612629	.5973969	n = 5
	within		.2035448	.0321804	.9521804	T = 388
lnhucl	overall	.1194948	.0619583	.04	.31	N = 1940
	between		.0018441	.1175773	.1221134	n = 5
	within		.0619364	.0373814	.3098557	T = 388
ehat	overall	446.1734	225.2267	127.1984	1134.037	N = 1940
	between		8.084433	434.1515	455.5156	n = 5
	within		225.1105	123.4478	1124.695	T = 388

Annex 2: Descriptive statistic results

```
. summarize noes tcl ts tc fi vad lnvadpe lnfs lncul lnvadpw lncil lnritcrm lnhucl
```

Variable	Obs	Mean	Std. Dev.	Min	Max
noes	1940	346.9531	1333.32	5	10568
tcl	1940	11635.16	38973.35	136.51	288683.9
ts	1940	334499.9	773683.8	4617.33	5591463
tc	1940	267479.4	619051	3688.11	4470737
fi	1940	94267.41	249966.9	511.43	1968044
vad	1940	67020.5	154803.7	929.22	1120726
lnvadpe	1940	446.1734	241.7571	84.4	1174.1
lnfs	1940	2899.055	7239.38	.12	44391.31
lncul	1940	.7197165	.1841518	.19	1.09
lnvadpw	1940	10.71856	4.953865	3.24	25.9
lncil	1940	4956.166	5041.218	218.56	37500
lnritcrm	1940	.5318711	.209314	.06	.98
lnhucl	1940	.1194948	.0619583	.04	.31

Annex 3: regression result

```
. xtreg lnvadpe lnfs lncul lnvadpw lncil lnritcrm lnhucl

Random-effects GLS regression                   Number of obs      =      1940
Group variable: year                            Number of groups   =         5

R-sq:  within  = 0.8756                         Obs per group: min =       388
       between = 0.0995                                        avg =     388.0
       overall = 0.8665                                        max =       388

                                                Wald chi2(6)       =  12546.48
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lnvadpe	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnfs	.0000369	.000285	0.13	0.897	-.0005217	.0005955
lncul	18.10624	11.31452	1.60	0.110	-4.069818	40.2823
lnvadpw	47.76026	.9066908	52.68	0.000	45.98317	49.53734
lncil	.0043559	.0004118	10.58	0.000	.0035489	.005163
lnritcrm	-74.5905	10.54785	-7.07	0.000	-95.2639	-53.9171
lnhucl	415.7955	73.08312	5.69	0.000	272.5552	559.0358
_cons	-110.4877	20.94943	-5.27	0.000	-151.5478	-69.42755
sigma_u	0					
sigma_e	84.227528					
rho	0	(fraction of variance due to u_i)				

Annex 4: Multicolinearity Test

```
. vif
```

Variable	VIF	1/VIF
lnhucl	5.08	0.196866
lnvadpw	5.00	0.200078
lnritcrm	1.21	0.828097
lncul	1.08	0.929781
lncil	1.07	0.936744
lnfs	1.05	0.948215
Mean VIF	2.41	

Annex 5:Heteroscedasticity Test

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ratioofnpl

         chi2(1)      =     0.98
         Prob > chi2  =   0.3223
```

Annex6: Hausman test

```
. estimates store fx

. hausman fx rm

Note: the rank of the differenced variance matrix (4) does not equal the number of coefficients being tested (6); be sure
      this is what you expect, or there may be problems computing the test.  Examine the output of your estimators for
      anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.
```

	Coefficients			
	(b) fx	(B) rm	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnfs	.0004283	.0000369	.0003914	.
lncul	-1.241482	18.10624	-19.34773	.
lnvadpw	48.04713	47.76026	.2868692	.
lncil	.0058903	.0043559	.0015343	.000123
lnritcrm	-70.23118	-74.5905	4.359317	.
lnhucl	534.0418	415.7955	118.2463	18.92296

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

           chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =   -44.67    chi2<0 ==> model fitted on these
                                 data fails to meet the asymptotic
                                 assumptions of the Hausman test;
                                 see suest for a generalized test
```

APPENDICES

Appendix 1: List of top 20 manufacturing countries by total value of manufacturing in US dollars for the year 2014

Rank	Country/Region	Millions of $US
	World Total	**12,578,627**
1	China	3,713,300
	European Union	2,566,070
2	United States	2,068,080
	Euro zone	1,946,857
3	Japan	850,902
4	Germany	787,503
5	South Korea	389,582
6	India	321,721
7	Italy	296,611
8	France	283,664
9	United Kingdom	282,675
10	Russia	248,481
11	Brazil	218,799
12	Mexico	216,773
13	Indonesia	186,744
14	Spain	166,594
15	Canada	162,074
16	Switzerland	128,881
17	Turkey	126,365
18	Thailand	112,214
19	Netherlands	95,683
20	Australia	93,461

Source: world Bank report, 2015

Appendix2: Regional distribution of manufacturing industries financed by DBE

Region	Number of Projects	Percentage Share
Tigray	74	19.1%
Oromia	131	33.8%
Amhara	53	13.7%
SNNPR	34	8.8%
AA	78	20.1%
Harari	1	0.3%
D/Dawa	9	2.3%
Afar	2	0.5%
E/Somali	2	0.5%
B/Gumz	4	1.0%
Total	**388**	100%

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report

Appendix 3: Growth trend of value addition of manufacturing sector financed by DBE by each sub sector

Sub Sector	Growth trend of value addition				
	2013	2014	2015	2016	Average
basic iron and steel	4.94%	-25.70%	37.26%	-2.14%	3.59%
chemicals and chemical products	1.05%	-22.28%	2.36%	-5.28%	-6.04%
fabricated metal products	9.94%	7.22%	8.94%	-4.43%	5.42%
food products and beverages	15.52%	4.24%	7.10%	2.44%	7.32%
footwear, luggage and handbags	2.76%	18.63%	9.73%	4.70%	8.96%
furniture	-12.18%	-25.05%	10.84%	13.16%	-3.31%
machinery and equipment	3.76%	13.06%	-5.86%	3.64%	3.65%
motor vehicles, trailers & semi-trailer	18.13%	5.08%	-8.00%	4.49%	4.92%
non-metallic mineral products	23.95%	-3.97%	4.96%	9.11%	8.51%
paper, paper products and printing products	6.59%	24.98%	-5.49%	10.08%	9.04%
rubber and plastic products	-5.12%	23.62%	0.13%	4.83%	5.87%
tanning and dressing of leather	24.82%	1.10%	13.88%	15.91%	13.93%
textiles	-7.73%	-2.99%	11.70%	8.00%	2.25%
wearing apparel	2.79%	13.25%	11.80%	2.00%	7.46%
Total	**-1.38%**	**2.47%**	**7.95%**	**5.32%**	**3.59%**

Source: annual report of DBE for the fiscal year ended June, 2016 and project follow up report