ADDIS ABABA UNIVERSITY
SCHOOL OF GRAGUATE STUDIES

MEASURING TOTAL FACTOR PRODUCTIVITY AND COMPETITIVENESS OF ETHIOPIAN TEXTILE AND GARMENT INDUSTRIES

BY
JEMAL HASSEN MOHAMMED

JULY, 2008

ADDIS ABABA UNIVERSITY
SCHOOL OF GRAGUATE STUDIES

MEASURING TOTAL FACTOR PRODUCTIVITY AND COPETITIVENESS OF ETHIOPIAN TEXTILE AND GARMENT INDUSTRIES

BY
JEMAL HASSEN MOHAMMED

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF THE ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENTS FOR THE DEGREE OF MASTERS OF ARTS IN ECONOMICS (COMPETITION POLICY AND REGULATORY ECONOMICS)

ADDIS ABABA
JULY, 2008

Abstract

This paper analysis the levels of total factor productivity and competitiveness of Ethiopian textile and garment industries in sight from medium and large scale firms over the period 2001-2005. In this regard, textile and garment sub-sector plays an important role in industrialization and economic development. Despite its importance for industrialization, the Ethiopian textile and garment sub-sector has not shown encouraging sign both in terms of productivity and competitiveness. Hence, the general objective of this study aimed at analyzing the level of total factor productivity and competitiveness of Ethiopian textile and garment sub-sector using secondary data from central statistical agency of Ethiopian which covers five years period. The study considered 17 textile and 8 garment sample firms.

In the analysis, the study employed stochastic frontier production function model and unit cost ratio method. The study made use of a computer program frontier version 4.1c and stata version 9 as a tool for analysis. The results of the analysis revealed that the level of total factor productivity and competitiveness capacity of the sub-sector is not good. On average, technical progress, technical efficiency and scale efficiency (economies of scale) declined by -34%, -25% and -1.3% per annum over the study period, respectively. The negative change of these efficiencies resulted in negative total factor productivity growth. So, the contribution of total factor productivity to output growth is found -60.3% per annum. With regard to competitive capacity, all the four digit groups of manufacturing activities in the sub-sector prove to be uncompetitive even in the domestic market.

From this analysis, therefore, it would be probably drawn that the growth of the sub-sector is pulled back by total factor productivity growth & failed to compete both in domestic and international market as a result of increasing trends in technical regress, technical and scale inefficiencies as well as cost ineffectiveness. This is, perhaps, a reflection of firm level weakness with mediocre product design, use of backward machineries, limited international exposure and passive reaction to competitive products. Thus, textile and garment firms ought to family work in addressing their weakness and adjust themselves with the challenges of the changing global environment. Government should also play its supportive role in terms of ensuring fairly competitive domestic market, providing market and technology information, supporting trainings and minimizing transaction costs related to the provision of its services.

Abbreviation

AGOA- Amarican

CD- Cobb Douglass

CNTOAC- China National Textile & Apparel Council

CSA – Central statistical Agency

CTPIC- China Textile Planning Institute of Construction

FDI- Foreign Direct Investment

EEA- Ethiopian Economic Association

EEPRI- Ethiopian Economic Policy Research Institute

EPZ- Export Processing Zone

FOB- Free of Board

GATT- General Agreement for Trade and Tariff

GDP- Gross Domestic Product

GPN- Global Production Networks

GVC- Global Value Chains

GVP- Gross Value of production

IOE- Institute of Economics

LDC- Least Developed Country

LR - Likelihood Ratio

LTA- Long Term Agreement

MOTI- Ministry Of Trade and Industry

MFA- Multi Fiber Agreement

MLE- Maximum Likelihood Estimator

OECD- Organization of Economic Cooperation For Development

OLS- Ordinary Last Square

PLC- Private Limited Company

STA- Short Term Agreement

TFP- Total Factor Productivity

UNCTAD- Unatidnation Cooperation for Trade In Development

UNIDO- Unatdnation Industrial Organization

WEF- World Economic Forum

Acknowledgment

Above all, I praise to the Almighty God (Alah) for giving me endurance to complete all.

It would be impossible to acknowledge adequately all the debts owned to individual. However, particularly I would like to express my heart felt thank to my advisor, Dr.Beyene Tadesse, for his valuable assistance in Material provision and constructive advice in the course of preparing this paper.

I am also greatly indebted to my wife who helped me morally and for her encouragement and willingness to share ideas.

The credit also goes to my friends Ato Belachew Yirsaw and Ato Belachaw Geatchew for their valuable advice, encouragement and willingness to share ideas.

I want to give this opportunity to express my deep gratitude to W/ro Yenenesh Genetu for her moral and material support as wall as encouragement.

List of tables and Figures

Page

Content

Figures and Appendices

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Textile and garment has been an important sub sector as it serves basic human needs by providing cloth and other basic textile needs. It offers employment for masses of the world's peoples, which is estimated to be at least 40 million (Mamo, 2004). Especially, the clothing industry is labour intensive and it offers entry-level jobs of unskilled labour in developed and developing countries. Moreover, it is a sector where relatively modern technology can be adopted even in poor countries at relatively low investment costs. These technological features of the industry have made it suitable as the first rung on the industrialization ladder in poor countries, some of which in particular in Asia, have experienced a very high output growth rate in the sector (Nordas, 2004).

- Textile and garment industries have also been known to kick tart industrialization in many developing economies. They have been known for providing the impetus for transforming strategic industrial policies of import substitution to export promotion. These industries have the potential to give a return around to stagnant industrial atmosphere if opportunities are rightly exploited. Furthermore, these are industries in which developing countries have a clear comparative advantage and potential to benefit from growing trade [UNCTAD, 2004].

The history of modern textile industry in Ethiopia goes back to the late 1930's with the establishment of the first textile factory, Dire Dawa Textile. Join venture investments with Italian, Japanese, Indian and British companies were instrumental in the early development of the textile industry [Mulat, et.al., 2004:40].

The development of the modern textile sub-sector has made historical contribution to satisfying domestic needs of fabrics, generating employment opportunities and promoting national economic development in addition to establish the basic foundation for manufacturing industry in Ethiopia. At the same time the textile sub-sectors' product export has earned large sum of foreign currency for the country [CTPIC, 2003/04:118].

The same source revealed that the textile sector established the foundation of the garment sub-sector, promoted its development and made contribution to meet the demand for fabrics from garment factories. In terms of fabrics for working wears, uniforms and other garments, local textile enterprises have always been the major suppliers.

Ethiopian textile and garment sub-sector is the third largest manufacturing industry, only later than the food processing and beverage and leather industry. It comprises large number of state-owned enterprises and growing number of private sector participants that have flourished recently. According to the central statistical Agency (2007) data, recently, there are 73 medium and large scale sized firms of which 42 are textiles manufacturers and 31 are wearing apparel producers. The firms in the sub-sector are engaged in weaving, spinning, knitting and dyeing, finishing, cutting and sewing. The distribution of large and medium scale textile and garment by regional state as well as public and private enterprises shows a concentration in Addis Ababa in number (CSA, 2007).

The sub-sector contributes to the Ethiopian economy in terms of Gross-Domestic product (CDP), employment, and foreign exchange earnings. According to UNIDO Industrial Statistics (2007), textile and garment industry accounted for 9.58% of gross-value of production, 25.25% of employment and 19.24% of wages and salaries of the total manufacturing sector for the year 2004.

However, the least developed, traditional Ethiopian economy, the contribution of industry particularly, textile and garment industry to the overall GDP, is one of the lowest in the world, assign post of its least industrialized economic structure overall.

In this regard, the Ethiopian textile and garment industry has remained uncompetitive both in domestic and world market. The sub-sector is characterized by low level of productivity growth, which results a stagnant value added.

For any economy, sustained industrial growth particularly the resource endowment based industrial growth has a great role to compete both in domestic and international market. Thus, analyzing the level of productivity and competitiveness thereby identifying the major factors influencing them will be a paramount importance for designing and implementing reform packages to develop the sub sector.

Therefore, this study is intended to analyze the productivity and competitiveness of Ethiopian textile and garment sub-sector thereby bridge the gaps on previous works done by Getnet and admit (2005), Swamy and Panda (2005), Kebede (2006), and Endalkachew (2006).

1.2. Statement of the Problem

Textile and garment sub-sector plays an important role in supporting and sustaining human life around the glob (Dickerson, 1999). Consumptions of the products of the sub-sector are central themes of the survival and development of Mankind (MOTI, 2003). Hence, textile and garment industries are known as evergreen industries as they will last ever since there is a need for clothing.

Moreover, the textile and garment sub-sector can play an important role in a nation’s economic development, especially in least developed countries, like Ethiopia. Experience of money countries, particularly of the Asian continent, revealed that textile and garment industries have made a considerable contribution as the base for industrial development and source of employment creation, income generation and export earnings.

Both in domestic and international aspects, Ethiopia has fine development opportunity and huge potential in developing a textile and garment sub-sector. However, the sub-sector has not made significant headway, let alone lays a basis for rapid industrialization. It is still on the lower progress. Despite the presence of national and global opportunities like advantages in market entry (AGOA, Cotton Agreement, COMESA), international sub-sector relocation and recent government support and priority, there are indications that the performance of the sub-sector is showing fluctuation and remain unsatisfactory [CTPIC, 2003/04:142].

At the same time, compared with other nations in Southern Africa, which enjoyed fast development in textile and garment sub-sector such as Kenya, Lesotho etc, Ethiopian development is insignificant (Ibid).

The extent of intra and inter- sectorial linkages seems to be insignificant. A Feasibility study conducted by Mulat and others (2003/04) on Ethiopia cotton sector put the linkage situation as:

> *The linkage between the several manufacturing stages in the cotton-textile-garment processing chain are not strong. The*

working condition between textile mills and garment is so loose that, for instance, a request for fabrics by the latter is not answered promptly by the former. The textile mills, though comparatively large, have also failed to flexibly meet the demands of small and medium garment factories in terms of right to size, width and color.

The textile and garment sub-sector has focused mainly on the domestic market for a long time, which was very much limitation on scale and scope of its development. The study, conducted by CTPIC [2003/04] on the Ethiopian textile sector also stated that.

Having been isolated from international market for a long period of time, enterprises in the sub-sector are unable to follow the demand and trend of international textile market, because they lack information. nor do they know to keep up with international textile market. To compete for export market, the enterprises' marketing and management ability, product validity, structure and quality level, will all meet tremendous challenges.

The domestic and international competitiveness of Ethiopian textile and garment sub-sector has not been satisfactory. According to the study conducted by Getnet and Admit (2005), the textile and garment industry prove to be uncompetitive both in domestic and international market as measured by unit cost ratio. The weak competitiveness in both domestic and international market has attributed by low level of productivity and under capacity utilization of the sub-sector. With this respect, a study report conducted by Ethiopian Economic Association (2004) on industrialization and industrial policy in Ethiopia revealed that from a total number of textile and fabric products producing firms, 55 enterprises were operating above 70 percent capacity in 1998/1999. The figure declined to 13 enterprises only operating with the same capacity in 2000/2002.

The above state of affaires of textile and garment sector would be due to policy and operational problems that requires a detail investigation at firm level. This situation calls for a solution by considering the realistic and current conditions of the sub-sector at firm level through empirically analyzing their total factor productivity (TFP) and competitiveness, which the theme of this study basically focuses upon.

Therefore, this paper is aimed to analyze the TFP and competitiveness of Ethiopian textile and garment sub sector in light of the following problem questions.

- How could we measure the levels of productivity and competitiveness of firms in garment and textile sub-sector?
- What is the current level of TFP and competitiveness of the enterprises in the sub-sector?

- What factors could affect productivity and competitiveness of enterprises in the textile and garment sub-sector?
- What will be done to improve productivity and promote competitiveness of the sub-sector?

1.3. Objectives of the Study

The main objective of the study is to analyze the levels of TFP and competitiveness of the Ethiopian textile and garment sub-sector in sight from medium and large-scale firms.

An attempt is made to use quantitative methods on secondary data sets and analyze the results in light of the factors affecting productivity and competitiveness.

Based on the general objective stated above the study focuses on the following specific objectives.

- Review the structure and dynamics of the sub-sector in light of the experiences of successful countries.
- Examine the role of the sub-sector in terms of employment creation, gross value of production and foreign exchange earnings.
- Assess the sub-sector's potential and strategic importance for the industrial development of the country.
- Empirically evaluate the levels of firms' TFP and competitiveness, using stochastic frontier production function and unit cost ratio.

- Identify operational and policy related problems that the sub-sector faced and recommend policy options for future development.
- Provide full information of total factor productivity and competitiveness of Ethiopian textile and garment sub-sector for the readers of this study.

1.4. Hypothesis of the Study

On the basis of the objectives, the following hypothesis is tested.

- In terms of technical efficiency and profitability, there is a significance difference between state owned and privately owned textile and garment enterprises.
- The Ethiopian large-scale textile and garment industries are capital consuming and labor saving contrary to the theory of initial factor endowment of the country.
- Ethiopian textile and garment firms are uncompetitive both in domestic and international market.
- Firms with low TFP are those with low domestic and international competitiveness indicators.

1.5. Significance of the Study

The ultimate goal of this study is to evaluate firms' TFP and competitiveness and forward policy options that will assist the Ethiopian government in adopting trade and industrial policies favorable to the development of the sub-sector and to assist Ethiopian textile and garment producers in facing the challenges and seizing the opportunities of trade liberalization. Moreover, the study will provide the necessary information for planners and policy makers to understand the prevailing situation of the sub-sector and take appropriate measures to solve operational and policy problems that hindered productivity and competitiveness of the same. It could also be used to other interested researchers for reference.

1.6. Research Design and Methodology

1.6.1. Methodology

With a view to address its objectivities, the study follows both descriptive and analytical approach. The analytical approach deploys quantitative techniques known as Stochastic Frontier Production Function Approach. It is used to measure total factor productivity (TFP) by decomposing it into change in technical efficiency (ΔTI), Technological Progress (ΔTP) and change in scale efficiency /economies (ΔSE) using a frontier software version 4.1c. The Stochastic Frontier Production Function adopted in this study follow s from Battese and Coelli (1992). This model has been selected because it allows a time variable to be included in the deterministic kernel of Stochastic production to incorporate the effect of technological changes. The model permits the relative technical efficiency of a firm to vary over time. It also captures two types of errors, the conventional random component (white noise), and errors due to the effect of inefficiency as the source of the deviation from the frontier (Battese and Coelli, 1992; cited in Beyene, 2007)

Moreover, certain ratio analysis including unit cost ratios are employed to measure domestic and international competitiveness of firms in the sub-sector in question..

Relevant statistical and econometrics packages such as STATA and SPSS are used to compute elasticities, marginal effects and variability measures.

1.6.2. Types and Sources of Data

As the study relies on a quantitative data type, secondary sources are used. Accordingly, the sources of data conducted are:-

- Quantitative data are collected from Secondary Sources, including ministry of trade and industry (MOTI), CSA of Ethiopia, Ethiopian Investment Commission, EEA/EEPRI, Ethiopian Customs Authority, PPESA, etc.
- Authentic and relevant literatures on the topic are reviewed. The literatures include books, proceedings, journals, working papers, directives and guidelines, regulations and other published and unpublished materials.

1.6.3. Sampling Population and Selection Technique

There are 73 textile and garment firms, both of which are a combination of large and medium scale firms (CSA, 2007). From the total of 73 textile and garment firms, 17 textile 8 garment totally 25 sample firms are included. The firms are selected by considering the data completeness and keeping the balance across the firms and years of observation. The sample firms include both private and state owned firms.

1.6.4. Data Gathering Tools

Raw data for the study are taken from CSA data base in soft copy. Data screening, filtering and grouping is made using SPSS Statistical package.

1.6.5. Data Analysis

After the completion of data screening and filtering, the process of tabulation ha been carried out to makes the data orderly and easier for presentation. After tabulation the data is analyzed and interpreted with using statistical and econometric tools.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature: Concepts & Methods of Measurement

2.1.1 Definition and Concepts of Competitiveness

The concept of competitiveness is frequently used by a wide range of people including economists, politicians and business leaders, however, there is little agreement about the precise *meaning of competitiveness* and it is common in practice that various people use the same word to express quite different things.

Although the majority of authors define competitiveness in a microeconomic Sense (Siggele, Ikiara & Ngarada, 2000), in recent years, there have been a growing number of studies that extend the meaning to entire economies (World Economic Forum 1995; Porter 1990) to capture the fact that some economies consistently outperform others in terms of economic growth, export expansion and increased well-being

Other authors define competitiveness as a nation's ability to produce and market a product in international trade while earning a level of return to the resources used. This level of return to the resources is comparable to what these resources could earn in alternative activities (i.e. opportunity cost). This is similar to the Domestic Resource Cost (DRC) concept, which is estimated as the ratio of economic value of factor of production used in production to economic value of output minus value of tradable inputs.

The DRC, thus represents the value of domestic resource spent in order to gain or save a unit of foreign exchange. But, as Salinger (2001; cited in Getnet & Admit, 2006) pointed out, such a calculation is based on assumptions which are out dated. The assumptions are

- There are no economies of scale
- Technologies are everywhere identical Productions are undifferentiated
- The pool of national factors is fixed
- Skilled or high quality factors are not tradable

The competitiveness policy guide in the United States defines competitiveness as:

"the ability to produce goods and services that meet the test of international markets while our citizens can earn a standard of living that is both raising and sustainable over the long run ." This definition, however, is specific to particular production area that may be appropriate for the US production firms.

The World Economic Forum (WEF, 2000) approached competitiveness through its world competitiveness report, in terms of economy wide business environment. Here, competitiveness is measured through a weighted index that includes different items , namely political, and economic stability, openness to trade and investment, legal and institutional enabling environment, financial infrastructure. Such a measure, as argued by Getnet & Admit (2006), however, does not allow for evaluating single industry or firm specific capability differences as it is used in a narrow sense to compare economic conditions across national plat form. Moreover, it heavily depends upon subjective judgment.

Another strand of economic literatures including Samar (2002) define competitiveness as:

" **Competitiveness is about productivity, which in turn is a function of factors related to cost of products as well as those related to non- price factors delivery schedules , reliability of producers and such intangible factors like images of the country and brand quality. Together they define the competitive sinew of a product to compete under conditions of free market."** Under these definitions, however, in order to translate industry or firm level Competitiveness, another set of issues in addition to productivity need to be examined. These relate market access conditions some of which are difficult to measure.

There are different strands of economic theory that are devoted to the issue of competitiveness:

a) Producer theory of Competitiveness: Producer theory of competitiveness states that ".....it is a firm's derive to maximize profits subject to the technical constraints of their production function that determines the amount of its sells and, consequently, its competitiveness". The main idea in the producer theory is that once a firm is competitive, it should first and for most maximize its profit and it asserted that profit could be a good indicator for a firm's or industry's competitiveness (Varian,1992; Cited in Cockburn, 1998). Arguments to this point states that "As long as profitable opportunities exist, firms and industries will increase their production and sales." Thus the existence of profit suggests a firm or an industry with increasing competitiveness (capacity to sell profitably) just as losses suggest falling competitiveness. Producer theory goes to explain that to make profits and thus expand sales, firms must be able to bring unit costs below market determined prices. Costs are thus, fundamental determinants of competitiveness

b) Productivity Differential Theory of Competitiveness

Under this theory, it is believed that productivity differentials are one of the sources of competitiveness. Productivity differentials are used at the industry and firm levels in order to analyze the so called technical and allocative efficiencies. However, this literature limits it self to assessing these inefficiencies without linking them to more general question of evaluating competitiveness and the role of its other determinants.

c) Comparative Advantage: A firm's competitiveness is determined by its costs at market rather than shadow prices as these are the prices consumers and producers face. By isolating the respective roles that the underling features of comparative advantage (measured at shadow prices) and the price distortions play both firm performance and the impact of government policies and market failures can be analyzed. This distortion analysis is inspired by yet another strand of empirical trade literature: protection and incentive analysis. This vast literature is devoted primarily to calculating price distortions and their impacts on the sales, prices and input cost of firms (Cockburn, et. al., 1998)

d) Cost based and Qualitative Theory of competitiveness: In a cost-based analysis, competitiveness is understood in a narrow sense and evaluated by the firm's ability to sell its product in a given market in a sustainable manner. The requirement of sustainability means that the production is profitable, i.e., the revenue received can cover all the costs with all factors and inputs being paid at their opportunity costs. At the firm level, producers are deemed to be competitive if their production costs per physical unit of output are not higher than those of their competitors in a given market. If unit costs are expressed in *monetary* unit of production (total costs divided by total production value), producers are profit making and competitive in the market place if their unit costs do not exceed the unity (IOE, 2001)

It should be stressed again that the concept of cost competitiveness ignores some very important aspects of the firm's ability to compete in the market place. One of those dimensions of competitiveness that is ignored is the firm's ability to make right strategic decisions to translate cost advantages into sustained market share, either domestically or on the international market. This is often called "**qualitative competitiveness**" and has to be analyzed. However, analysis of cost-based competitiveness is a good starting point in evaluation of the firm's overall competitiveness. The concept of cost-based competitiveness is applicable to analysis of the firm's competitiveness at both the domestic and international levels. International competitiveness is of particular importance when markets are open or being opened to international competition, such as in the case under trade liberalization

Though divers are the theories of competitiveness emanated from its vast definitions, this study focuses the micro economic versions of the concept, in particular cost-based competitiveness integrating with productivity differentials. By integrating and modeling production function explicitly, it would be better able to distinguish technical progress scale efficiency, and technical efficiency /inefficiencies which each will lead to different recommendations concerning policy reform and areas of improvement in firms performance.

2.1.2 Methods of Measuring Competitiveness

There are various measures of competitiveness. The common measure of competitiveness used by many researchers is unit cost(UC)- defined as total cost (TC) divided by the value of output (VO), which in turn equals output quantity times the x-factory price (Cockburn et al. 1998; Siggel and

Ssemogerere, 1999; and Siggel, Ikara and Nganda,2000). The UC approach rests upon comparing the cost structure of local firms with those of their competitors to determine their competitiveness. This is in line with the neo-classical firm theory. Firms always drive to maximize profits subject to technological and resource constraints. As long as profitable opportunities exist, firm will increase their production and sales. Making profits and expanding sales require firms to bring the unit cost below market (or marginal cost blow marginal revenue). Costs are, thus, the fundamental determinants of competitiveness. Competitiveness of local firms is therefore, defined by a cost advantage over foreign competitors, namely unit cost of local firms should at least be equal to that of their foreign competitors. Symbolically, this can be put as:

$$\mathbf{UC \leq UC_F} \quad \ldots\ldots \quad \mathbf{(1)}$$

Where F represents the foreign competitor and UC represents unit cost, which is total production cost (TC) per physical unit of production. This leads us to

$$\mathbf{UC = TC/Q} \quad \ldots\ldots \quad \mathbf{(2)}$$

Where Q = quantity produced. Since firms produce products of different quality, such physical unit comparisons among firms might be unreasonable. As long as consumers value quality through price, equation (2) can be transformed into:

$$\mathbf{UC = TC/PQ} \quad \ldots\ldots \quad \mathbf{(3)}$$

Where P represents market price. Now, unit cost takes a monetary form that allows comparison across firms. Hence, the indicator of competitiveness-the unit cost ratio-is defined as total cost divided by the value of output.

Such a comparison will require information on the cost structure and output of both local firms and their international competitors, which is highly data demanding. One way out from such a difficulty would be to impose the assumption of long-run behavior of free entry and exit of firms and the free interplay of market forces, firms are supposed to operate at or near zero profit in order to survive. Employing the same principle, a typical international best practice competitor is assumed to sell at cost, implying that TC = PQ. Therefore,

$$\mathbf{UC_F = TC/PQ = 1} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad \mathbf{(4)}$$

Thus, the unit cost of this typical best practice international producer corresponds to the international price. As a result, the indicator of competitiveness will reduce to:

$$\mathbf{UC \leq 1} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad \mathbf{(5)}$$

Such a formulation of the competitiveness indicator will have two advantages: the usual difficulty of making inter-firm comparison due to product mix and quality differences will be eliminated,

such an indicator will become free of actual comparison with foreign firms, which otherwise would require looking for data on an international competitor.

If UC<1, the firm in question produces at a lower cost than its competitors and is thus more competitive. A unit cost inferior to one indicates that the firm is making profit. Since total cost includes the opportunity cost of capital, a firm may earn a positive rate of return and still show up as uncompetitive if its rate of return is lower than the lending rate. Competitiveness in this sense, therefore, means hat the price covers all costs including the full opportunity cost of capital, and is a long-run analysis.

There are different types of indicators to measure competitiveness. These are indicators of domestic competitiveness, indicators of international competitiveness, and indicators of comparative advantage. Their basic difference mainly rests upon the evaluation. While domestic competitiveness denotes the situation of cost advantage under protection, international competitiveness reflects the situation at free trade prices while that of comparative advantage relates to shadow price conditions (competitiveness measured in the absence of price distortions). Competitiveness, domestic and international, is measured in terms of market prices while comparative advantage is measured in terms of shadow prices (economic opportunity costs) net of all price distortions. Domestic competitiveness reflects financial profitability at domestic, protected, distorted prices. International competitiveness is the financial profitability at international output prices. Comparative advantage is economic profitability at shadow prices. In order to measure comparative advantage, one has to replace all prices, output as well as all inputs, by shadow prices (Getnet & Admit, 2006)

Symbolically, an indicator of domestic competitiveness can be expressed as:

$$US_D = TC/P_DQ \leq 1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Where, D represents domestic competitiveness and P_D represents domestic (protected) prices which usually refer to ex- factory prices for domestic sales and boarder prices for exports. The domestic price of output is assumed to depend on boarder prices of equivalent imports, implicit nominal rate of protection and monopoly power. In the absence of qualitative restrictions and monopoly power, the domestic output price is affected only by the nominal rate of protection. And in the absence of the above, nominal rate of protection is normally equal to the tariff levied. When contraband, under-invoicing, and dumping are significant, however, this setting will be jeopardized. In this setting, domestic prices could be less than boarder prices, local industries no more enjoying the tariff protection.

In the same way, indicator of international competitiveness (or indicator of export advantage will be:

$$UC_X = TC/P_WQ \leq 1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

Where X represents indicator of export advantage and Pw is the international price

The comparative advantage criterion can similarly be expressed as:

$$UC_S = TC_S/P_SQ \leq 1 \quad \text{..} \quad (8)$$

Where TCs is total cost in shadow prices and Ps is the shadow prices of output which is usually equal to the international price adjusted for any distortions in the exchange rate. Total cost at shadow prices is the sum of all cost components adjusted for all price distortions and subsidies.

For domestic sales the ex-factory price is the domestic market price (Pd), which is typically higher than the international price of a similar imported product by a margin equal to the nominal rate of protection. For export sales, on the other hand, the ex-factory price is equal to the international (fob) price (Pw).

There are a number of advantages in using monetary unit of production for calculating unit costs. First, it helps to overcome the differences in product mix and quality that make inter-firm comparisons always problematic. It is assumed that the output price is usually proportionate to the quality attributes of products. Second, such a measure allows evaluating international competitiveness of the firm without the need to look at a particular foreign market where the firm's product goes. As such, this concept of cost competitiveness is multilateral, without the need to identifying the firm's competitors, as opposed to a bilateral firm-to-firm or country-to-country comparison, which is often problematic due to the lack of reliable and sufficiently detailed data.

As already mentioned, the firm is considered to be competitive if its monetary unit cost is lower than or equal to 1. Since total cost includes the opportunity cost of capital, it exceeds one if the rate of return is lower than the interest rate, and it is less than the unity if the rate of return is higher. The difference between unit cost and the unity therefore presents *pure* profit in case unit cost is smaller than 1. This measure of competitiveness thus reflects the profitability of the firm and the concept of cost competitiveness has another name of *unit profitability*. The lower the unit cost, the greater the scope for firms to expand and/or to cope with unfavorable external shocks and in this sense, lower unit cost may be considered as a sign of higher level of competitiveness. Comparison of unit costs across firms may therefore provide useful information about relative competitiveness of individual firms or a group of firm's vis-à-vis others. It should be noted that if two firms A and B have unit costs that are both smaller than 1, but unit cost of firm A is greater than that of firm B, one should conclude that both firms are profit-making, but firm B is more competitive than firm A in a sense that B has greater scope to expand and/or to react to external shocks, and therefore is likely to have better chance to increase its relative share in the market place vis-à-vis firm A.

2.1.3 Definitions and Concepts of Productivity

The fundamental determinant of firms' competitiveness is the level and rate of growth of productivity of factors which are largely influenced by aspects internal to the firm. Factor productivity is an important component of industrial growth and development. It comprises many aspects. So, different economists have defined it in different ways. For instance, Solomon Fabricant (1959) defines it as "a measure of efficiency with which the nation's resources are transferred to the consumption, investment and other goods that satisfy individual or collective wants". According to Kendrick (1969) and OECD (2001), Productivity is commonly defined as the ratio of a volume of measure of output to a volume of measure of input use. While there is no disagreement to this general notion, a look at the productivity literature and its various applications reveals very quickly that there is neither a unique purpose, nor a single measure of productivity (OECD, 2001)

2.1.4 Types of Productivity Measures

There` are many different productivity measures, the choice between them depends on the purpose of productivity measurement and, in many instances, on the availability of data. Broadly speaking, productivity measures can be classified as a single factor productivity measures (relating a measure of output to a single measure of inputs) or total factor productivity measures (relating to measure of output to a bundle of inputs). Another definition, of particular relevance at the industry or firm level is between productivity measures that relate some measures of gross output to one or several inputs and those which use a value added concept to capture movements of output (Ibid, 2001).

However, the idea behind measuring productivity is how best the inputs such as labour, capital, and raw material are utilized to produce certain levels of output or how efficiently these inputs are utilized over a period of time (Swamy and Padma, 2005). So, the preferred measure of productivity is total factor productivity (TFP). TFP is defined as the ratio of quantity index of gross output to quantity index of combined input (OECD, 2001; Bart, 2004; Susan et al., 2004; and Beyene, 2007). It is the best and robust measure of gains in productivity. It can be also technically explained as the combined effect of changes in technological progress and technical efficiency (Beyene, 2007).

There are generally two measure approaches to measuring TFP:

I) The deterministic approach: The deterministic approach may in turn be broken down into the index number approach and the growth accounting approach where the former does not require any explicit specification of production function while the latter requires.

II) The Stochastic Frontier Production Function Approach

The stochastic frontier production function approach was first developed by Farell (1957), and has been expanded by Aigner, Lovell and Schmidt (1977); Meeusen and Van den Broeck (1977), and Battese and Coelli (1992), involves unobservable random variable associated with the technical inefficiency of production of individual firms in addition to the random error in deterministic stochastic frontier (Battese and Coelli, 1992). A frontier production function has increasingly been used as a methodological tool. The basic concept behind this model is that it is originated from "best practice" techniques and captures two types of error, the conventional random component (white Noise), and errors due to the effects of inefficiency as the source of the deviation from the frontier (Battese and Coelli, 1992; Cited in Beyene, 2007). As it also allows observation to fall above the production function, the model is less sensitive to the influence of outliers on the technical inefficiency estimate. Therefore, it is more closely related to the theoretical definition of production function which relates to the maximum attainable output from a given sets of inputs (Beyene, 2007). Moreover, the presence of the variable which captures a firms inefficiency solve the bounded-range problem encountered in frontier model and the presence of the statistical noise allows the frontier to be stochastic (Daniel, 2005)

The major distinguishing feature of the stochastic frontier production function approach to the growth of accounting methods is the assumption regarding the existence of an unobservable production function. This function corresponds to the set-off maximum attainable output levels for a given combination of inputs. According to Chyi and Wang (1994), for each firm, this frontier or best practice production function can be represented as:

$$\mathbf{Q_t^F = f[X_t, t]} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [9]$$

Where Q_t^F is the potential output level on along the frontier production function at any particular time t, and X_t is the vector of factor inputs. From equation (9), any actual or observed output can be expressed as:

$$\mathbf{Q_t = Q_t^F .exp(U_t) = f(f[X_t, t].exp(U_t)} \ldots\ldots\ldots\ldots\ldots\ldots [10]$$

Where $Ut \leq 0$ and $\exp(U_t)$ (with $0 < \exp(U_t) \leq 1$) is the level of technical efficiency at the observed output Q_t. The variable U_t represents the combined effects of various non-price and organizational factors which constrain the industry or firm from obtaining its maximum possible output Q_t^F (Caesar, et al., 1995)

When there are no socio-economic constraints affecting the industry/firm, U_t takes the value of zero. On the other hand, when the industry faces constraints, U_t takes the value of less than zero. The actual value of U_t depends on the extent to which the firm is affected by the constraints. Thus, a measure of technical efficiency of the i^{th} industry can be defined as:

$$\mathbf{Exp(U_t) = Q_t / Q_t^F} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [11]$$

Equation (11) is the basic model used for measuring technical efficiency Taking the derivatives of the logarithm of equation (10) with respect to time yields:

$$Q\mathbf{/Qt = f\cdot_x (X/X_t)\cdot f_t + (U_t)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [12]$$

Where f_x and f_t denote output elasticity's of $f(X_t, t)$ with respect to input X and time t, respectively.

The variables with dots indicate time derivatives. Thus, equation (12) shows that output growth can be decomposed into three main components :

I) The growth of input weighted by their respective output elasticities (economies of scale)

II) The rate of out put shift of the best practice frontier function (which also indicates technological progress) &

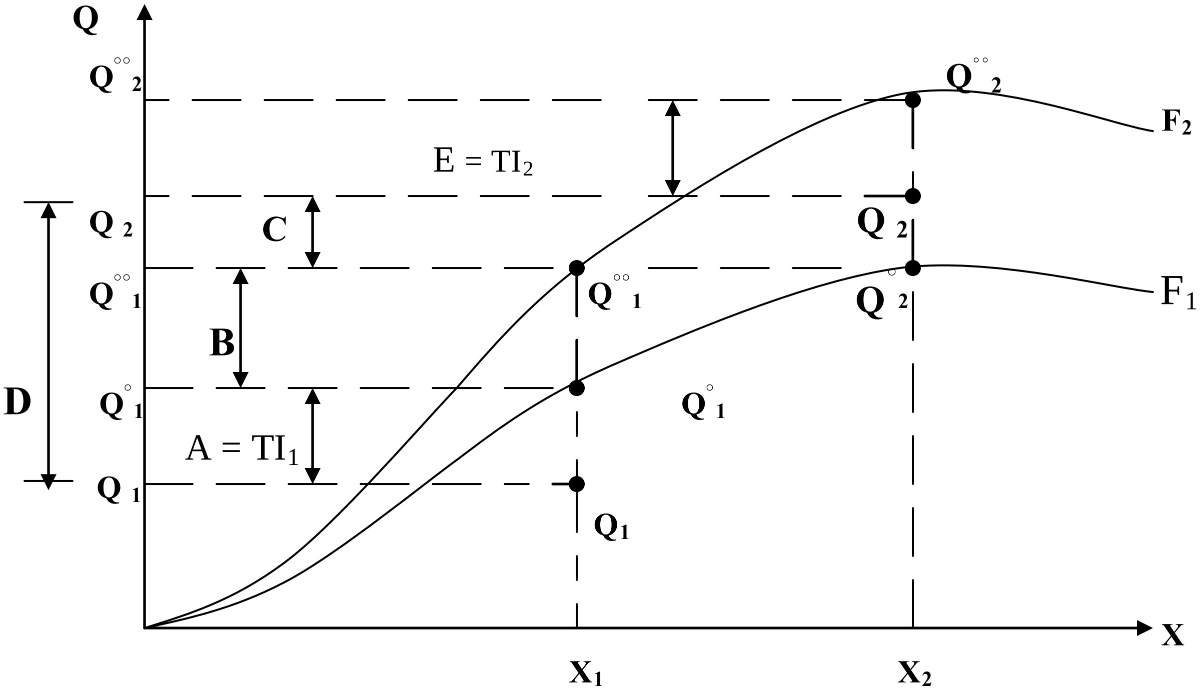
III) The change in the level of technical efficiency at time t. Thus, the total factor productivity growth of industry j at time t is:

$$\mathbf{TFP_{jt} = Q_j / Q_{jt} - f_x \cdot (X_j / X_{jt}) = f_{jt} + (U_{jt})} \text{ .... } \quad \mathbf{[13]}$$

Thus, TFP growth is the sum of technological progress and change in technical efficiency.

On the basis of the literature by Kalirajan, Obwona and Zhao (1994), the methodology for estimating the impact of changes due to the economic and institutional reforms on productivity (technological and productivity changes) and then on output growth is shown graphically in figure (1) below:

Figure 1:
Decomposition of Output growth into Technical Efficiency change, Technical change and Input change



The firm faces two production frontiers in periods 1&2; F_1 and F_2, respectively. If the firm is technically efficient, output would be $Q_1\cdot$ in period 1and $Q_2\cdot\cdot$ in period 2. However, the firm's realized output is Q_1 in period 1 and Q_2 in period 2, owing to technical inefficiency (TI). TI is measured by the distance between the frontier output and the realized output of a given industry, i.e., TI_1 in period 1 and TI_2 in period 2. Therefore, the change in technical efficiency over time is the difference between TI_1 and TI_2. On the other hand, technical change or technological progress, is measured by the distance between F2 & F1, i.e., $Q_2\cdot\cdot$**-** $Q_2\cdot$ (using x_2 input levels) **or** $Q_1\cdot\cdot$ - $Q_1\cdot$ (using x_1 input levels)

The total output growth of the firm using this framework can be decomposed into input growth technical change (technological progress) and Technical efficiency change.

Based on figure 1, the decomposition is:

$$\mathbf{D = Q2 - Q1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \mathbf{[14]}$$

$$= \mathbf{A + B + C}$$

$$= \mathbf{Q_1\cdot - Q_1 + (Q_1\cdot\cdot - Q_1\cdot) + (Q_2 - Q_1\cdot\cdot)}$$

$$= \mathbf{(Q_1\cdot - Q_1) + (Q_1\cdot\cdot - Q_1\cdot) - (Q_2 - Q_1\cdot\cdot) + (Q_2\cdot\cdot - Q_2\cdot\cdot)}$$

$$= \mathbf{[\,(Q_1\cdot - Q_1) + (Q_1\cdot\cdot - Q_1\cdot) - (Q_2\cdot\cdot - Q_2) + (Q_2\cdot\cdot - Q_1\cdot\cdot)}$$

$$= \mathbf{[(Q_1\cdot - Q_1) - (Q_2\cdot\cdot - Q_2)] + (Q_1\cdot\cdot - Q_1\cdot) + (Q_2\cdot\cdot - Q_1\cdot\cdot)}$$

$$= \mathbf{(TI_1 - TI_2) + \Delta TC + \Delta Qx}$$

Where $Q_2 - Q_1$ = production output growth

$TI_1 - TI_2$ = technical efficiency change

ΔTC = Technical change or Technological progress

ΔQx = Change in output production due to factor input growth

From equation (14) TFP growth consisting of changes in technical efficiency over time and shifts in technology over time can be measured by

$$\mathbf{TFP = (TI_1 - TI_2) + \Delta TC \quad \ldots\ldots\ldots\ldots \quad [15]}$$

It is clear from these equations that the technical change captures shifts in the frontier technology (Caesar, et al., 1995).

The distinction between technical progress and technical efficiency has very important policy implications. For a given technology, it may be interesting to know whether the gap between the "best practice" technologies and realized production function is diminishing or widening over time. Technical efficiency change can be substantial and may outweigh gains from technical progress itself. It is, therefore, important to know how far a firm is off its frontier at any point in time and how quickly it can reach the frontier. For instance, in the case of developing economies which borrow technology extensively from abroad, failure to acquire and adopt new technology will be reflected in the lack of shift in the frontier over time. The movement of the frontier over time reflects the success of explicit policies to facilitate the acquisition of new technologies. Similarly, changes in technical efficiency over time and across individual firms will indicate the success or failure of a number of important industrial or agricultural policies (Kalirajan, Obwona and Zhao, 1994).

On the other hand, technological change leads to a shift in the production frontier, and derives primarily from investment in research and then adoption of improved varieties and practices the magnitude and direction of change in TE and technology, therefore, determine the level of TFP. Thus, a flexible model like this is to be recommended for a sector that is relatively unstable and is in the process of transformation (for instance industry in developing countries where productivity of inputs s expected to change over time owing to expected technological and efficiency changes).

2.1.5 Determinants of Productivity and Competitiveness

Domestic and international competitiveness of an industry (or a firm) is influenced by mutually reinforcing internal and external factors. External factors, those beyond the direct control of firms or industries have to do with the production environment. Such Factors include government policies and incentives within which enterprises operate. These are macro-economic and sectoral policies, legal and regulatory measures, trade and investment specific incentives, etc. Specifically they include, inter alia, tariffs, taxes, subsidies, foreign exchange rate and allocation system, pricing policy, state monopoly, licensing. etc. The level and stage of development of a country, including availability of infrastructure , and demand conditions, supply of export support services, and the nature of international trading regime (international trade laws and regulations) are also part of external factors that affect transaction costs hence competitiveness (Berhanu & Kibre,2002; Cited in EEA, 2003/04). These factors significantly affect the competitive statues of industries. In fact, recent studies about the process of industrialization based on experiences in South East Asian countries or the lack of competitiveness of the African manufacturing sector emphasize the role of deliberate strategic interventions by the state through subsidies and the like (Rodrik, 1999; Cited in EEA, 2003/04) or other policy variables such as real, exchange rate misalignment (Elbadwi, 1999), or factors affecting transaction costs (Collier, 1997), as the most crucial determinants of industrialization and international competitiveness.

On the other hand, factors within the direct reach of enterprises basically determine the physical productivity level, and hence, the unit cost of production of a given quality product. While external factors can determine the international competitiveness of otherwise efficient firms, inefficient firms can hardly compete in international markets even if they have a conducive external environment.

The other fundamental determinants of competitiveness are the level and rate of growth of productivity of factors which are largely influenced by aspects internal to the firm. Factor productivity is an important component of industrial growth and development. On the supply side, the growth of an economy (industry or firm) is determined by the rate of expansion of its productive resources and by improvement in their efficiency-that is the rate of growth of total factor productivity.

In manufacturing industry all aspects of the quality and quantity of labour and capital including investment level and priorities, degrees of automation, age structure, size and economies of scale educational background, of labour, training and experience etc., in general technological capability constitute major factors for influencing productivity. Technological capabilities, the ability of workers and firms to use, adopt, and develop the technology significantly influences productivity level. Similarly, the size of the capital stock, the quality or technology embodied and social overhead capital (availability and reliability of infrastructure), all affect productivity.

2.2 Empirical Literature

Firm level competitiveness is an important topic in business and policy research and therefore, this issue is addressed in a large body of economics literature. Methodology of measuring competitiveness is discussed in Siggel Cocckburn, (1995); Cockburn, et al., (1998) as well as Swann and Taghavi (1992). The concept of competitiveness at the national level is introduced in porter (1990), and World Economic Forum

(1995). The latter also calculates indicators of competitiveness of numerous economies in various parts of the world.

There are also a number of emperical studies that investigate sources of cost competitiveness for a number of countries (Siggel and Ssemogerere, 2004; Cockburn, et al., 1998; Siggle, Ikara and Nganda, 2000). These studies have focused on quantitative analysis of cost based competitiveness. The methodology was then applied to compare competitiveness of firms in the reference country with those in comparator countries. However, replication of this methodology for cross country comparison requires that reliable data on comparator countries be collected, which most of the times is impossible task.

The first paper conducted on Ethiopian manufacturing industry that presents concepts of competitiveness in a systematic manner to my best knowledge is by Getnet and Admit (2006). The paper made a critical over view of numerous concepts of competitiveness and methods of measurement. Other papers conducted on Ethiopian Manufacturing industry's competitiveness are by Getnet (2003), by Birhanu and Kibre (2001), and EEA (2003/04). However, none of these works has made a detailed quantitative analysis of cost based competitiveness at the firm level.

As to total factor productivity, a number of studies have been conducted at global, regional and country level using stochastic frontier production function approach. For instance, the study conducted by Marixsen (1998) on the growth of productivity of American manufacturing sector found that the American economy has slowed considerably since 1973. With this respect, TFP measures the annual growth rate in output in the economy, and the annual growth rate of its component sectors that would have occurred if the size of the labour force and capital stock had remained constant. From 1949 to 1973, TFP of the American economy grew at an average rate of 1.8 percent per year. The study concluded that if capital and labour employed in manufacturing had remained constant, output would have increased 1.8 percent per year solely as a result of the 1.8 percent TFP growth. In contrast, from 1973 to 1992, manufacturing TFP grew at just 0.8 percent per year, a decrease of one percentage point per year.

According to the study conducted by Goldar and Kumari (2003), the lowering of effective protection to industries favorably affected productivity growth. The result of the study suggested that gestation lags in investment projects slower agricultural growth in the 1990s had an adverse effect on productivity growth. Their analysis revealed that underutilization of industrial capacity was an important cause of the productivity slowdown. With correction for capacity utilization, the estimated productivity growth in the 1990s was found to be about the same as in the 1980s. The study concluded that examining trends in TFP of Indian Manufacturing in the 1980s and 1990s, a decade of major industrial and trade reforms, was a declaration in TFP growth in manufacturing. However, a closer examination revealed that capacity utilization was a significant factor influencing productivity growth in industries, and there was an increase in capacity utilization in manufacturing in the 1980sa fall in the 1990s. The final result of these scholars showed a significant favorable effect of tariff reforms on industrial productivity. The results also indicated that slower growth of agriculture in the 1990s and gestation lags in investment may have had an adverse effect on TFP growth of Indian manufacturing in that period.

Studies conducted by Harding, Soderbon and Teal (2004) on African firms showed that recent reform in most African economies of their trading and exchange rate regimes have eliminated previously limited competition. Despite these reforms, in the author's view, African manufacturing firms remained unsuccessful particularly in the international export markets. In their study, the role of learning, competition and market imperfections in determining three aspects of firm performance, namely firm exit and firm productivity growth. They used a pooled panel dataset of firms Ghana, Kenya and Tanzania that spans a period of five years. They found that the main determinants of exit were firm size, with small firms, having much higher exit rates than large ones. They concluded that both Ghana and Tanzania have had introduced substantial reforms since the 1980s. Both had undertaken a number of policy and regulatory changes to liberalize a previously highly protected and public sector dominant economy. Measures which had impacted upon the industrial sector included the introduction a market-based foreign exchange system, liberalization of trade policy privatization of state owned enterprises and fiscal policy reform. In general, they found a negative and highly significant interaction term between size and productivity, indicating that selection on efficiency occurs among the relatively large firms. They also found no evidence that larger firms grow faster and neither size nor firm age affect underlying efficiency. The most significant and potentially interesting relationship, for them was that from competitive pressure to productivity growth. Given the objectives of the reforms in three countries was to stimulate higher efficiency levels and the eventual achievement of international competitiveness. Among African manufacturing firms, the finding that competitive pressure was positively associated with productivity growth showed that one aspect of the reform program had been successful, as to these researchers.

Moreover, the study conducted by Bartelsman (2000) explored the dispersion of productivity across firms and establishments the persistent of productivity differentials, the consequences of entry and exit, and the contribution of resource reallocation across firms to aggregate productivity growth. He concluded that the research revealed important factors correlated with productivity growth, such as managerial ability, technology use, human capital, and regulation. For him, the more advanced literature in the field has begun to address the more difficult questions of the causality between these factors and productivity growth.

Mahadevan (2001) studied TFP growth of Malaysian manufacturing industry using stochastic frontier approach. She used a manufacturing survey data of 1981-1996 and she divided the data into three periods, namely 1981-1984, 1987-199 and 1991-1996. She found that the contribution of input has increased over time but the contribution of TFP growth was negative in the last two periods. During the second period, the negative contribution of TFP growth was due to a negative contribution of technical progress whereas during the third period it was due to a negative change in technical efficiency.

In case of Ethiopia, similar studies have been conducted revealing that industries and /or firms are operating at different levels of productivity due to either internal or external conditions. For instance, the study conducted by Daniel (2005) on measurement and sources of technical inefficiency in Ethiopian manufacturing industries for the period 1998-2002 using a panel data of 361 firms, found that technical efficiency of the firms for most sub-sector was decreasing. Based on his study result, he recommended that the existing levels of technical efficiencies and the level of production of the sector could be enhanced and improved through provision of credit, better marketing strategies, workers training, accelerating the slow pace of privatization and designing effective incentive designing strategies. There has also been a study conducted by Swamy and Padma (2005) that assessed the performance of the Ethiopian Manufacturing industry using total factor productivity indices and found that there was productivity variation among firms as well as it showed a declining trend over the study periods. Other studies have also been conducted to determine the levels of productivity at an industry and /or firm level including EEA (2003/04); Berhanu and Kibre (2002); and Getnet and Admit (2006). However, the methodology employed in these studies would not allow segregating the extent to which firm specific weakness contributed for the turn down of total factor productivity during the reported periods.

From both the theoretical and empirical literatures presented above, the following key vital lessons are drawn:

Regarding to the theoretical literature review, it is possible to construct a similar model and obtain some ideas for the TFP and competitiveness of Ethiopian textile and garment industry

The empirical literature, on the other hand, gives clue on the estimation of stochastic frontier production function, domestic and international competitiveness indicators, the total factor productivity growth decomposition and some technical operations and other related issues all over the world including Ethiopia. They have geared to the direction towards scientific research analysis.

Therefore, this study aims to build on the aforesaid works and fill the gap left by those studies by making explicit discussion on methodological framework for quantitative analysis of cost based competitiveness and application of stochastic frontier production function approach to decompose and estimate change in total factor productivity of textile and garment firms using the data obtained from Central Statistical Agency (CSA, 2002-2005) In this study, we do not carry out analysis of qualitative factors that affect competitiveness and productivity of textile and garment firms.

HAPTER THREE

AN OVERVIEW OF TEXTILE AND GARMENT SUB - SECTOR

3.1 The global Prospective

Historically, the development of textile and apparel manufacturing has been an important "first step" of many countries' industrialization progression (Dickerson, 1995). Over time, as relative costs of labour and capital shift, textile and apparel manufacturing has moved from the US , Great Britain, and Japan, which dominated international trade of textiles and clothing in the first half of the 1990s, to lower cost countries (Park and Anderson, 1991). This phenomenon has taken place in successive waves over a period of more than forty years. In Asia, for example, this induced the movement of labour-based clothing industries out of Japan to South Korea, Hong Kong, Taiwan, then to Mauritius and Bangladesh, and most recently, into Madegaskar, Vetinam and Indonesia.

The structure of the global textile and garment sub-sector is in such a way that it is both a labour intensive, low wage industry and a dynamic and innovative sector, depending on which market segments one focuses upon. In the high quality fashion market, the industry is characterized by modern technology, relatively well paid workers and designers and a high degree of flexibility. The competitive advantage of firms in this market segment is related to the ability to produce designs that capture tests and preferences, in addition to cost effectiveness. The core functions firms servicing this market segment are largely in developed countries and often in a limited geographical areas or clusters within these countries (Nordas, 2004).

As to the share of textile and garment sub-sector, China has the highest market share in global textile and garment market, followed by India, and Pakistan in Asian region (Paresh and Ali, 2007).

Table 3.1: Global Market Share in 2005-06

No.	Countries	Production		Consumption	
		000' tons	%age of world	000' tons	%age of world
1	China	5,700	24	10,000	41
2	India	4,148	18	3,655	15
3	Pakistan	2,058	9	2,584	11
4	Others	11,740	50	8,095	33
5	World total	23,646	100	24,334	100

Source: USDA; Cited in Paresh and Ali, 2007.

Textile production from the production of fiber, through subsequent steps, represents one industry common to all countries in global economy. No industries are more broadly dispersed around the world than textiles and apparels (Dickerson, 1992).The textile industry, one of the traditional industries plays an indelibly important role in the development of the world industry. The great industrial revolution began from the textile industry and laid the basis for the rapid development of western economies in terms of market exploitation, personnel training and funds accumulation (China National Textile and Apparel Council, 2003/04). Similarly, as other countries moved towards economic development, the textile sector played a vital role in industrialization efforts. Later, as apparel production become an industrial activity, both sectors become significant components of a changing global economy (Dickerson, 1992).

The enhancement of science and technology is the fundamental deriving force for upgrading the global textile and garment industry. In 1960, at the time of steam technology Britain became the textile centre to powered engine; in 1907, at the time of electrification, Europe become the centre of electric textile industry; in 1922, at the time of macro molecule materials, the US, Europe, North America and Japan were the centres for synthetic textile and garment. In mid 2^{1st} century, at the time of high technology, Europe, North America, and Japan have become the centres of high – tech textile and garment industry. The low end production has brought new opportunities for the developing countries (CNTaAC, 2003/04).

Global shift in textile and apparel activities (production, employment, and trade) began to occur in the early 20th century. At the turn of 20th century, Britain accounted for 70% of the world textile trade (Aggarwd, 1985). After world war 2nd, other developed nations such as USA and Japan became major producers of textile and apparels. By 1950s and 60s, the Asian newly emerging industrial nations entered the global textile markets and, gradually, production growth rates in developing countries far out- paced those in the developed countries. Similarly, world apparel production increased at slow rate and after 1973, the global place for apparel production changed from developed to developing countries (Dickerson, 1992)

The annual employment growth rate of textile and garment industries began to decline in the 1950s in developed countries, while it revealed an increasing trend in developing nations. Under the impelling of competitive advantage, the transfer of production factors, particularly differences in wage rates are noted as the main cause for the international relocation of these industries both in production and employment. Moreover, global consumption patterns of textile and garment products have also a wide spread impact on global shift of these industries (Kebede, 2006).

Global trade in textile and apparel has grown 60 folds during the past forty years from under 6 billions USD in 1962 to 342 billion USD in 2001. Today, trade in textile and apparel, represents nearly 6% of the world exports of manufacturers. Exports in the more labour-intensive apparel industry have increased more rapidly than textile exports. So that, today apparel exports account for more than half of the total. Forty years ago, developed countries were the main exporters of textile and apparel. During the late 1980s, however, the developing countries surpassed them and now account for half of the world textile exports and nearly three quarters of world apparel exports (European Commission 2003; Cited in Kebede, 2006)

Regarding trade policy, until the establishment of World Trade Organization (WTO), General Agreements on Tariff and Trade (GATT) was the principal international structure concerned with trade, which of course, included trade in textile and apparel. Although textile and apparel trade provisions were a typical, they occurred as a GATT-sponsored exception to General Agreement (Dickerson, 1999). The trade policies that involved for textiles and apparel under the auspices of GATT represented a significant departure from the rules that apply to other sectors. In effect, textile and apparel were justified for the following reasons:
The challenge presented by low cost imports was unique to textiles and apparel. The production and employment in those industries were considered critical to the importing countries' overall economic activities (Ibid)

As mentioned above, protection of the textile and clothing sector has a long history. In 1961, the short term arrangement (STA), and in 1962, the long term arrangement (LTA) regarding international trade in cotton textiles was signed under the auspices of the GATT. The LTA was renegotiated several times until it was replaced by the Multi-Fibre Agreement (MFA), which comes into force in 1974. The MFA, as its name suggests, extended restrictions on trade to wool and man-made fibres in addition to cotton. The MFA aimed at an orderly opening of restricted markets in order to avoid market disruptions. Like LFA, it was supposed to be a temporary measure. However, The MFA was renegotiated four times the last time in 1991, and it finally expired in 1994. The expiration of MFA did not, however, mean the end of quotas in textile and clothing exports from developing countries.

After more than forty years, of import quotas, the textile and clothing sector has been subject to the general rules of the GATT from 1st January, 2005. The integration of textile and garment sector into the disciplines of the WTO does not, however, mean that the discrimination will disappear. While quotas, the most severe instrument of managed protection, were removed, tariff in this sector remains high. In the future, favored partners will only benefit from tariff preference rather than distribution of quotas.

The impact of phasing out of ATC has several dimensions. Globally, there is political gain related to the credibility of the multi-national trading system at a time when the system is experiencing considerable strain and there are also efficiency gains from eliminating highly distorting quotas that have led to an inefficient global allocation of textile and clothing production. According to Mamo (2004), the impact of elimination of quota in international trade in textile and clothing is summarized as:

- Market shares will be gained more through international Competitiveness
- Price falls further
- Competition is intensified
- Production locations dynamically changed
- Retailers will decide on supply sources, dictate prices, demand quality and insist on quick response.
- Trade agreements such as AGOA, continue to attract buyers despite decreasing importance.
- Signatories of trade agreements will continue to benefit from tariff preferences or tariff free access.
- The long term shift to Asia will continue to make gain at the expense of others.

3.2 Experiences of Successful Selected Countries in the Sub-Sector

Following the global shift of textile and apparel production and trade, most of the emerging nations choose textile and garment production as a major sector to which to concentrate their investment, their efforts and their dreams for advancing economically.

In the early stage of development, the economies of most Asian countries were fuelled by export oriented industry, in which textile complex accounts for high proportion of industrial outputs, employment and exports. In Africa, some countries such as Mauritius, Madagascar, Lesotho, Kenya, etc. received outside investment and developed significant export industries in textile and garment sector. Exports of textile products originating from sub-Saharan countries have grown dramatically in the last decade. Recent trade initiatives such as Africa Growth and Opportunity Act (AGOA), along with low labour cost and improved integration into world markets are giving further stimulus to the growth of textile and apparel industry.

The following developing countries are selected for reviewing success stories in textile and garment sectors. The lessons drawn from these countries are presented in major categories. Furthermore, in drawing lessons caution has been taken to problem/ situation similarity likelihood to import the experience and if there are other complementary factors.

3.2.1 Experience of China

Textile and apparel industries are one of the most important pillars of the national economy and have played a major role in china's drive to development since 1978. Its textile and garment industries entered into industrial structural upgrading age and quickly developed in the 1980s. In 2001 the industry employed around 13% of China's work force; in 2002 it accounted for 13% of all China's export; and in 2003 it accounted for around 8% of China's GDP and 16% of manufacturing value added (Peter, 2004). There are many factors that make China a successful country in textile and garment sector.

1. Economic Policy Reforms

The introduction of economic reform under the open door policy in 1978, unleashed pent-up economic forces that spurred the rapid development of the Chinese economy. The textile and apparel industries have been placed in the vanguard of the reform process from the outset and it has been the textile and garment sector that first transformed from planned to market economy (Ibid).

The reform enhanced progressive liberalization of the market, trade and investment, which intensified competition in domestic market. The reform also introduced open door policy to actively increase the country's economic engagement with the rest of the world. Tariffs on textile imports were reduced and other non-tariff barriers to trade have also been progressively dismantled. Subsequently, there has been an influx of foreign companies mainly from Hong Kong and Taiwan that have established joint and wholly owned ventures (Ibid).

The reform resulted in growing economic prosperity and social change that has purred the development of domestic demand for textile and apparel products, which was the major driving force for the rapid development of Chinese textile and garment industries. Under the reform, the country has set-forth and vigorously executed trade strategies such as the strategy of broad-based foreign trade and economic cooperation, strategy of diversified markets and strategy of wining with quality that drafted with Chinese characteristics based on its actual development situation (CTPIC, 2003).

2. Improving Quality of Human Resources.

It is recognized that top quality of human resources are the real momentum and great source for economic growth and social progress. Education and training are effective ways of improving the quality of human resources. One of the reasons for the great success of the Chinese in the textile and garment sector is the availability and supply of productive and trained manpower both in technical and managerial skills. The country has many universities, colleges and institutions that provide education and training of manpower as well as doing research and development on textile and clothing.

3. Progressive Reform of State Owned Enterprises

The reform of public enterprises is a complicated and long standing work. In its economic reshuffling, china adopted a model of progressive reform that avoided tremendous social tremble and promoted the reform under the situation of social stability. The china's progressive reform yielded some positive results. It has been carried on for more than two decades and under gone the forms of contracting, leasing, and assets management stock holding system, modern corporate system and debt equity swap system.

4. The Attraction of Foreign Direct Investment

Chinese textile and garment sub-sector is among the earliest industries to make use of foreign capital with significant effect, and the foreign investment in textile and garment sub-sectors occupies an important position in all foreign investment in china Enterprises with foreign investment have become integral parts of textile and garment sub-sectors, which effectively introduced foreign funds, advanced techniques and modern management. It is also made up for the insufficiency of domestic textile construction funds and pushed forward technical progress of the textile and garment sub-sectors. Moreover, FDI in china helped for the adjustment of product structure and trained a number of entrepreneurs, and high level talents who can master the advanced techniques, modern enterprises management as well as international market. It also enhanced the capacity of textile and garment sub-sector to export and earn foreign exchange (CTPIC, 2003)

China was able to attract huge amount of FDI in textile and garment sectors since the reform and opening up, as the country has good infrastructure, unlimited supply of cheap, disciplined and productive labour force, indigenous raw materials, like cotton, ramie and silk. Moreover, the country has other investment pooling factors like capability of full package production, deepening of participation in global value-chain and global production networks, large market size, high rate of private savings, its accession to WTO, eagerness to understand customer demand, willingness to learn and upgrade, open to foreign investor's new ideas, technology and management know-how.

Regarding taxation, the Chinese government gives preference of tax for enterprises registered in EPZ and the income tax rate is 15%. They are also exempted from tariff that is used for the production of fabric, equipment, transporting vehicle and office equipment.

In china, FDI plays an important role to finance economic development including labour intensive industries in several ways, such as gaining of high quality new assets enhancing the quality of existing assets and enhancing the quality of assets of related industries.

5. Export Processing Zone (EPZ)

China developed the textile and garment sectors through the establishment of EPZ. Chinese EPZs usually provide an attractive inspection and supervision system, supporting measures; perfect infrastructure and low enforcement team composed of fair minded and clear customs officials. It may also boast its preferential policies simplified and faster customs clearance, highly efficient management and superior geographic locations (CTPIC, 2003).

These EPZs are located in the vicinity of ports and airports, often equipped with convenient transportations, relatively modern infrastructures, complete administrative services and better facilities for living quarters such as standardized factories staff residences, apartment buildings, up to international standards multi-functional environment, foreign trade service systems, as well as networks of transportation up to the neighborhood of those export processing zones. Their highly efficient and low cost services provide great help to the enterprises inside the zone (Ibid). All these help to provide efficiency for business operation and cut down duration and costs of transaction, which enable the enterprises to be competitive and profitable internationally.

3.2.2. Experience of Mauritius

Mauritius is one of the successful countries in textile and apparel production and marketing in Africa. Its textile and garment industry recorded fast growth during the 1980s and early 1990s and become one of the main pillars of the economy, as it accounted for 60% of export and 11% of GDP in 2001 (EUROSTAT, 2004). Mauritius success in developing textile and garment sector mainly attributes to the following factors.

1. Economic Policy Reforms

One of the elements of success for Mauritius is the formulation and implementation of a sound set of trade and economic policies. The country implements an open trade policy. To support a vital export oriented manufacturing base, the government of Mauritius has ensured that the domestic businesses have competitive access to imports through maintenance of an extremely open trade policy in which the terms of trade move slowly to the country's favor.

2. Attraction of foreign Direct Investment (AFDI)

One of the primary reasons for Mauritius's success has been the attraction and efficient utilization of the FDI in the sub-sector. Mauritius's stable political situation and favorable economic environment helped to attract FDI to its economy. The country has relatively good infrastructure, cheap labour force, good economic governance that is characterized with stable price and low inflation rate. There was also a stock exchange markets in Europe, and until 2000 in the USA (Chemonics International, 1996)

In Mauritius the national treatment and preferential policies to foreign funded enterprises included exemption of tariffs for imported raw materials and equipment exemption of dividend tax and capital surplus tax, corporate tax rate levied at 15% against profits and unrestricted remittance of profits dividend and capital. Newly launched foreign enterprises are required to pay only half of the registration tax for land and building purchases, and income tax free up to two foreign management personnel CTPIC, 2003).

3. Export Processing Zone (EPZ)

Mauritius established a large-scale EPZ in the 1970s. Most enterprises in EPZ were engaged in textile and garment exporting business. In Mauritius, the FPZ has registered remarkable performance in boosting exports and attracting funds and technologies from overseas in the textile and apparel sectors. EPZ is the ideal place to secure better infrastructure and accord with special and favourable policies and regimes. For enterprises inside the export processing zone, there is tariff exemption of packing materials, spare parts, and other related goods (Ibid). The establishment of the EPZ attracted significant investment in textile and garment from various countries such as Taiwan and Hong Kong.

4. Preferential Access to Markets

Mauritius's attraction of substantial amount of foreign investment in textile and apparel sector from Asian and European countries is partly attributed to the country's privilege access to EU's duty and quota free market under the Lome convection to USA until 2000. Subsidiaries of large clothing manufacturers from Hong Kong and France were attracted to Mauritius to enjoy the preferential market access that they lost because of quotas Under Multi-Fibre Agreement (MFA).

3.2.3. Lessons to be learnt

In both countries, the most crucial success factor is the reform of economic policy that changed the whole situation and enabled them to create business friendly environment. Both common as well as unique success factors of the two countries are relevant to Ethiopia's case as the country is in the process of economic reform including the development of its textile and garment sub-sector using the experience of successful countries.

Although many of the above mentioned successful development experiences have been started recently in Ethiopia; it is imperative to note the following important development processes in the textile and garment sub-sector from success stories of China and Mauritius.

In both countries, the facilities of textile and garment sector are mainly financed by foreign investment. They are able to attract foreign investment by establishing investor's friendly environment. This will require creation as well as implementation of sound policies and laws that ensure property rights, flexible and liberal labour law, access to foreign currency and inputs, etc. Furthermore, it needs the establishment of adequate and efficient infrastructure. Thus, in Ethiopia, to create flexible investor's friendly environment, the above pre-conditions should be well addressed and implemented shortly in a coordinated manner.

In both countries mentioned above, the textile and garment sectors registered remarkable performance in boosting exports, attracting foreign capital, and technology from overseas by establishing export processing zones. Export processing zones helped both countries to integrate their economy with outside world and accelerated the development of export business. Hence, it is essential for Ethiopia to establish export processing zones as the country promote the development of processing trade with imported materials. So that the country is able to provide improved infrastructure facilities and transform the sub-sector's performance to international levels. Moreover, it will create better policy environment for expanding export trade and enter into international competitiveness as well.

The other important experience to be taken is deepening participation in the global value chains (GVC) and Global Production Networks (GPN).

Therefore, for Ethiopia, drawing into emerging GVCs and GPNs is crucial for number of reasons:

- they broaden the scope for getting gains from an open trade and investment regime and thus, diminish pressures for protectionism

- they can help the country to enter new foreign markets, earn more foreign currencies, diversify exports, and most importantly to get new skills knowledge and all considered as key factors for productivity enhancement and increased competitiveness in the sub-sector
- They enable the country to learn and create new capabilities and capture the externalities of collective learning
- They expose the country's macro-economic and business conditions to stronger competitive pressures and finally
- They stimulate the country to make better physical infrastructure and utilities and to create more business friendly environment, though it presents new challenges for the enterprises (UNIDO, 2004)

3.3 The State of the Sub-Sector in Ethiopia

3.3.1 A Historical contribution of Textile and Garment Sub-Sector

In Ethiopia, the textile and garment sub-sector has along history. The country's modern textile and clothing enterprises and large scale production of cotton were initiated in 1950s with instrumentality of foreign investment. Dire Dawa textile mill, the first textile mill established by foreign capital in 1939, marked the starting point of textile sub-sector. Before 1961, five large scale integrated textile enterprises were established mainly by private capital achieving a spinning scale of 175,000 spindles. In 1975, these enterprises were nationalized. From 1975 to 1992, in order to satisfy the domestic demand for regular textiles with foreign aid, the country established another four large scale integrated textile enterprises which played great roles in substituting imported products. Since 1992, given the changes in the trends of international aid, it has not set up any new large scale public textile enterprises.

According to Ethiopian Central Statistics Agency (CSA) survey data (2007), there are 73 medium and large sized firms of which 42 are manufacture of textiles, and 31 are wearing apparel producers. The firms in the sub-sector are engaged in spinning, weaving, knitting, dyeing finishing, cutting and sewing.

Textile and garment sub-sector is the third largest manufacturing industry in Ethiopia. It comprises a large number of state-owned enterprises and a growing number of private sector participants that have flourished recently. The sub-sector can contribute to the economy in terms of Gross Domestic Product (GDP), employment, and foreign exchange earnings from export. According to CSA's survey report (2007), textile accounted for 17% of fixed capital assets, 9.2 % of gross value of production, 29 % of employment and 20.5 % of wages and salaries of the total manufacturing sector for the year 1998 E.C. Moreover, the sub-sector generates 2,096,000 USD export earnings to the country in the 1990 E.C. This figure increased to 11, 098,000 USD in the year 1998 E.C (Ethiopian Customs Authority, 1999 E.C.)

3.3.2 Structure of the Textile and Garment Sub-Sector

The textile and garment sub-sector can be categorized into three groups:

- -cottage and handicrafts
- small and medium sized private sector companies, particularly in the garment sub-sector
- large cotton mills, many of which are obsolete

The cottage and handcrafts (handloom) sub-sector includes weavers of traditional and modern fabrics which are many in numbers. Textile and garment manufacturing of the second category comprises small and medium scale privately owned enterprises. Textile factories in the third category include the followings which are mostly state owned or leased by foreign private investors:

- Integrated mills: Akaki, Awassa, Kombolcha, Bahir Dar, Dire Dawa , Almeda, and Ethio-Japan Nylon Textile factories
- Spinning mills: Adei Ababa and Ediget Yarn factory
- Spinning and weaving: Arba Minch Textile factory
- Integrated blanket factory: Debre-Birhan Blanket Factory

  Woven Blanket Factory: KK PLC and DH Geda Blanket Factories.

3.3.3 Opportunities for Developing Textile and Garment Sub-Sector in Ethiopia

I) Strong support by Government

As the document of Industrial Development Strategy of the country points out, the government can and should play a major role in the economy through careful selection to remove market distortions for the purpose of speeding up development. Since the government wants to create slipover effect on other sectors of the economy and due to shortage of finance and human resource, it prioritizes and selects targeted industries to rehearse fast industrialization.

As given in the same document:

The tasks of the government include expanding infrastructure, creating an efficient and corruption free government administration, building an efficient justice administration, and creating peace and stability through out the country implementing measures for the prevalent of accountability and transparency in the government and throughout the economy (IDSE, 2003:74)

The support of the government is very selectively targeted, time bounded, and reward is based on targeted achievements. Hence, textile and garment sub-sector is one of the sectors that are given strong support by the government. The textile sub-sector has a vast market, which means it is a lucrative industry, yet the sub-sector is labour intensive rather than technology-intensive, which means it requires low technical access but will provide more employment opportunities. At the same time, textile sub-sector is also an industry with high intermediate input ratio and intermediate demand ratio, with high inter-relations with other industries. On the one hand, textile sub-sector depends on the development of industries; on the other hand, it will promote the development of relevant industries. The textile sub-sector used to play the leading role in the history of the industrial revolution and development in the world and always enjoys top priority in many developing countries on their way to industrialization and developing national economy.

According to “the Agricultural Development–led-Industrialization (ADLI)”, Ethiopia identifies textile as the key industry to the development of industrialization as well as the exploitation of local resources to promote export. According to the long term strategy of Ethiopian government the development objective of textile and garment sub-sector is not only to expand shares in domestic market, but also to develop a competitive, profitable industry in the export market.

II) Comparative Advantage in Industrial Base and Abundance of Cotton Resource

Ethiopian cotton textile, with its relatively long history and big scale, has made some contribution to national economy. As a labour intensive economy, the sub-sector plays an important role in solving employment problems. On the other hand, Among African countries, Ethiopia are a country whose textile industry is with relatively long history and large scale. The domestic cotton production has formed a certain scale and for a long time, has made important contribution to meet the demand of the sub-sector for raw material. The expansion of cotton planting and rise of yield will guarantee sufficient supply of material for the sub-sector.

III) Large International Market

In the later half of the 20th century, the consumption of fibre products all over the world increased by 5 times while the population increased only by 1.4 times. The improved living quality of human beings created 2/3 of the increase in fibre production (CTPIC, 2004).

Generally, the rate of international trade growth is twice the rate of the world's economic growth, but the growth rate of the world's trade of fibre product is always keeping peace with the growth of international trade or slightly higher. In resent years along with the resurrection of world economy of the major economic bodies, namely USA, Europe, and Japan, the market demand thrives, especially, the demand for middle and lower end consumption. In 2002, import volume of textile in the world amounted to USD 52.2billion. United States and Europe, as the two largest textiles import markets, occupy 41.6% in the world's import volume. Moreover, the global current demand for textiles and apparel products account for USD 300 billion which is likely to increase to USD 800 billion within the next 10 years (Paresh and Ali, 2007).

IV) Improved Domestic Investment Environment

The basic and key to improve the competitiveness of Ethiopian textile and garment sub-sector is through:

- Encouraging foreign and domestic capitals to invest in the sub-sector

- Expanding productive scales
- Upgrading the conditions of equipment
- Enhancing productive capacity

Investment Policy reform

The minimum capital for foreign investors on a single investment project has been reduced to 100000 USD from 500000 USD for solely foreign invested projects. The minimum capital required for foreign investor investing jointly domestic investors is 60000 USD down from 300000 USD.

For any improved new investment the proceeds will be exempted from income tax for 1-5 years. Production scale expansion projects are eligible for income tax exemptions, specifically, 2 years for new establishments, and 1 year for expansion projects.

For firms suffering losses during the tax free period, after the expiration of the period, the losses can calculated into a period of time from 3-5 years depending on the investment location method

Taxation Policy Reform

Income tax rate has been reduced from 40% to 35% for individuals and a single proprietor business from 35% to 30% for companies as per proclamation number 286/2002.

Sales tax had been replaced by value added tax. All exports of goods and services will be exempted from VAT.

Tariff Policy Adjustment

Since 1992, Ethiopian tariff policy has under dramatic changes. After five rounds tariff adjustment, tariff level, structure, and coverage tend to be rational. and the highest tariff level has already been reduced from 230% 10 years ago, to 35%. The arithmetic average level of total tariff in current Ethiopia is 17.5%.

V) Bilateral and Multi-lateral Agreements

In May 2000, the Unite States approved Africa Growth Opportunity Act (AGOA), to give sub-Saharan region in Africa, namely 48 countries special preferential trade policy. In August 2001 Ethiopia is entitled to acquire AGOA qualifications and is one of the 18 beneficiary countries in terms of textile and garments. According to AGOA, Ethiopia can export textiles and Garments to the US duty free and quota-free by 2008. More favorably, Ethiopia, as a least developed country (LDC), before October 2004, enjoys privileges to export garments made fabrics from any other countries to the US market duty free and quota free.

Since the signing of Lome Agreement, EU has given preferential trade policy to the lesser developed Beneficiary countries (LDBC) including

Ethiopia. For Ethiopia, Everything but Arms can be exported to EU, duty free and quota free.

Ethiopia has also signed bilateral trade agreements with 16 nations, such as Russia, Turkey, Yemen etc which provide legal framework for enjoying most-favored nation treatment and removing tariff barriers. According to Generalized system of Preference (GSP), most of products made in Ethiopia enjoy preferential tariff treatment in US, Canada, Switzerland, Norway, Sweden, Finland, Austria, Japan and the majority of EU member nations.

Moreover, Ethiopia is a member of common market for Eastern and Southern Africa CMESA). This marked the historic step made by COMESA toward the integration of regional economy and provided good exterior environment for the development of foreign trade and economy.

3.3.4. Disadvantages for the Development of the Sub Sector

Both in domestic and international aspects, Ethiopia has fine development opportunity and huge potential in developing textile and garment sub sector. However, the textile sub-sector is still on the lower level with little progress. The total output value in the textile is fluctuating in recent years with lower proportion in the manufacturing sector. Although in recent years textile export showed significant growth over the previous years, the absolute quantity was still very low. At the same time, compared with other nations in southern Africa, which enjoyed fast development in textile and garment sub-sector, such as Kenya, Lesotho, Mauritius, etc, Ethiopian development was insignificant. Some of the reasons forwarded by CTPIC, (2004) are:

Operation of the enterprises are in difficult conditions (suffering from substantial losses, poor condition equipments, limited product variety and low quality as well as shrinking market share)

Immature market economy system (Unclear market concept, unclear market role of public enterprises, absence of social insurance system)

- Poor raw material supplying capacity
- Incomplete marketing network
- Insufficient supporting organization (Absence of industrial management organizations, weak capacity of educational organizations, backward quality inspection and standardization)
- Low status of human resource (shortage of management, marketing personnel and technicians; poor quality of labour force)
- Low level of infrastructure etc.

CHAPTER FOUR

MODEL SPECIFICATION AND DEFINITION OF VARIABLES

4.1 Model Specification

The stochastic production frontier model adopted in this study follows the work of Aigner, Lovell, and Schmidt (1977), Pitt and Lee (1981), and Battese and Coelli (1992). The application of stochastic production function model has a great advantage in modeling output growth in terms of evaluating the effects of policy changes: first it allows the filtering out of random effects typical for developing industrial economy and traditional agriculture; second, estimates of a firm's TE can be obtained by comparing observed and predicted outputs; and third, it allows a functional specification for production technology and a test of its statistical properties. The stochastic model considers the various techniques of application of inputs that are assumed to influence output. TFP growth, can therefore, be consistently decomposed into its components – technical efficiency (TE), Technological progress (TP) and economies of scale (Kumbhakar and Lovell, 2000; Cited in Ikhsan, 2006). The relative importance of these components can also be estimated. In this context, the stochastic frontier approach employed further benefited from the modelling framework discussed in Fan (1991), Salim and Kalirajan (1999), Voigt and Uvarovsky (2001) as cited in Beyene (2007).

In general, the stochastic models have been applied to a variety of data sets because of their advantages over the deterministic frontiers through incorporating the two error components. Furthermore, the main attraction of stochastic frontier model is the possibility it offers for a richer specification particularly in the case of panel data. The model also allows for, among other things, a formal statistical testing of hypothesis and the construction of confidence intervals. Because of all these aspects, the model seems most attractive and employed in this study using firm level panel data to predict total factor productivity and its components.

Using production frontier model on panel data has the following advantages: First the technical inefficiency of a particular firm can be estimated consistently as $T\rightarrow\infty$. This is because adding more observations on the same firm yields information not attainable by adding more firms; second, panel data need not make such strong distribution assumptions as unlike a single cross-section. Panel data also permits the simultaneous investigation of both technical changes and technical efficiency change over time; given that technical change is defined by an appropriate parametric model and the technical inefficiency effects in the stochastic frontier model are stochastic and have the specified distribution.

From the panel data version of stochastic frontier model (Battese and Coelli, 1992), we have the generic representation of the model as:

$$\mathbf{Ln(Y_{it}) = f(X_{it}, t, B_t) + V_{it} - U_{it}} \quad \text{...} \quad \mathbf{[16]}$$

$$\mathbf{U_{it} = \{Exp[-\eta(t-T)]\}U_i}$$

$$i = 1, 2, \ldots.N; \; t = 1, 2, 3, \ldots.T$$

Where Y_{it} is the output of the i^{th} firm at t^{th} time period

X_{it} denotes a (1*K) vector of (transformed) input values and other associated variables.

B is a (K*1) vectors of unknown scalar parameter to be estimated

V_{it}s are the usual random errors, measuring the positive and negativeeffects of exogenous shocks, assumed to be independently and identically distributed (iid) with N $(0, \sigma^2)$ and independently of the U_{it}s

U_{it}s represent a systematic deviation from the frontier because of an unobservable random variable associated with technical inefficiency of the firm in production, i.e., for a given level of technology and inputs, the observed output falls short of its potential output. It is a one sided (non-negative) error term ($U_{it} \geq 0$); implying that observations lie beneath or on the stochastic production frontier.

U_is are assumed to iid as the generalized truncated normal random variable, N (μ, σ^2_{it}).

The random variable U_i can be considered technical inefficiency effects for i^{th} firm in the last period of the panel. Technical inefficiency effects of the firm for earlier periods are assumed to be the product of technical inefficiency effects of the last period and the value of the exponential function exp[(-וי (t-T)].

-if μ > 0, -וי (t-T) > 0 and exp[-וי (t-T)] > 1 , U_{it}>U_i This implies technical efficiency of all establishments improves over time

-If μ = 0, technical inefficiency effects of the i^{th} firm do not vary over time, $U_{it} = U_i$

-If μ < 0, then, $U_i t < U_{i,}$ implying technical efficiency declines over time (Battese, et.al., 1998). Thus, the patterns of technical inefficiency change are common to all establishments as reflected by וי

We suppose that the maximum capacity to produce is measured from observed input and output based on the best practice performance of all the firms in the sample, only when a firm uses a particular input with full efficiency, it does receive the highest possible response from that input. A firm may or may not use all the inputs with full efficiency. Technical efficiency of a firm at time t, then, is defined as the ratio of observed output to the corresponding frontier output conditioned by the

level of input used by that firm. Hence, technical efficiency for the i^{th} firm in the t^{th} time period is defined by:

$$TE_{it} = Y_{it}/Y_{it}^* = \{ f[X_{it},B]e^{(V_{it}-U_{it})}\}/\{f[X_{it},B]e^{(V_{it}-U_{it})}\} = e^{(-U_{it})} \qquad [17]$$

Where, Y_{it} is the actual observed output and Y_{it}^* is the maximum feasible output given by the stochastic frontier function .

U_{it}s are non-negative random variables which are assumed to be independently and identically distributed with mean μ_{it} and $б^2$

TE_{it} is a measure of the extent to which a certain firm operates below the frontier drawn by the most efficient firm among the sample firms, given similar working conditions and nature of input use. Unlike measures such as designed capacity of machinery, the model does not set internationally accepted technically attainable maximum level of output to make an inter-country comparison possible. In other way of saying, the maximum output steams from two sources: from the efficient use of the inputs and from firm specific intrinsic characteristics, including economies of scale. The TE_{it} is, therefore, the expectation of the exponentiated technical inefficiency conditions on the errors (Beyene, 2007). Since U_{it} is a non-negative random variable, the TE_{it} lies between 0 & 1 where 1 is the highest score indicating that the firm is technically perfectly efficient. Technical inefficiency (TI) is then given by:

$$TI_{it} = 1-(e^{-Uit}) \qquad [18]$$

Some assumed that technical inefficiency effects are time invariant:

$$U_{it} = U_i, i = 1, 2, 3, \ldots N ; t = 1, 2, 3, \ldots.T$$

However, the assumption that firms to be time irresponsive in their mode of organization and inputs utilization is not usually practical.

4.2 Functional form of Production Frontier

The two most popular stochastic frontier production functions that represent the production process to evaluate the performance of industries and/or firms are Coub-Douglass (CD) & Tran logarithmic stochastic production functions.

Both functional forms are widely used in modeling industrial frontier production function (Coelli, 1996). The CD function has been widely and extensively used in stochastic frontier production function analysis. It is simple to use but it is said to be less flexible (it imposes a constant factor share over time. However, Sali and Kalirajan (1999) argue that it is less restrictive when all coefficients are allowed to vary. Moreover, as citd by Beyene (2007) from the works of Tybout and Daniel (2005), Voigt & Uvarrovsky (2001), the CD function can afford Maximum flexibility in dealing with data imperfections and it gives more realistic information in describing production behaviour in developing and transition economy.

The Tran slog production function has a preferential characteristic in that it is a less restricted (unrestricted) form, allowing more flexibility in the elasticity of substitutions between factors than the CD functional form (Piesse and Thirtle 2000;Abdulai, Haffma 2000; Cited in Beyene, 2007). According to Beyene's citation from various literatures, however, the Tran slog production function is often criticized because it does not yield coefficients of plausible sign and magnitude, mainly due to series problem of multicollinearity (Fan, 1991; Battese and Broca, 1997).

Diewert and Wales (1987) also point out that the translog functional form often fails to satisfy a minimum priority requirement of basic production behaviour than the CD function.

With this caveat in mind, the production technology representing medium and large scale textile and garment firms during the period 2001-2005, could be either CD or Tran slog stochastic frontier production function as represented by the following equations, respectively:

$$\ln Y_{it} = \beta o + \Sigma\beta_i \ln X_{it} + \Sigma\beta_{it}(\ln X_{it} t) + \beta_t t + \beta_{tt} t^2 + V_{it} - U_{it} \quad [19]$$

$$\ln Y_{it} = \beta o + \Sigma\beta_j \ln X_{jit} + \beta_t t + 1/2\Sigma\Sigma\beta_{jk} \ln X_{jit} \ln X_{kit} + 1/2\beta_{tt} t^2 + \Sigma\beta_{kt} \ln Xk_{it} t + V_{it} - U_{it} \ldots \quad [20]$$

Where, i = 1, 2, 3, ... N, representing identity of firms (in my case N = 17 for extile or 8 for garment processors)

t = 1, 2, 3, 4, and 5, representing the time periods of 2001-2006;

j = 1, 2,= and 3, identifying explanatory variables ;

Y_{it} = denotes firms' output output;

X_{jit} = (K_{it}, L_{it}, M_{it}) denotes the cost of capital labour wage and intermediate inputs.

Assuming time variant technical inefficiency effects, U_{it} are non-negative random variables defined in equation and the probability distribution of both U_{it} and V_{it} are as described above.

In this study, the method of maximum likelihood is used for simultaneous estimation of the parameters of the stochastic frontier and the model for the technical inefficiency effects using the computer programmed Frontier version 4.1c. The likelihood function of the model is expressed in terms of the variance parameters $б^2 = б^2_u + б^2_v$ and

$\gamma = б^2_u / (б^2_u + б^2_v)$ (Battese and Corra, 1977). The parameter γ is the ratio of the one sided error term (inefficiency) to the total error. It is important in determining whether a stochastic production frontier is a superior measure to the traditional average production function. In other words, it measures the total variation in observed output that is attributed to technical inefficiency. Therefore, it must lies between 1 & 0. The value of zero indicates that the non-negative random variable U_{it} , is absent from the model while the value of one shows the absence of statistical noise or exogenous shocks from the model and hence low level of firm's production compared to the best practice (maximum output) of the other firm is totally a result of firm specific technical inefficiency.

In fact, this study will not merely focus on the explanation of the pros and cons of the two functional forms given above. Rather the likelihood ratio test is performed to identify which production technology will better represent the technology of the textile and garment sub-sector included in the study. The likelihood ratio statistics, Λ, is defined as:

$$\lambda = -2\ln[L(H_o)/L(H_1)] = 2[\ln L(H_1) - \ln L(H_o)] \quad \ldots\ldots\ldots\ldots\ldots \quad [21]$$

Where, L(Ho) and L(H1) are the maximum values of the likelihood function over the null and alternative hypothesis Ho and H1, respectively. If the null hypothesis that defines the constrained parameter space is true, then $\boldsymbol{\lambda}$ is asymptotically distributed as $\mathbf{x^2}$ or as mixed $\mathbf{x^2}$ with k degrees of freedom where k is the number of restrictions imposed by the null hypothesis. The restrictions imposed the null hypothesis are rejected when $\boldsymbol{\lambda}$ exceeds the critical value (Samad and Patway, 2003; Cited in Daniel, 2005)

In addition to applying stochastic frontier model, we also applied a unit cost ratio approach to estimate indicators of international and domestic competitiveness of textile and garment firms. The competitiveness indicators are estimated using the same data source as used in TFP estimation.

For this particular analysis, following the work of Getnet and Admit (2006), we made the following assumptions:

Total cost is the difference between gross value of production (GVP) and operating surplus (P)- value added at factor cost less wages and salaries, employees benefit and depreciation, as defined by CSA (2007). Symbolically,

$$TC = GVP – P$$

In the short run, fixed costs are assumed to be sunk costs; What matters in the decision making process would be variable costs. It is difficult in the short run to dispose or expand fixed assets. This assumption implies that the opportunity cost of capital (fixed assets) will be zero, and the cost of capital will only be the sum of the accounting depreciation, rental expenses, and interest paid (for working capital or otherwise). This will leave total cost as that of above: TC = GVP-P = LC+IC+NIC

Where, LC=Labour cost; IC = Industrial cost; NIC = non-Industrial cost

In the long run fixed costs are not sunk costs. Fixed costs are variable. They can be disposed off or can be put in another field of operation in which they can generate better profit. They can be expanded to reach a level that maximizes economies of scale. Hence, fixed assets have an opportunity cost and this cost has to be included in the total cost.

Among the different alternatives of estimating the opportunity cost of capital (rate of return forgone, the current lending rate, the current saving rate, the official discount rate), the official discount rate (r) currently in force, which is 10 percent will be used.

The fixed assets of a firm or an industry are measured by their net fixed asset value (k) as defined by CSA. This makes the total cost differ from the above by the amount of the opportunity cost of capital or fixed assets. Symbolically, TC = GVP-P+rk (Getnet and Admit, 2006)

Using this basic assumptions, the indicators of domestic competitiveness both in the short run and long run scenario would be:

a) Short-run scenario:

$$UCD = TC/(PdQ) = 1-P/(GVP) \leq 1 \text{ .... } [22]$$

b) Long-run scenario:

$$UCd = TC/(PdQ) = 1 + rk/(GVP) - P/(GVP) \leq 1 \text{...... } [23]$$

The following additional assumptions will be imposed so as to compute international competitiveness:

The cause for the difference between domestic prices and boarder prices (international prices) is customs tariff imposed. Hence, the subtraction of the customs tariff (t) in GVP at domestic prices (GVPd), will give GVP at boarder prices (GVPb)

Simbolically, GVPb = GVPd – GVPd*t = (1-t)GVPd

Hence, the indicator of international competitiveness for the two scenarios will take the following:

C) Short-run scenario:

UCs=TC/(PsQ) = GVP/[GVP(1-t)] = GVP/[GVP(1-t) - P/[GVP(1-t)].... [24]

d) Long-run scenario:

UCx = [GVP- P + rk]/[GVP(1-t)]=1/(1-t) [1+(rk-p)/(GVP)] ≤ 1 ... [25]

4.3 Definition of Variables

1) Gross value of production (Y_{it}): Output of a certain firm could be measuredeither in gross value of production or in terms of value added. Both measures have their own strength and weakness. Production is the result of the interplay of raw materials, fixed assets, and other basic industrial costs and it is relatively less affected by measurement errors when calculated at the firm level. Thus, considering gross value of production as a measure of output and a dependent variable is found more reliable. One needs to be cautious that the price of products could either in gross value of production or in terms of value added. Both measures have vary from one factory to the other due mainly to quality differences. This is mainly seen in the exporting and non exporting firms. Thus, this paper takes different value of production among factories for similar quantity of output assuming that prices could capture quality differences (worku, 2006)

2) Industrial Cost (M_{it}): includes the cost of raw materials, fuels, electricity and other supplies consumed and industrial services rendered by the firm

3) Wages and Salaries (L_{it}): In the frontier production, labour is proxied by the amount wages and salaries paid to the workers in each time. This s done because the heterogeneity of labour is not only in terms of biological make =up of the workers but also in terms of different attributes like education and work experience. Therefore, wages and salaries are presumed to better consider such differences and better represents the extent of labour input use. This variable includes all payments in cash or in kind made to the worker during the reference period in connection with the work done for the firms

4) Fixed Capital (K_{it}): represents those assets of the establishments with a productive life of one year or more. It shows the net book value at the beginning of the reference year plus new capital expenditure minus the value of sold and disposed machineries and equipment and depreciation during the reference period

5) Time (T_{it}): Represents year of observation, where, t=1, 2, 3, 4 and 5 for the year 2001, 2002, 2003, 2004,and 2005, respectively.

4.4 Sources of Data & Coverage

The study uses firm level data on large and medium scale textile and garment industries and the main sources of data is the annual survey of large and medium scale manufacturing industries conducted by Central Statistical Agency (CSA). Both raw data and data from various statistical bulletins published by the authority are used in the study. Since the raw data set is in terms of value at current prices, it is converted to constant prices by deflating using appropriate deflators. An implicit sectoral deflator is used to deflate gross value of production, wages and salaries industrial cost, while investment deflator is used to deflate capital or fixed assets.

The study covers those large and medium scale textile and garment firms at national level during the survey period 2001-2005. The selection of firms within each sub-sector is based on balanced panel data requirement such that those firms with complete observation and which are operational in the study period are covered.

The data set has its own limitations. Number of textile and garment industries reported to the CSA varied from year to year. Enterprises either reported missing values, highly exaggerated figures or at times they could even become totally out of sight in the data set. In the case of textiles, the problem is not very much series as compared to the garment firms. Due to this fact, out of 73 total textile and garment firms, 17 textile and 8 garment (total of 25) firms are included in this study.

CHAPTER FIVE

EMPIRICAL RESULTS & DISCUSSION

5.1 Descriptive statistics results

Summary statistics for the variables used in the analysis and other relevant firm characteristics are given in table 5.1. This table shows that sample firms average annual output totals around Birr 19.6 milion. The table also shows that firms used a value of 12.9 and 11.2 million Birr for industrial costs and fixed capital, respectively and paid a wage and salary of Birr 2.8 million for their employees per annum. Investigation of each firm's output, fixed capital and material costs indicated that, though they have similar machineries and equipment, there was a wide difference in the level of production as well as the volume of variable and fixed inputs employed in each textile and garment firms.

Table 5.1: Descriptive statistics results on textile and garment industries (000' Birr) (2001-2005)

Variable	Mean	Min	Max	Stdev	Skewness	Kurtosis
Out put (Y_{it})	16,476.8	394.7	73,515.5	22,3137	1.45	1.55
Industrial cost (M_{it})	12,880.5	224.3	61,301.5	16757.5	1.81	2.57
Wages & Salaries (L_{it})	2,845.6	58.0	12,951.7	3,379.5	1.36	1.66
Fixed capital (K_{it})	11,212.0	127.8	69,909.4	16,688.4	2.39	6.09

Source: - Own computation from CSA survey data (2001-2005)

Table 5.2 reveals that majority of the firms were operating below their technical capacity. Reported values of production did not go proportional to their capacity. For instance, the Ethiopian textile and garment firms are operating less than 50 percent of their capacity. This could be as a result of old and out-dated machineries used by the firms in addition to external factors they are faced.

Table 5.2: Actual capacity utilization of textile& garment firms (2001-2005)

Indicators	**2001**	**2002**	**2003**	**2004**	**2005**	**Average**
Mean	48.69%	44.71%	46.87%	46.78%	53.02%	48.01
Maximum	100%	100%	100%	100%	100%	100%
Minimum	1.28%	3%	5%	13%	8%	6.06%
Std dev	27.44%	24.53%	22.20%	21.54%	22.02%	23.55%

Source:- Own computation based on CSA survey data (2001-2005)

From 25 sample textile and garment firms, relatively, smaller number of them (44%) was exporting their products. In terms of scatter and variability measures, it is found that exporting textile and garment firms were relatively better in scale of operation as compared to non-exporting firms but no tangible and consistence evidence for productive use of their resources. Table 5.3 below revealed that labor was more productive in exporting firms while capital was more productive in non-exporting firms. As to capital and labor ratio, exporting firms are relatively more capital intensive than inward-oriented textile and garment firms.

Table 5.3: Comparative descriptive statistics for exporting and non- exporting firms (1000 Birr)

Firm types	Indicators	Y_{it}	M_{it}	L_{it}	K_{it}	Y_{it}/L_{it}	Y_{it}/K_{it}	K_{it}/L_{it}
Exporting Firms	Mean	26105681	19439918	3075029	15208228	8.489573	1.71655	4.945719
	Max	73515450	50875265	9727968	36717256	7.557123	2.002204	3.774401
	Min	86192.4	36435.4	51357.8	59681.6	1.678273	1.444204	1.162075
	Std dev	25896683	18881233	3463885	13481599	7.476197	1.920891	3.892046
Non-exporting firms	Mean	9512225	5151123	1776880	4283015	5.353329	2.220918	.410413
	Max	32744880	18262935	6414971	20774435	5.104447	1.57621	3.23843
	Min	76511.2	43575.4	17764.4	17481	4.306996	4.376821	0.984047
	Std dev	9672275	5218111	2001523	6164663	4.832457	1.568987	3.079986

Source:- Own Computation

As could be observed from table 5.4 below, on average, the value of output produced by one birr worth of both labor and capital inputs has declined in exporting firms while it has been increased for non-exporting firms over the study period.

Table 5.4 partial Productivity trends in textile and garment industries

Industry type	**Indicators**	**2001**	**2002**	**2003**	**2004**	**2005**
Exporting firms	Y_{it}/L_{it}	9.24	8.61	8.48	8.43	8.32
	Y_{it}/k_{it}	1.95	1.94	1.92	1.88	1.52
Non-exporting firms	Y_{it}/ L_{it}	5.49	5.27	4.70	5.66	5.87
	Y_{it}/K_{it}	1.37	1.48	1.68	1.82	2.45

Source:- Own computation

Table 5.5 below shows descriptive statistics for large and medium scale textile and garment firms with a large and inconsistent variation of productivity. One of the probable cause for variation on productivity may be the size of firms and the consequential level of scale economies that they could possibly exploit. Though there has not been any rule of thumb to level a firm into a certain scale, for the sack of this analysis, firms engaging 200 persons and more are considered large while others are labeled to be medium. Accordingly, mean values of production and inputs significantly varied between large and medium scale textile and garment industries though the numbers in the two categories are not similar.

On average, large scale textile and garment firms are relatively capital intensive compared with medium scale ones. Moreover, mean values of output produced, material inputs, net fixed capital and wages and salaries of labor employed are larger than their medium scale counter parts.

In general, partial productivity of labor is found larger than that of capital in both large and medium-scale firms, however, these partial measures may not entail a conclusive indication whether a large or medium scale firms were more efficient in the use of their factors of production.

Table 5.5: Descriptive Statistics for large and medium scale textile and garment industries (000' Birr except the ratios)

Scale	Indicators	Observation (2001-2005)	Y_{it}	M_{it}	L_{it}	K_{it}	Y_{it}/L_{it}	Y_{it}/K_{it}	K_{it}/L_{it}
Large scale	Mean	67	26,900	16,800	13,300	16,800	2.02	1.60	1.26
	Max	67	94,300	71,000	22,000	27,500	4.29	3.43	1.25
	Min	67	231.3	88.9	30.7	542	7.53	0.43	17.65
	Std dev	67	26,400	17,700	7,200	4,888	3.67	5.40	0.68
Medium Scale	Mean	58	9,118.8	7,132.6	894	943.8	10.20	9.66	1.06
	Max	58	88,900	95,424	36,300	44,625.6	2.45	1.99	1.23
	Min	58	76.9	35.2	1.8	4.8	42.72	16.02	2.67
	Std dev	58	17,700	16,700	6,923	8,267	2.56	2.14	1.19

Source:- own computation

5.2 Econometrics Results

The estimation of parameters in the stochastic frontier model given by Equation [16] is carried out via maximum likelihood method using the program frontier version 4.1C (Coelli.1996). Firm level panel data is used consisting of 37 textile and garment firms and four years observation from 2001 to 2005. Accordingly, stochastic frontier Cobb-Douglass and Tans log production functions are estimated. OLS and maximum likelihood error component frontier estimation procedure is carried out to identify the underlying production technology that might better explain the operation of textile and garment firms.

5.2.1 Hypothesis testing and Model selection

Before interpreting the results of stochastic production frontier, a number of LR tests are carried out to identify the adequate functional forms and the presence of inefficiency effects in the model.

The first test was carried out to investigate whether Cobb-Douglass or Trans log technology better represents the underlying production function of the textile and garment industries. The test result is based on the maximum likelihood estimates of the two-frontier functions presented in Table 5.6. To identify the functional form the null hypnotist is Ho: B11 = B22 = B33 =B12 = B13 = 0, and the alternative hypothesis is H1: B11 ≠ B22 …≠ 0. Accordingly, we accept Ho if LR ratio, $\lambda < x2\ (r)\ (0.95)$, otherwise we reject Ho. The LR computed value for textile and garment

firms is 68.72 with six restricted variables and the critical LR value with 6 degrees of freedom is 16.81 at 1% significance level. This test result suggests that Translog Stochastic frontier production function is found better to represent the underlying State of art in the Ethiopian textile and garment producing firms.

Given the specification stochastic frontier model, there is a particular interest in testing the hypothesis of the non existence of sector level inefficiency expressed by the null hypothesis Ho: $\gamma = \mu = \eta = 0$. The LR computed value for textile and garment firms is 24.14 with three restricted variables and the critical LR value at 3 degrees of freedom is 11.34. The null hypothesis is strongly rejected at 1% significance level for textile and garment firms suggesting that the average production function is an inadequate representation of the textile and garment firms for all cases and will underestimate the actual frontier because of the existence of technical inefficiency effects. Moreover, the OLS estimation does not consider the effect of the one sided inefficiency disturbance term and assumes that all the coefficients and the disturbance terms are normally distributed, this implies that, if inefficiency prevails in the model, all the Bi estimators (except the intercept) obtained from the OLS are usually consistent, but not efficient (Beyene, 2007). The ML estimate, on the other hand, takes into account the existence of inefficiency disturbance and thus computes parameters σ^2, γ, μ and η that help us understand the extent of technical efficiency and trends in the level of technical efficiency [Ibid, P.18]. Therefore, given the assumptions and specification of stochastic frontier production model, with time-varying inefficiency effects, the inferences about the parameters of the model and the different hypothesis test would be based on maximum likelihood estimations.

The third hypothesis is carried out to identify whether there is technical progress in Ethiopian textile and garment firms. The LR computed value for textile and garment firms is 16.51 with five restricted variables and the critical LR value at 5 degrees of freedom is 15.09. Therefore, the null hypothesis is strongly rejected at 1% significance level for textile and garment firms. Moreover, the coefficients of the time variables (neutral change) and of time-input interactions variables (non-neutral change) appeared to be significantly different from zero at least at 1% significant level.

The fourth hypothesis is specifying that technical inefficiency effects have half normal distribution (i.e., Ho: $\mu = 0$) against truncated distribution is accepted implying that technical efficiency levels for the Ethiopian textile and garment firms are better estimated with hlf normal distribution of $U_{it.}$.

The fifth hypothesis is carried out to identify whether firm's inefficiency effects are time-invariant or not (i.e., H0: η=0). The test result showed that firm's inefficiency effects are time-variant implying that technical inefficiency effects significantly tended to increase systematically for textile and garment firms (i.e., η = -0.76) . This suggests that technical efficiency of textile and garment firms significantly declined over the study period.

Table 5.7: LR test of hypothesis for parameters of stochastic frontier Production function.

No	Null hypothesis	Df.	Test statistics	Critical Value	Decision
1	CD Production function H_O: $B_{11}=B_{22}=B_{33}=B_{13}=B_{23}=O$	6	68.72	16.81***	Rejected
2	No technical inefficiency $H_O : \gamma = \mu = \eta = O$	3	24.14	11.34***	rejected
3	No technical Change H_O: $B_4=B_{44}=B_{14}=B_{24}=B_{34}=O$	5	16.51	15.09***	Rejected (Regressed)
4	No neutral technical change H_O: $B_4=B_{44} = O$	3	93.51	11.34***	Rejected (Regressed)
5	No non-neutral technical change	2	89.77	9.21***	Rejected (Progressed)
6	Technical inefficiency effects are time invite, $H_O : \eta = O$	1	18.76	6.64***	Rejected(declined)
7	Half normal distributed of technical efficiency H: $\mu = O$	1	-5.41	2.71	accepted

Notes : ***, ** and * significant t-values at or better than the 1%, 5% and 10% confidence level , respectively.

Since the LR test of γ is found statistically significant it implies that the share of firm level inefficiency from the total out put variation attributable to both internal and external factors was much influential. That is a large proportion of the total variability in output of the textile and garment firms was explained both by technical inefficiency and by white random shock effects, the later were beyond the control of the firms. Here, the coefficient of γ indicates that error due to inefficiency, on average, amounted to about 25%. This result, though relatively low value, suggests that TFP estimation using traditional method, which does not differentiate between technical efficiency and productivity might be misleading. So, one should not rely solely on average production function response as an adequate representation of the sample data.

The coefficients of factors of production reveal the responsiveness of output due to a one unit change in the use of respective factor inputs. However, the coefficient of factors of inputs came up with a prior expected sign except capital. It appears that the contribution of industrial inputs to output found to be a modest one. On the average, a one unit change in the raw material usage and labour employed bring about 0.55% and 0.36% change in the level of out put, respectively. In capital scarce country one may not find statistically insignificant and negative value of capital and would not be theoretically sound. However, the extent of fixed capital use is highly influenced by the amount of variable inputs employed. Majority of the firms were operating far below their technical capacity; reported values of production might not go proportional to their capacity. On average, sample textile and garment firms operate about48 % of their full capacity (CSA Survey Data, 2001-2005)

In general, in flexible functional forms, like Trans log frontier production function, many parameters could turn out non-significant to the LR and the usual t-test and unexpected sign and magnitude of the coefficients of explanatory variables would be observed. This is due to a high level of multi-co linearity problems associated with the presence of squared and interaction terms in such flexible functional forms.

5.2.2 Output Elasticity and Return to scale (RTS)

The output elasticity's can be estimated at mean value of output with respect to the K-th input variables in year t for each study period [Piesse and Thirtle, 2000; Ikhasan, 2006]. From Trans log frontier production function in equation [20] , the output elasticities with respect to each input X_{kit} (K = 1,2,3 and X_{it} = M_{it} + L_{it} +K_{it}) for firm i in year t could be mathematically computed as

$$\varepsilon_{nt}=\partial \ln\{[E\ (Yit)]/\partial \ln X_{kt}\}=B_n+\ \Sigma B_{nk}\ \ln\ X_{kit}+B_{nt}*t \quad \ldots\ldots [26]$$

One of the basic regulatory conditions of production function is monotonocity, which means that additional unit of any input should not decrease the level of out put [Beyene, 2007]. . As indicated in table 5.8, the elasticities for labor input was very low and decreasing over the study period and finally became negative in 2005 implying that the utilized proportional change of labour input has increasingly lower proportional contribution to textile and garment output. The low output elasticities with respect to capital inputs implies that use of machineries and equipment was not optimal and rational.

Table 5.8: Summary of Elasticity of out put with respect to each factor inputs.

Factor input	2001	2002	2003	2004	2005	Average
Material input	0.854	0.858	0.863	0.867	0.870	0.862
Labor input	0.176	0.132	0.081	0.043	-0.002	0.086
Fixed capital	-0.033	-0.024	-0.010	-0.003	0.009	-0.012
Return to scale	0.998	0.965	0.934	0.907	0.878	0.936
Change in Scale Efficiency	-	0.003	-0.010	-0.012	-0.032	-0.013

Source: - Own Computation

In general, the out put elasticity estimates with respect to capital is the lowest but can be observed increasing from -0.03264 to 0.009253 between 2001 to 2005. However the output elasticity of material inputs showed consistently increasing pattern. It slowly incases from 0.854257 to 0.862335 between 2001 and 2005

The sum of elasticities of mean frontier production function with respect to all three inputs used in the production textile and garment products gives return to scale (RTS), which reflects the degree to which a proportional increase in all inputs increases output (Coelli, et al., 1998; cited in Beyene, 2007)

The return to scale for textile and garment firms is significantly less than one and slowly decreased from0.998 to 0.936 between 2001 and 2005 implying that there is slight evidence of decreasing return to scale. This could be due to unskilled and excess labour as well as use of obsolete and out-dated machineries. Moreover, change in scale efficiency of sample firms took a negative value providing further evidence in favor of decreasing return to scale and implying that any increase in the size of Ethiopian textile and garment firms would cause an increase in cost of production. This means that Ethiopian textile and garment firms took disadvantage of economies of scale by increasing firm size.

5.2.3 Technological Progress

Technical progress is the increase in the maximum output that can be produced from a given level of inputs (shift in the production frontier). It is the time derivative of out put that measures the percentage change in output due to a unit elapse of time. Given the Translog frontier production the average measure of technological change can be obtained from the first derivative of the estimates function with respect to time at mean values of the input used in each year. So, the rate of technical change could be computed as:

$$\partial \ln(Yit)/\partial t = Bt + B_{tt}*t + \Sigma B_{nt}*\ln X_{kit} = B_4 + B_{44}*t + B_{14}\ln M_{it} + B_{24}*\ln L_{it} + B_{34}\ln K_{it} \quad ...[27]$$

The above formulation implies that the technical change for i^{th} firm production unit can be calculated directly from the estimated parameters by evaluating the partial directive of the Trans log production function with respect to time. According to key, McBride and Mosheim (2006), the average technical change over the study period can be calculated as:

$$\Delta TP_{it} = ½\{ [\partial \ln (X_{it}, t)] \partial t + [2\partial \ln (X_{i(t+1)}, t+1)] / \partial (t+1)\} \quad ....[28]$$

However, if technical change is non-neutral, the technical change may vary for different input vectors. Hence, following Coelli, Rao and Battese (1998) we use geometric mean between adjacent periods as a proxy for technical changes:

$$\Delta TPit = \{ [1+ \partial \ln (Xit,t) /\partial t] * [1+ \partial \ln f(X_{i\,(t+1)}, t+1) /\partial (t+1)]\}^{1/2} - 1 \quad .....[29]$$

Given the above formulations for technological change, an upward (progress) or downward (regress) movement of the production frontier could be represented by $\Delta TP > 0$ or $\Delta TP < 0$.

In the literature of productivity in developing countries which borrow technology extensively from abroad, the lack of shift in the frontier over time will indicate the failure to acquire and adopt new technology. In other way of saying, the movement of the frontier over time reflects the success of explicit policies to facilitate acquisition of new technology.

In the estimated model of Trans log frontier production function (Table 5.6) the neutral technological change is represented by coefficient B_4 and B_{44} while the non-neutral technological change is explained by coefficient of time-input interaction represented by coefficients B_{14}, B_{24} and B_{34}. The total change of the technological progress in the process of production is determined by the cumulative effect of neutral and non-neutral technical charges.

The sum of the value of the coefficients of neutral and non- neutral changes shows technological regress, which implies dawn ward shift of the frontier production function. The negative sign of the summation of the coefficient of technical change is proved in both frontier version 4.IC and state version 9, though the results in the two packages showed different magnitudes for each coefficient.

Table 5.9 presents the absolute value of change in technological progress estimated both in arithmetic and geometric mean. The result obtained in both methods is almost the same. In both cases the absolute value of change in technological progress has been showing declining trend over the period 2001-2005.

Table 5.9: Summary of Technological progress* over the study period.

Year	Technical progress	Change in technical progress	
		Geometric mean	Arithmetic mean
2001	-0.285001481		
2002	-0.319248499	-0.30345	-0.30212
2003	-0.342920337	-0.33125	-0.33108
2004	-0.361740076	-0.35243	-0.35233
2005	-0.38045946	-0.37123	-0.3711
Average	-0.337873971	-0.33959	-0.33916

Source: - own computation using stata version 9

* The figures in the table 5.9 are computed by applying equations (27), (28) & (29) 0n the lag values of inputs and time variables as well as the estimated values of their coefficients indicated in table 5.6

From table 5.9 one could observe that, on average, change in technical progress was negative. The change in technical progress decreases from -0.302 to -0.339 between periods 2001-2005, computed by arithmetic mean or average method. So, the trends of change in technological progress of Ethiopian textile and garment firms has shown a declining trend over the study period ..

Table 5.10 revealed that, on overage, all the sample (25 firms) firms, are found with negative technical progress and technical change over the study period.

Table 5.10: Number of firms with Negative technological progress and change in technological progress (2002-2003)

Year	Total firms	Technological progress	Change in TP
2002	25	25	-
2003	25	25	25
2004	25	25	25
2005	25	25	25
Average	25	25	25

Source: own computation

Generally, there has been a down ward shift in frontier production function for Ethiopian textile and garment firms and there was no technological progress in the period of 2001-2005. This set of result implies that there might have been a big gab or a failure in the approach to acquiring and adopting new technology or foreign technology. Moreover, most of textile and garment firms are capital intensive as indicated by their capital labor ratio reflecting high expenses on physical assets but not optimally benefited from technological change. This may also be due to poor adoption of new technology or lack of skilled workers to operate a more sophisticated technology.

5.2.4 Technical Efficiency and its Changes

One of the basic components for TFP change is change in technical efficiency. It is the change in firm's ability to achieve maximum out put given its set of inputs (how cloth it is to production frontier). In other way of saying, change in technical efficiency is the rate at which a producer moves towards or away from the production frontier. This implies the gab between production frontier and firm's production function. According to the literatures of Key, BcBride and Mosheim (2006); F. Lnbarra, T. Serra and J. M. Gil (2008), as well as Modjo (2006), the change in technical efficiency is expressed as:

$$\Delta TE = \eta\ U_i\ EXP\ (-\eta(t-T)) = -\partial \ln U_{it} / \partial t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [30]$$

Change in technical efficiency can be positive ($\Delta TE > 0$), zero ($\Delta TE = 0$) or negative ($\Delta TE < 0$) implying that technical inefficiency declines, remains constant or increases over time, respectively.

According to the outputs obtained from frontier version 4.1c program, the negative value of the coefficient of η revealed the existence of technical inefficiency among textile and garment industries which was increasing over time.

The table 5.11 below presents the average technical efficiency and its changes over the study period

Table 11: Technical Efficiency and technical inefficacy of textile and garment firms

Year	TE				Technical inefficiency			ΔTE (Mean Value)
	Mean	Max	Min	std dev	Mean	Max	Min	
2001	0.918	0.924	0.911	0.003	0.082	0.089	0.076	-
2002	0.905	0.917	0.891	0.007	0.095	0.109	0.083	**-0.109**
2003	0.877	0.902	0.848	0.014	0.123	0.152	0.098	**-0.193**
2004	0.821	0.871	0.764	0.027	0.179	0.236	0.129	**-0.301**
2005	0.716	0.811	0.612	0.050	0.284	0.388	0.189	**-0.399**
Average	0.847	0.885	0.805	0.020	0.153	0.195	0.115	**-0.251**

Source: - own computation

The above table revealed that the average technical efficiency scores for the sample Ethiopian textile and garment firms is 0.85 with a standard deviation of 0.020. Thus, the influence of external factors being constant, identifying and accordingly alleviating firm specific constraints could have compensated the 15% short fall in output.

Though technical efficiency results of each firm showed limited variation across firms, it shows a declining trend with big variation over time. For instance, the average technical efficiency level declined from 0.918 in 2001 to 0.716 in 2005. This implies that there is technical inefficiency increment in firms' operation which demands an extra effort to minimize inefficiency. Most textile and garment firms have been operating with old and obsolete machineries and equipment with little rehabilitation and expansion activities. They also suffer from lack of proper management to institute waste disposal mechanisms and insure quality both in the working environment products as well as study ways of improving mode of operations in light of new states of arts to improve their competitiveness [CSA Survey Report, 2001-2005].

The variability of technical efficiency of textile and garment firms also increased over the study period. For instance, in 2001 the range between the most and least efficient firms was as high as 1.3%. The gab has increased to about 19.9% in 2005. Firms performing at the lowest level of technical efficiency also declined from 0.911 in 2001 to 0.612 in 2005. Contrary to the theoretical argument, state and privately owned firms were operating in a comparable level of technical efficiency.

Table 5.12: Summary of average efficiency variation between groups of textile and Garment firms

Indicators	All sample firms	Ownership oriented firms		Market oriented firms		Scale oriented firms		Location oriented firms	
		State	Private	Exporting	Non exporting	Large	Medium	Firms in Addis	Firms out of Addis

Mean	0.847	0.85	0.85	0.5	0.86	0.85	0.85	0.85	0.85
Max	0.89	0.87	0.89	0.89	0.88	0.88	0.89	0.89	0.86
Min	0.81	0.81	0.82	0.81	0.82	0.82	0.81	0.81	0.83
Std dev.	0.02	0.019	0.023	0.020	0.019	0.017	0.022	0.026	0.009

Source: Own computation

Contrary to the descriptive results, econometrics findings revealed that exporting firms were found less efficient compared to those which either unable to or totally gave up looking for the international market. The possible reason may be, whatever the degree of competition in abroad, the alternative market may not be attractive for exporting firms. The kind of technology and the level of processing are oriented to manufacture of high grade textile, whose effective demand may be very low in the local market. Export oriented textile and garment product processors, which could have been a good market for exporting textile and garment products, are very few in number and they may not have the capacity to constantly use superior quality material for the production of exportable articles. Besides their own weakness, inefficient operation of exporting firms could be attributed to problems related to export facilitation.

As opposed to level of production value, firm size-measured by number of employees, did not have significant contribution to technical efficiency variation. Large and medium scale firms were operating in a comparable level of technical efficiency.

In general, technical efficiency of sample textile and garment firms in Ethiopia showed a declining trend. Consequently, the change in technical efficiency declined at a decreasing rate over the study period. For instance, the average technical efficiency level in 2001 was about 0.92. The value declined to 0.72 in 2005, demonstrating how firms have been loosing ground to withstand the sever internal managerial, technical and market searching capabilities. As a result, not only those firms that were able to export their products to the international market have failed to persistently to do so, but also many firms become out of the domestic market in the sub-sector where the country is thought to have a comparative advantage.

5.2.5 Change in Total Factor Productivity (TFP)

In this section we decompose and estimate TFP for Ethiopian textile and garment firms over the study period. We follow the econometrics methodology proposed by Orea (2002) (cited in Kumbhakar and Lovell, 2000), to examine the contribution of changes in technical progress (TP), scale economies (SE), technical efficiency (TE), and allocative efficiency (AE) in changing TFP. Accordingly, change in TFP can be expressed as:

$$\Delta TFP = \Delta TP + \Delta SE + \Delta TE + \Delta AE \quad \text{..........................[31]}$$

Where, $\Delta SE = (\varepsilon_t - 1)*\sum(\varepsilon_{nt/}\ \varepsilon_t)*\Delta X_{nt}$ – measures the contribution of Scale Economies (Scale Efficiency) and $\sum(\varepsilon_{nt/}\ \varepsilon_t)*\Delta X_{nt}$ indicates the increase, constancy or decrease in input use, where $\mathbf{\Delta X}_{nt}$ = $\ln X_{n(t+1)}$ - $\ln X_{nt}$

$\mathbf{\Delta AE} = \sum(\Delta TE / \varepsilon_t - S_{nt})^* \mathbf{\Delta X}_{nt}$ – measures allocative inefficiency and captures the effect of deviation from their expenditure shares , i.e., the impact of deviation in input prices from the value of their marginal products. Where, S_{nt} is the expenditure share of input k from the total input expenditures.

The effect of allocative efficiency on TFP change, however, is not considered in this study. This is due to the fact that, allocative efficiency to exist, it considers different assumptions which are unrealistic in the real word [farell, 1957; Leibenstain, 1966; Scheultz, 1978; Junanker, 1989; Dean and Perlman, 1989; Cited in Beyene, 2007]. Moreover, allocative efficiency to prevail, it requires the existence of perfectly competitive market. Here, under conditions of perfect competition elasticities of output with respect to each input are assumed to be equal to share of expenditure on respective factor inputs in total output. However, this could not be practical at least in the Ethiopian situation where markets are highly distorted by illegal operation, information asymmetry and other physical and institutional factors (CSA Survey Result, 2002-2005)

So, to get the values of change in TFP, we do have three components expressed in the following three equations:

(a) $\Delta TE = -\partial \ln U_{it} / \partial t = \ln U_{i(t+1)} - \ln U_{it}$ …… ……………… **[32]**

(b) $\Delta TE = ½\{\partial \ln \ln f(X_{it}, t)/ \partial t + \partial \ln f[X_{i(t+1)}, t+1]/ \partial(t+1) \}$ ………. **[33]**

(C) $\Delta SE=½\sum [(\varepsilon_{nt} -1)/ \varepsilon_t{*}\varepsilon_{nt}+[(\varepsilon_{n(t+1)} -1)/\varepsilon_t+1{*}\varepsilon_{n(t+1)}]{*}[\ln X_{n(t+1)}-\ln X_{nt}]$ ..[34]

As explained in the above three equations, change in TFP is simply the sum of changes in technical and scale efficiency as well as change in technical progress (Orea, 2002; Modjo,2006; Key, McBride and Mosheim,2006, and Lanbabarraa, Serraa and Gil, 2008).

Table 5.13 presents the average results of TFP decomposition for all firms. On average, TFP decreased at an average rate of -0.603 per annum. The overwhelming portion of this negative change in TFP resulted from decrease in technical change and change in technical efficiency by a rate of –0.25 and –0.34 per annum; respectively. Moreover, change in scale efficiency has been decreased by -0.013 per annum.

Table 5.13: Decomposition of TFP

Year	ΔTE	ΔTP	ΔSE	ΔTFP
2001	-	-	-	-
2002	-0.109	-0.302	0.003	-0.408
2003	-0.193	-0.331	-0.010	-0.534
2004	-0.301	-0.352	-0.012	-0.665
2005	-0.399	-0.371	-0.032	-0.802
Average	-0.251	-0.339	-0.013	-0.603

Source: - Own computation

In general, the change in TFP decomposition presented in equation **(31)** showed that TFP could be changed as a result of movement in the production frontier, a movement of current production towards or away from the frontier and the firm's ability to take advantage of economics of scale. Accordingly, the result of this study revealed that TFP of Ethiopian textile and garment industries for the entire test period recorded a negative value. This implies that the contribution of total factor productivity to output growth is found negative.

Table 5.14: Rate of the out put growth and its components

Change in growth					
Year	**Output**	**Material**	**Labour**	**Capital**	**TFP**
2001	-	-	-	-	-
2002	0.027	-0.061	0.004	-0.028	-0.408
2003	0.016	0.000	0.096	0.140	-0.534
2004	0.237	0.199	0.036	-0.008	-0.665
2005	0.001	0.065	0.014	0.039	-0.802
Average	0.070	0.051	0.037	0.036	-0.603

Source: - Own computation

5.3 Estimating Domestic and international competitiveness of the Sub- Sector

Indicators of domestic and international competitiveness of the Ethiopian textile and garment firms have been computed based on equation (22), (23),(24) and (25). The computation results of unit cost ratios are reported here in the same order as the indicators where presented previously. The first indicator UCD, relies almost exclusively on the raw data obtained from CSA, only the opportunity cost of capital is added. The indicator, UCx, relies on additional assumptions made previously on protection rate.

5.3.1 Domestic competitiveness of the sub sector

It must be remembered that indicator 0f domestic competitiveness essentially measures the financial profitability of firms but differs from the profit rate as it includes the opportunity cost its own capital within the cost of capital. The condition UCD >1 is equivalent to the market interest rate exceeding a profit rate. We have also estimated UCD at firm level as well as based on a four digit ISIC, grouping where four manufacturing activities are identified for the analysis. For both each firm and group of manufacturing activities identified, an indicator of domestic competitiveness have been computed using three cases; namely with out depreciation and opportunity cost of capital, with out opportunity cost of capital and with all costs of capital. The first two cases are short-run scenarios in which fixed assets would possibly be considered as sunk cost. In the short run, it could be managerially advisable to allow production to continue, even if all the cost of capita are not recovered. The third case is the long-run scenario in which it is not advisable to continue production if all costs are not be recovered. In this case, shifting to other activities could be considered (Genet & admit, 2006) in the analysis of domestic competitiveness, a value of UCD greater than one indicates that these particular firms groups of manufacturing activates in the sub sectors are financially unprofitable; implying that they sell their products below their unit costs.

As shown in table 5.15, all the four digit groups of textile and garment manufacturing activities are not financially profitable even with the current tariff barriers Ethiopia imposes in imported textile and garment fabrics. As per the computation, manufacturing activities were unable to cover all cost of production including the cost of capital (depression and opportunity cost) over the study period. This implies that most of the Ethiopian textile and garment firms are not competitive even in the current protected and distorted domestic market. Unfortunately, all of the firms belong to textile and garment sub-sector in which one could expect Ethiopia to have a clear competitive advantage on the global market. It is interesting to note, here, that the maximum unit cost ratio for domestically uncompetitive firms even with out considering the cost of capital has increased from **3.3** in 2002 to **4.7** n 2005 (see Appendex-3).The significance of contraband, dumping and under invoicing could be the reason behind such a situation, for this could nullify any advantage the protection of these sub-sector could other wise provide. Moreover, poor design and lack of skilled manager, use of obsolete and outdated machineries, failure to use modern communication facilities, weak reaction in response to competitive products ad weak international exposures are supposed to be firm level constraints hindering the performance of Ethiopia textile and garment firms [CSA survey result, 2002-2005].

These precarious conditions may bring firms into a vicious circle where the prevailing under utilization of capacities (on average about **48%**) or factor inputs would further enhance unit cost of production and exasperatedly, weaken their fragile competitiveness and financial position.

In general, Ethiopian textile and garment firms register losses and became non- profitable sub-sector over the study period. This may be due to the above-mentioned problems as well as due to strong competition in the export market.

Table 15: Summary of Domestic Competitiveness Indicators

No.	Industrial Group	UCD1	UCD2	UCD3
1	**Spinning, waving and finishing of textiles**	**0.999**	**1.100**	**0.821**
2	**Manufacture of cordage, rope, twine and netting**	**0.902**	**0.959**	**0.995**
3	**Knitting mills**	**0.816**	**0.907**	**0.964**
4	**Manufacture of wearing apparel except fur**	**1.693**	**1.791**	**1.868**
4	**Average**	**1.693**	**1.791**	**1.868**

Notes: UCD1- Domestic unit cost ratio without all capital costs
UCD2 – Domestic unit cost ratio with out opportunity cost
UCD3 – Domestic unit cost ratio with all capital costs

5.3.2 International competitiveness of the sub-sector

International competitiveness is interpreted, here, as the situation where full unit cost in terms of domestic prices is inferior to the prices in the international market. The condition is reflected by a unit cost ratio (UCx) inferior to one, as the index divides the total unit cost in market prices by the border or free trade prices. The international competitiveness of each firms and groups of textile and garment manufacturing activities have been computed using the three cases as used in domestic competitiveness.

Table 5.16 below presents the results of international competitiveness of four digit I SIC groups of manufacturing activities in the sub sector.

Table 16: Summary of International Competitiveness Indicators

No.	Industrial Group	UCX1	UCX2	UCX3
1	**Spinning, waving and finishing of textiles**	1.541	1.691	1.842
2	**Manufacture of cordage, rope, twine and netting**	1.388	1.476	1.531
3	**Knitting mills**	1.255	1.369	1.483
4	**Manufacture of wearing apparel except fur**	2.626	2.772	2.885
4	**Average**	1.908	2.050	2.170

Notes: UCx1– International unit cost ratio without all capital costs
UCx2 – International unit cost ratio with out opportunity cost
UCx3 – – International unit cost ratio with all capital costs.

The values of the computation suggest that textile and garment manufacturing activities as a whole found uncompetitive in the international market. As the values of UCX presented in Table 5.16 revealed, all the groups of manufacturing activities in the sub-sector did not show any tendency of being internationally competitive though they are local resource based activities.

Appendix 4 also shows that the maximum value of unit cost ratio of a firm that has demonstrated a sign of internationally uncompetitive was increasing from **3.28** in 2002 to **4.67** in 2005 uniformity in terms of international competitiveness since the standard deviation has increased from 0.82 in 2002 to **1.39** in 2005 (See Appendix-4). Hence, we can say the likelihood that Ethiopian textile and garment firms would be internationally competitive, even considering the cost of capital as a sunk cost, is limited. The cost of capital did not significantly influence the competitiveness of Ethiopian textile and garment firms' activities though it is an important factor in the production process. The possible reason, for Ethiopian textile and garment firms being uncompetitive in the international market, may be firms own weakness as well as policy related problems.

A study on sub-Saharan African countries revealed that in addition to policy related constraints, transport costs exerted a sever negative impact on external trade performance. Freight rates for African exports often are considerably higher than on similar goods originating in other countries, and these charges generally conceal very high rates of effective protection for processed goods, a point that significantly reduces incentives for new investment in export oriented production [world Bank, 1995; cited in worku, 2006]. This condition in Ethiopia could not be different, if not worth.

It is also observed that the poor performance of Ethiopian textile and garment firms measured by TFP, indicates lack of competitiveness both in domestic and international market.

Inefficiencies in relation to external trade movements; long delays of vehicles and of exportable and imported intermediate goods, mainly due to time consuming and lengthy processes result high transaction costs could be reasons for lack of competitiveness. Through these processes, exporters could supply their products with competitive prices and import principal and auxiliary inputs at a cheaper price. In this effect, the application of improved logistics management system such as electronic data interchange (EDI) schemes allows to effectively co-ordinate the activities of transport service providers custom offices, insurance companies, port service providers and exporters [TFEDC, 2001]. This is particularly proven mechanism which has brought about a significant reduction in transaction cost and facilitating trade relations in many countries [World Band, 1992]. So, reduction of transaction costs could be substantially benefit the sub sector in particular and the country in general.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1. Summary & Conclusion

The textile and garment industries play an important role in the economic development of many countries of the world. Experiences of many countries including China and Mauritius showed that textile and garment industries have made a considerable contribution for economic development in several ways. The Ethiopian experience shows no encouraging signs in industrialization and competitiveness of the sub sector despite opportunities of large labor force, huge domestic market, availability of raw material and government support as well as relatively early entry to the sector compared to other African countries.

The Ethiopian textile and garment sub-sector is under severe threat even in the domestic market owning to both external factors and firm level weakness.

Given the current global developments and liberalized market conditions, the survival of both unproductive and uncompetitive firms is highly questionable. In light of this fact, the study has examined the growth of total factor productivity as well as domestic and international competitiveness of Ethiopian textile and garment firms.

A total number of 25 medium and large scale production firms are taken from the sub-sector for the purpose of analysis. A Tran slog and /or Cobb Douglass Stochastic frontier production function involving traditional production inputs of capital, labor and industrial cost was specified. And balanced panel data model developed by Battese and Coelli (1992) is employed for the purpose of estimating technical efficiency and decomposing TFP growth into changes in technical efficiency, technological progress and scale economies. After performing the likelihood ratio tests, it is observed that the Tran slog production function is a good representation for the production technology of Ethiopian textile and garment firms.

According to descriptive statistical results, sample Ethiopian textile and garment firms were operating below their technical capacity. On average, firms are operating less than 50% of their full capacity. This could be as a result of obsolete and out-dated Machineries employed by the firms in addition to internal and external factors affecting them.

According to econometrics results, mean technical efficiency scores of sample textile and garment firms is 85% with standard deviation of 0.020. Thus, the influence of external factors being constant, identifying and accordingly alleviating firm specific constraints could have compensated the 15% of short fall in output. Despite limited variation across firms and over time, technical efficiency declines during the study period. This could be due to the existence of obsolete and out-dated machineries with little rehabilitation and expansion activities, lack of proper management to institute waste disposal mechanisms etc.

Contrary to the theoretical argument, the empirical result also revealed that state owned firms are found operating as the same efficiency level as that of privately owned firms

According to the empirical result, the output elasticity with respect to each input are found in inelastic range. Moreover, the output elasticities of labor and capital are found less than 0.1, and the contribution of capital input to output growth is found negative as reflected by negative value of its coefficient.

The study also found that, firms have recorded decreasing return to scale. On average, firms were recording a deteriorating technical progress implying that there was a downward shift in frontier production function over time. With this respect, all the 25 sample firms are found with negative technological progress. This set of result implies that there has been a big gab or a general failure in the approach to acquiring and adopting new technology or foreign technology. Moreover, most of textile and garment firms are found capital intensive or capital consuming and labor saving contrary to the theory of initial factor endowment of the country, reflecting high expenses on physical assets but not optimally benefited from technological change.

The study also provides an overall evaluation of TFP changes in the Ethiopian textile and garment firms using a frontier based decomposition method. The change in TFP is decomposed into change in technical progress (ΔTP), change in Technical Efficiency (ΔTE) and change in scale efficiency /economies (ΔSE). When the decomposition was made, it was observed that there has been a deterioration in the growth of technical efficiency, scale efficiency and technological progress which made the change in TFP negative over the study period. On average, Ethiopian textile and garment firms recorded average TFP growth of -60.3% per annum over the study period. The overwhelming portion of this negative change in TFP resulted from negative change in technical progress, technical efficiency and scale efficiency by an average change of –0.39, and –0.25 and 0.013 per annum over the study period, respectively.

In general, Ethiopian textile and garment firms recorded negative TFP changes over the study period implying that the contribution of TFP to output growth is remained negative.

Given the negative contribution of TFP to output growth of textile and garment firms, the study also tried to see the financial profitability or competitiveness of the firms in both domestic and international market. The analysis made use of unit cost ratio as an indicator for both domestic and international competitiveness.

In the case of domestic competitiveness, all the firms as well as groups of manufacturing activities in the sub-sector were remained with losses over the study period. As per the computation made, on average, firms recorded 1.69 domestic unit cost ratio (UCD1). This implies that firms, on average, fail to compute in the current protected and distorted domestic market even without all capital costs. The reason for such situation could be the increase in contraband, dumping, under invoicing, poor design and unskilled manpower, use of obsolete and backward machineries, weak reaction in response to competitive products and weak international exposure and failure to use modern communication facilities.

Similarly, international competitiveness indicators showed that Ethiopian textile and garment firms are failed to compute in the international market. . With this respect, on average, all sample firms as well as group of manufacturing activities in the sub-sector, recorded 1.91 international unit cost ratio (UCD1). This implies the likelihood that Ethiopian textile and garment sub-sector would be internationally competitive even considering the cost of capital as sunk costs, is found uncertain. The cost of capital did not significantly influence the competitiveness of the sub-sector, despite its importance in the production process. The possible reason for the failure of the sub-sector to compute in the international market may be firms' own weakness, as well as export facilitation and policy related problems. These include high transaction costs of export trade resulting from transportation delays, weak information flow and coordination among exporters and service providing agencies (including customs administration, insurance and transport operators) seriously affects the competitiveness status of textile and garment firms in the external market. Moreover, the inability of concerned bodies to control quality standards of similar imported products and ensuring fairly competitive market environment make the survival of textile and garment producing firms at stake.

In general, the hypothesis that firms with low TFP are also firms with low domestic and international competitiveness are well reflected in the empirical result. And from this analysis, therefore, it would be probably drawn that the growth and role of textile and garment sub-sector in Ethiopian economy is very low implying that the level of industrialization in the sub-sector is very low. Thus, policy makers would focus on the implications of this study to mitigate the problem and achieve the designed goal of sustainable industrial growth.

6.2 Policy Recommendations

Based on the findings and generally accepted ideas by many scholars, the following possible policy recommendations are made:

As the study vividly explained both TFP and competitiveness of Ethiopian textile and garment firms, both of firm level and groups of manufacturing activities, are very low: so to solve the problem the following actions should be taken by concerned parties

1. To solve the problem of technical efficiency, the government and its policy should focus on two respects.
    - For those firms which are recently established, to improve their efficiency, the government policy should be geared towards assisting them through providing relevant training, credit service and other technical support so that they can cope up with the experienced and old aged ones.
    - For those firms having relatively more experience and old aged, the government should focus on assisting them by introducing new technology and encouraging and supporting them to replace their old aged technology as well as conduct Business Process Reengineering (BPR) to avoid their weakness and use their opportunity.

2. To solve the problem of raw material supply, the government policy and its support should be:

(a) In the short-run, instead of direct involvement in importing inputs for textile and garment firms, the government should encourage and support the establishment of agents of the foreign companies and other efficient importers to intensively involve in importing inputs. This creates an opportunity for firms to get the inputs locally which may help them from keeping huge stocks, increase the availability of working capital and reduce the problems with custom procedures.

(b) Strengthen inter-sectoral linkage through the development and promotion of agriculture as well as local support industries that produce and provide input for firms of textile and garment sub-sector.

(c) The government has to provide necessary incentives for the establishment of vertically integrated textile and accessory industries as well as re-innovating the existing ones in order to have a reliable and quality supply of inputs with reasonable price. However, as the establishment of integrated textile mills needs huge investment, the government should contribute its share in the form of joint venture to encourage and develop the confidence of the private sector to get involved in the textile and garment sector.

3. To solve the problem of competitiveness:

a) Emphasis should be given to pull-approach over push-approach. Through push-approach, the government attracts firms by incentives. With this respect, the government wants the textile and garment firms to actively respond to the available export market for foreign currency demand and provides various incentives for firms engaged in export activities.. And the firms simply start business in export activity with out knowledge, experience, market demand and market linkages. They built factories, import foreign technology and then search for market. Finally, most of the newly established firms operate under capacity due to lack of market. Therefore, pull approach policies should be disseminated through out all firms at the start of business to ensure the importance of generating information on polices, customers preference demand for product quality and market channels.. In order to do this integrated efforts are important from concerned stack holders including financial institutions, trade associations, R & D institutions, the government as well as cotton, textile & garment producing firms.

b) It is very important to establish export processing zone to create better export policy environment relatively functional infrastructures that enable to further develop and expand export trade. This is practically proven mechanism, which has brought about significant improvement in the development of textile and garment sub-sector in China and Mauritius.

c) Emphasis should also be given to improve the quality of the product. With this respect:

- Firms should have to establish in-house quality control unit that could ensure its products full fill the minimum acceptable quality including quality absence of bleaching etc.
- There should be persistent capacity building programs for standard and quality authority agency, firms and trade associations in order to enable them cope up with frequent changes and demand for international quality standard authority.
- A joint forum should be organized by firms, the government, trade association and other concerned parties to set and revise standards, identify problems and to propose interventions to solve quality problems.
- The government should strengthen and expand higher learning institutions that are engaged in textile and garment sector in order to increase professionals on quality control.

d) More emphasis should be given to create conducive and competitive marketing system. With this regard, the recent interventions, both in controlling illegal trade and promoting export, seem to indicate that government has wake-up, and tries to rescue the industrial sector in general and the textile and garment sub-sector in particular. It is a commendable move that should be pursued in a well integrated and Coordinated manner. Moreover, facilitating external trade by way of establishing electronically driven information system that facilitate co-ordination of the services of customs, insurance, transport and others should be considered.

Efforts of firms, government and other stack holders should be synchronized to address the stated constraints to bring about sustainable improvement and development to the sub-sector and the country at large.

Table 5.6: ML estimates of Cobb-Douglass and Translog Production frontier model

Variables	Para meters	Cobb-Donglas Model				Translog Model			
		OLS Estimates		ML Estimates		OLS Estimates		ML Estimates	
		Coefficient	T-ratios	Coefficient	T-ratios	Coefficient	T-ratios	Coefficient	T-ratios
Constant	Bo	0.506	0.999	0.575	1.064	2.209	0.939	2.484	2.468**
Indu cost (M_{it})	B1	0.828	17.412***	0.828	16.207***	0.500	1.610*	0.545	1.838**
Wages & salaries (Lit)	B2	0.189	3.518***	0.197	16.207***	0.319	0.976	0.356	1.180
F..Capital (Kit)	B3	-0.006	-0.099	-0.014	-0.262	-0.035	-0.129	-0.143	-0.512
Year (T_{it})	B4	0.482	2.808***	0.453	2.151**	0.501	2.888***	0.440	2.385**
½ ln M_{it}^2	B11					0.002	0.082	-0.001	-0.048
½ ln L_{it}^2	B22					0.002	0.513	0.026	0.569
½ ln K_{it}^2	B33					0.025	1.775*	0.068	1.923**
Ln (M_{it} *Lit)	B12					0.062	1.227	0.029	1.140
Ln (M_{it}* K_{it})	B13					0.030	-0.282	-0.005	-0.200
Ln (M_{it} * K_{it})	B23					-0.007	-1.944**	-0.062	-1.993**
Ln M_{it} X* T_{it}	B14	0.006	0.422	0.005	0.221	0.004	0.254	0.003	0.201
Ln L_{it} X *T_{it}	B24	-0.034	-2.188**	-0.036	-2.216**	-0.043	-2.620**	-0.045	-2.880***
Ln K_{it} X* T_{it}	b34	0.000	0.008	0.003	0.183	0.009	0.483	0.011	0.628
½ Tit^2	B44	-0.028	-1.042	0.007	0.183	-0.026	-0.964	0.018	0.405
Sigma Square	$б^2$	0.063		0.074	1.067	0.063		0.067	6.446***
Gamma	γ			0.289	0.447			0.250	6.446***
Mu	μ			0.293	0.447			0.259	1.955**
Eta	η			-0.564	0.325			-0.465	1.253
Log likelihood function	LF		0.002		10.326		32.616		44.684

Notes : ***, ** and * significant t-values at or better than the 1%, 5% and 10% confidence level , respectively.

Bibliography

- Aigner, D.J., C.A.K., Lovell, and P.J. Schemidt, (1977). "Formulation and Estimation of Stochastic Frontier Production Models", Journal of Econometrics, Vol. 6: pp21-37.
- Alan, H., et.al (2004). "Survival and Success Among African Manufacturing Firms", **Center for Study of African Economies,** Department of Economics, University of Oxford UK.
- B. Golder & A. Kumari (2003. **Import Liberalization and Productivity Growth in Indian Manufacturing In lustiest in the 1990s**, India.
- Berhanu Nega and Kibre Moges (2001). "Productivity and Competitiveness o f t he L eather S ector i n Africa: F indings from four countries case studie**s"; Paper Presented to the UNECA**, Addis Ababa.
- Beyene Taddese, (2007). "Study of Total Dactor Productivity of Teff in Ethiopia"; Application of a Growth Decomposition Approach. Ethiopian Journal of Agriculatural Economics. 6(2):103-140, Addis Ababa
- C. Marxser, wages (1998). **Water and Stagnation The Real Worth of Prevention & Production to Growth**, University of Nebraska of
- Calsar, B. et. al., (1995) **Estimation of Total Factor Productivity of Philippine Manufacturing Industries: The Estimate**; Philippine Institute, for Development Studies Discussion paper services, No. 95-32.
- Camilla, J.B. and Josephson. S., (2002), **Determinant of Total Factor Productivity and phases in Economic Growth; Swedish Manufacturing Industry**. 1950-1994, Congress of Economic History Association.
- Central Statistical Agency of Ethiopia (2003/04). Statistical

Balletin 310. **Report on large and Medium Scale Manufacturing and Electricity Industry Survey**.

- Central Statistical Agency of Ethiopia (2007). Statistical Balletin. **Report on large and Medium Scale Manufacturing and Electricity Industry Survey.**
- China Textile Planning Institute of Construction (2003). **Study Report on the Development Strategy of Ethiopian Cotton-Textile-Garment Sub-sectors** Addis Ababa (Unpublished)
- China Textile Planning Institute of Construction, (2003). Study **Report on the Development Strategy of Ethiopia Cotton/Textile/ Garment Sub-Sector. Unpublished. Addis Ababa**
- Cockburn, ET. al., (1998). Measuring competitiveness and its sources: The Case of Malis Manufacturing Sector: http:www.creta.enc.vlava/ca/cahier/
- Collier, P. (1997). "Globalization: What should be the African Policy Response" **CSAE**; Oxford, Mimeo.
- Daniel G.H., (2006). **Measurement and Sources of Technical Efficiency in Ethiopian Manufacturing industries**; Thesis Addis Ababa University Unpublished.
- Dickerson, K, G., (1992). **Global shift: The Internalization of Economic Activity;** (Second Edition), New York Guilford press
- Dickerson, P., (1999). **Textile and Apparel in the Global Economy.**
- Elbadawi, I., (1997). "Can Africa Export Manufactures: The Role of Endowment, Exchange Rate and Transaction Costs", **WPPRP**.2120
- Endalkachew Sime, (2006). "Enterprise Management of State

owned cotton/Textile/ Garment Enterprises in Ethiopia **"Proceedings of the third International Conference on the Ethiopia Economy;** Ethiopian Economic Association Vol. II.

- Eric, J. B. (2000). **Understanding Productivity Lessons From Longitudinal Micro Data,** Free University, Amsterdam
- Ethiopian Economic Association, (2004). **Industrialization and Industrial Policy in Ethiopia,** Report on Ethiopian Economy. Volume III. Addis Ababa.
- F. Lambarraa ,T, Serra and J.M, Gil (2007). Technical Efficiency Analysis and Decompsition Total Factor Productivity Growth of Spanish Olive Farms" **Spanish Journal of Agricultural Resurch** ; 5(3) 259 – 270 WWW. India eslsjar: WWW.inia. N. Key, W. McBride and R. Mosheim (2006). "Decomposition of Total Factor Productivity Change in the US Hog Industry"; **Paper Prepared for Presentation at the Annual Meeting**
- Fabricant, S., (1959). " Basic Sector in Productivity Changes"; **National Bureau Economic Research** Occasional Paper No.63
- Farrel, M.J., (1999). "The Measurement of productive Efficiency", **Journal of Royal Statistical Society** Series A (General) 120:253-281
- Getnet Alemu (2003). "Ethiopia Manufacturing Competitiveness Opportunities and Constraints" **Paper Presented on the National Workshop on Ethiopian Manufacturing Competitiveness From there to where**: Addis Ababa.
- Getnet Alemu and Admit Zerihun,(2006). "The Ethiopian Manufacturing Sector: Competitiveness and the way a head". **Ethiopian Journal of Economics.** Volume X, No. 2
- Idris, Jahli (2007). Determinants of Total Factor Productivity Growth in Malaysia; **Journal of Economic Cooperation**; 3 (28): 41-58

- Institute of Economics (2001b). "Analysis of competitiveness of Textile and Garment Firms in Vietnam: A Cost Based Approach" , **International Development Research Center**, Mimeo Hanoi
- K. P Kalirajan, M. B. Obwona, and S. Zhao (1996). A Decomposition of Total Factor Productivity Growth: The Case of Chinese Agricultural Growth Before and After Reform. **American Journal of Agricultural Economics; http;//WWW.jstor.org/stable/1243706** Kearhey, USA
- Kebede Abera, (2006). **An Examination of the Challenges, and Prospects of Textile and Garment Industrial Sub-sector in Ethiopia**; Thesis unpublished, Addis Ababa University.
- Kendrics John (1969). "Productivity Trends in in the United States", **National Bureau of Economic Research** ; Prindon University Press New Yorks.
- Kumbhakar, S.C. and Lovell, C.A.Knox (2ooo). Stochastic Frontier AnalysisNewYork,**CambrigeUniversityPress;WWW.warwick..ac.uk/res2003/papers/liao**/
- Mamo Mihretu (2004). **The Expiry of the Agreement on textiles and clothing and its Implication for Ethiopia;** Ethiopian Embassy, Brussels (Unpublished)
- Ministry of Trade and Industry, (2003). **Diagnostic Trade Integration** Study Addis Ababa Unpublished.
- Mohamad, Ikhsan, (2006). **Total Factor Productivity in Indonesia Manufacturing. A Stochastic Frontier Approach**. ABERU Discussion paper, Monash University, Business and Economic.
- Mulat Demeke et.al., (2004), Decent Work **Deficits in the Ethiopian Cotton Sector**; Unpublished, Addis Ababa.
- Nordas, H. K., (2004). "The Global Textile and Clothing Industry Post the Agreement on Textile and Clothing"; **WOT Working Paper**.
- OECD (2001) **Measurment of Aggregate and Industrial – Level Productivity Growth. www.copyright. Com**; France **of American Agricultural Economics Association**; California

- Porter, M. E., (1990). "The competitive Advantage of Nations", **Harvard Business Review 2:73-93**
- Rahel Abebe, (2007). **Opportunities and Challenges of Development for Africa in the Global Arena, the case of Ethiopian Textile sub-sector**; Paper submitted to African Economic Conference Unpublished.
- Salinger, B. Lynn, (2001). Productivity**, Comparative advantage and competitiveness in Africa**. Africa Economic Policy Discussion paper No. 35.
- Samar, Verma, (2002). "Export Competitiveness of Indian Textile and Garment Industry"; **Indian Council for Research on International Economic Relations Working Paper**; No. 94. New Delhi 110003.
- Siggel E. and J. Cockburn (1995). **"**International Compositeness and its S ources: A Method of D evelopment P olicy Analysis**";** Concordi University, Department of Economics**; Discussion Paper 9517.**
- Siggel, Ikiara and Nganda, (2000). **Competitiveness of Manufacturing Industry in Kenya**. African Economic Policy Discussion Paper. No. 25.
- Siggel, S., (1999). **Uganda's Policy reforms, Industry competitiveness and regional integration a comparison with Kenya**...http://www.(Sae.ox.ac.uk/conferences.
- Swamy, P. and Padma. (2005). "The Ethiopian Manufacturing sector; Structure, , Growth and Efficiency," **proceedings of the second International conference on the Ethiopian Economy**: Volume X, Addis Ababa.
- Swann, P. and M. Taghavi (1992). **Measuring price and quality Competitiveness;** Avebury,
- UNCTAD (2004) Trade and Gender Opportunities and Challenges for Developing Countries, Geneva.

- Worku Gebeyehu, (2005). "Privatization and Efficiency in the Ethiopian Manufacturing Industry". **Proceedings of the Second International Conference on the Ethiopian Economy.** Ethiopian Economic Association vol. I.
- World Economic Forum (1995). **The World Competitiveness Report**, International Institute Management Development; Geneva

Appendex 1: Technical Efficiency of Textile and Garmet Firms

Firm No	2001	2002	2003	2004	2005	Average
1	0.918	0.905	0.878	0.822	0.716	0.848
2	0.918	0.905	0.878	0.822	0.716	0.848
3	0.911	0.891	0.848	0.764	0.612	0.805
4	0.920	0.909	0.886	0.839	0.748	0.860
5	0.913	0.894	0.856	0.779	0.638	0.816
6	0.920	0.910	0.887	0.841	0.752	0.862
7	0.918	0.904	0.875	0.816	0.706	0.843
8	0.919	0.906	0.879	0.825	0.721	0.850
9	0.920	0.909	0.885	0.837	0.745	0.859
10	0.918	0.904	0.875	0.816	0.706	0.844
11	0.916	0.900	0.866	0.800	0.675	0.831
12	0.920	0.908	0.884	0.836	0.742	0.858
13	0.924	0.917	0.902	0.871	0.809	0.884
14	0.918	0.904	0.876	0.819	0.711	0.846
15	0.922	0.912	0.892	0.852	0.773	0.870
16	0.921	0.912	0.892	0.851	0.771	0.869
17	0.919	0.907	0.881	0.830	0.731	0.854
18	0.920	0.908	0.884	0.835	0.741	0.857
19	0.918	0.905	0.878	0.823	0.718	0.848
20	0.915	0.898	0.862	0.792	0.662	0.826
21	0.917	0.902	0.871	0.810	0.693	0.839
22	0.924	0.917	0.902	0.871	0.811	0.885
23	0.915	0.899	0.865	0.798	0.672	0.830
24	0.916	0.901	0.869	0.805	0.685	0.835
25	0.913	0.894	0.855	0.777	0.636	0.815
Mean	0.918	0.905	0.877	0.821	0.716	0.847
Maximum	0.924	0.917	0.902	0.871	0.811	0.885
Minimum	0.911	0.891	0.848	0.764	0.612	0.805
St. deviation	0.003	0.007	0.014	0.027	0.050	0.020

Appendex: Domestic Competitiveness indicators

No.	Industrial Group	Indicator	2002			2003			2004			2005			average		
			UCD1	UCD2	UCD3	UCD1	UCD2	UCD3	UCD1	UCD2	UCD3	UCD1	UCD2	UCD3	UCD1	UCD2	UCD3
1	**Spinning, weaving**	Max	1.340	1.531	1.890	1.434	1.629	1.821	1.735	2.014	2.625	1.317	1.954	2.462	0.999	1.100	0.821
	and finishing	Min	0.789	0.846	0.869	0.370	0.487	0.658	0.495	0.499	0.506	0.608	0.614	0.620	0.999	1.100	0.821
	of textiles	Mean	1.051	1.163	1.265	0.992	1.100	1.218	0.996	1.121	1.233	0.945	1.069	1.169	0.999	1.100	0.821
		Stdev	0.147	0.206	0.275	0.301	0.316	0.351	0.311	0.419	0.539	0.220	0.344	0.460	0.999	1.100	0.821
2	**Manufacture of ,**	Max	0.915	0.965	1.005	1.110	1.205	1.261	0.786	0.840	0.878	0.929	0.975	1.007	0.935	0.996	1.038
	cordage, rope,	Min	0.880	0.933	0.971	0.915	0.957	0.991	0.768	0.829	0.855	0.913	0.971	0.994	0.869	0.923	0.953
	twine and netting	Mean	0.898	0.949	0.988	1.013	1.081	1.126	0.777	0.834	0.867	0.921	0.973	1.001	0.902	0.959	0.995
		Stdev	0.024	0.023	0.024	0.138	0.175	0.191	0.013	0.007	0.016	0.011	0.003	0.009	0.047	0.052	0.060
3	**Knitting mills**	Max	0.986	1.002	1.142	0.745	0.841	0.879	0.766	0.889	0.938	0.765	0.829	0.898	0.816	0.907	0.964
		Min	0.986	1.002	1.142	0.745	0.841	0.879	0.766	0.889	0.938	0.765	0.829	0.898	0.816	0.907	0.964
		Mean	0.986	1.002	1.142	0.745	0.841	0.879	0.766	0.889	0.938	0.765	0.829	0.898	0.816	0.907	0.964
		Stdev	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	**Manufacture of**	Max	3.279	3.360	3.416	6.859	7.502	7.967	4.079	4.174	4.243	4.670	4.927	5.092	4.722	4.991	5.180
	wearing apparelst	Min	0.307	0.326	0.329	0.778	0.851	0.928	0.754	0.811	0.869	0.798	0.861	0.914	0.659	0.712	0.760
	except fur apparel	Mean	1.315	1.379	1.424	2.154	2.334	2.465	1.584	1.638	1.687	1.718	1.812	1.895	1.693	1.791	1.868
		Stdev	0.877	0.890	0.900	2.074	2.279	2.427	1.099	1.117	1.127	1.301	1.375	1.413	1.338	1.415	1.467
	Textile	Max	3.279	4.335	6.538	6.859	7.502	7.967	5.170	5.447	5.786	4.670	4.927	5.092	3.827	5.553	6.346
	and garment	Min	0.307	0.326	0.329	0.370	0.487	0.658	0.423	0.427	0.430	0.608	0.614	0.620	0.275	0.464	0.509
	(Total)	Mean	1.169	1.304	1.482	1.343	1.345	1.493	1.331	1.375	1.474	1.268	1.300	1.390	1.693	1.791	1.868
		Stdev	0.645	0.789	1.138	1.563	1.708	1.809	1.011	1.059	1.127	0.994	1.059	1.106	0.805	1.154	1.295

Appendex 3: International Competitiveness Indicators

No.	Industrial Group	Indicator	2002 UCX1	2002 UCX2	2002 UCX3	2003 UCX1	2003 UCX2	2003 UCX3	2004 UCX1	2004 UCX2	2004 UCX3	2005 UCX1	2005 UCX2	2005 UCX3	Average UCX1	Average UCX2	Average UCX3
1	Spinning, weaving	Max	2.061	2.356	2.908	2.206	2.506	2.801	2.669	3.098	4.038	2.025	3.006	3.788	2.197	2.493	2.998
	and finishing	Min	1.214	1.301	1.337	0.568	0.749	1.012	0.761	0.768	0.778	0.935	0.000	0.041	1.052	1.109	1.189
	of textiles	Mean	1.617	1.789	1.946	1.526	1.718	1.874	1.532	1.725	1.897	1.454	1.492	1.649	1.541	1.691	1.842
		Stdev	0.227	0.317	0.423	0.462	0.513	0.541	0.478	0.645	0.829	0.339	0.680	0.838	0.298	0.436	0.539
2	Manufacture of	Max	1.407	1.484	1.546	1.708	1.853	1.941	1.210	1.292	1.351	1.429	1.500	1.550	1.412	1.520	1.584
	cordage, rope,	Min	1.355	1.435	1.494	1.408	1.473	1.524	1.182	1.276	1.316	1.404	1.494	1.529	1.364	1.432	1.479
	twine and netting	Mean	1.381	1.459	1.520	1.558	1.663	1.733	1.196	1.284	1.333	1.416	1.497	1.540	1.388	1.476	1.531
		Stdev	0.037	0.035	0.037	0.212	0.269	0.294	0.020	0.011	0.025	0.018	0.004	0.014	0.034	0.062	0.074
3	Knitting mills	Max	1.518	1.541	1.756	1.147	1.294	1.352	1.178	1.367	1.443	1.177	1.275	1.382	1.255	1.369	1.483
		Min	1.518	1.541	1.756	1.147	1.294	1.352	1.178	1.367	1.443	1.177	1.275	1.382	1.255	1.369	1.483
		Mean	1.518	1.541	1.756	1.147	1.294	1.352	1.178	1.367	1.443	1.177	1.275	1.382	1.255	1.369	1.483
		Stdev	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	Manufacture of	Max	5.045	5.170	5.255	10.552	11.541	12.257	6.275	6.422	6.528	7.184	7.580	7.834	7.264	7.678	7.969
	wearing apparel	Min	0.472	0.501	0.506	1.197	1.309	1.427	1.160	1.248	1.337	1.228	1.324	1.406	1.238	1.266	1.277
	except fur apparel	Mean	2.023	2.122	2.191	3.314	3.591	3.792	2.437	2.521	2.596	2.642	2.788	2.916	2.626	2.772	2.885
		Stdev	1.350	1.369	1.385	3.191	3.506	3.734	1.691	1.719	1.733	2.002	2.115	2.173	2.045	2.161	2.238
	Textile	Max	5.045	5.170	5.255	10.552	11.541	12.257	6.275	6.422	6.528	7.184	7.580	7.834	7.264	7.678	7.969
	and garment	Min	0.472	0.501	0.506	0.568	0.749	1.012	0.761	0.768	0.778	0.935	0.000	0.041	1.052	1.109	1.189
	(Total)	Mean	1.745	1.876	1.985	2.163	2.378	2.537	1.801	1.941	2.038	1.868	1.915	2.030	1.908	2.050	2.170
		Stdev	0.761	0.788	0.821	1.842	2.014	2.137	1.034	1.084	1.154	1.178	1.318	1.394	1.179	1.260	1.318

Declaration

This thesis is my original work and has not been presented for a degree in any other university, and that all sources of material used for the thesis has been duly acknowledged.

Name:- Jemal Hassen Mohammed

Signature:-______________________

Confirmed by Advisor Dr. Begene Tadesse

Signature:- _____________________

Place:- Department of Economics
Addis Ababa University
School of Graduate studies