Impact of technological factors on the Competitiveness of Ethiopian footwear industry

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School of Mechanical and Industrial Engineering

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DECLARATION

I hereby declare that the work which is being presented in this thesis entitled "Impact of Technological factor on the Competitiveness of Ethiopian Footwear Industry" is original work of my own, has not been presented for a degree of any other university and all the source of resources used for this thesis have been properly acknowledged.

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This is to declare that the above declaration made by the candidate is correct to the best of my knowledge.

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DEDICATION

This thesis is dedicated to my father, Teshome Terefe, who sacrifices his all life to make my life journey possible.

ACKNOWLEDGMENTS

First of all I want to thank Almighty God for all the extra energy he gave me during this thesis working period. It is no exaggeration to state that without insisting the Almighty God, Jesus Christ, would not have been in a position to finalize successfully accomplished of this thesis paper. So, Glory to him.

Conducting of this thesis research from project proposal to the final write up could not be fruitful without the generous assistance of individuals. In particular, I express my deepest gratitude to my advisor, Dr. Gulelat Gatew for his encouragement, valuable advice and comment throughout the development of this thesis. I also extend my cordial appreciation and thanks to my co-advisor Dr. Gezahegn Tesfaye, in following every steps and progress of the thesis write up and for his valuable advice.

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Thank you!

Dereje T.

ABSTRACT

Competitiveness is the struggle of two or more parties stand-in independently to confident the business of a third party by proposing the most promising terms. There are two different outlooks that try to explain competitiveness. As a whole, macroeconomic perspective is famous as the angle that categorizes what global competitiveness is in terms of price-based factors. Oppositely, microeconomic perspective tries to categorize firm level competitiveness with non-price based factors examining challenge between enterprises. The competitiveness of the footwear industry of Ethiopia is not matured as its age due to different competitiveness factors like technology; hence the enterprises are losing their markets for cheap imported shoes from foreign countries. This study is done with the objective of examining the Technological factors that affect competitiveness of the Ethiopian footwear industry. To meet this objective a survey of 6 shoe factories was conducted around Addis Ababa. Out of 90 sampled respondents, 63 properly answered and returned the questionnaire to the researcher. The survey data was analyzed using factor analysis, the factor loadings and the measurement of decision rules adopted by Vichea (2005) were used to analyze the Technological variables and their impact on the competitiveness of the industries. In addition, the One-Way Analysis of Variance (ANOVA) is used to examine if there is a statistical difference between the opinion of respondents regarding technological factors. The finding indicated that significant technological factors have had different observed force on the competitiveness of the companies. The result shows that all nine technological factors were significant and supported. A competitiveness model is proposed to overcome the highly affecting competitiveness factors of the sector. The model developed shows the continuous improving of the price based and non-price based factor affecting these industries competitiveness.

Key words: competitiveness, technological barriers, factor analysis, competitiveness model, price based and non-price based factor.

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LIST OF ACRONYMS AND ABBREVIATIONS

AMT	Advanced Manufacturing Technologies
ANOVA	One-Way Analysis of Variance
CSA	Central Statistical Agencies
EFA	exploratory factor analysis
EU	European union
FA	factor analysis
FMCG	Fast moving customer goods
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
LIDI	Leather Industry Development Institute
MSA	Measures of Sampling Adequacy
MTI	Ministry of trade and Industry
OECD	Organization for economic cooperation and development
PU	Poly Urethane
PVC	Poly vilely chloride
QCI	quality competitive Index
SCM	Supply chain management
SPSS	Statistical package for the social sciences
UK	United kingdom
UNIDO	United Nation Industrial Development Organization
US	United state
USD	United states dollar

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CHAPTER ONE

1. INTRODUCTION AND RESEARCH JUSTIFICATION

1.1 Introduction

The impact of countries on the competitiveness of firms or nations was highlighted by studies, which seek to explain the technological capabilities of industries. Technological capabilities of industries in the innovatory process result in a unique technological profile for each country (Bartholomew, 1997); Alan (2011) stated that international competitiveness ultimately depends upon the linkages between a firm's unique, firm-specific advantages and its home country assets (country-specific advantages). With this regard, Ethiopia can be placed in a comparative advantageous position in footwear production. This is because of different reasons. First, Ethiopia has availability of livestock population. Second, there is abundance and relatively lower cost of labour power.

The United Nation (2001) reported that globalization is the movement toward greater interaction, integration and interdependence among people and organizations across national borders. The strongest indicator of globalization has been the growing economic interactions among countries in trade and investment and in the intercontinental flows of capital, people, technology, and information. The fast improvement of technology needs quick feedback by manufacturers in order to continue in an emerging competitive environment and keep up with new trend and innovative service which other competitors might be utilizing (Yang and Ying 2013).

Within every sector, enlargements in technology openly reflect the priorities of the industry they serve. Technological factors have evolved to enable firms to be commercially alert and responsive to change. As every department in manufacturing industry understand their role in the cross functional processes, fully supported by technologies and systems aligned to the unique need of the industry, productivity is greatly improved. Technological factors influence all actions in a business value chain and technology which particularly affects a company's productivity and competitiveness in the field of manufacturing. This study will be examining the technological factors that affect competitiveness of the Ethiopian footwear industry.

1.2 Background of the study

The global leather supply chain and footwear industry has restructured significantly with a geographic shift of production towards those developing countries that have the lowest production costs. Since leather is the common denominator of the two value chains (Footwear and Leather Goods). Department of trade and industry (2008**)** reported that the most impressive development has been made by China, which has increased its share of world footwear exports, from only 3% in 1979, to a dominating 51% of total world footwear exports in 1999, and the trend continues. China's dominance as the main footwear exporter has increased even further by 32% in 2001 to 2003 which means from 3.4 billion pairs to 4.5 billion pairs. Furthermore, China (despite a huge population - local demand - and minimal imports) has increased its exports share as a percentage of total production to 63%.

The manufacture of leather products is a strategic sub-sector for the economic and industrial development of Africa, but faces strong competitive challenges. The sub-sector has a good resource base, is labour intensive, and is a good source of employment (Cipriani, 2002 and Kiruthu 2002 cited in United Nations Industrial Development Organization).

According to UNIDO (2002), the African footwear sub-sector seems isolated from the fast pace of technological innovation taking place globally. Lack of design capabilities of operator, supervisory and manager skills, and of knowledge of more appropriate material inputs and marketing techniques, all combine to cause poor productivity and a low level of competitiveness.

Even in the local market, high operation costs and a lack of attention to what the market demands in shoes in terms of quality and price, allow cheap Asian products and second hand shoes to penetrate the local market.

The manufacture of leather and leather products in Ethiopia dates back to historic times, and traditional cottage leather manufacturing is still practiced for both hides and skins. Leather manufacturing in modern tanneries began in the mid1920^{s} (Ethiopian Business Development Services Network, 2010).

According to MTI, Ethiopia is endowed with abundance of livestock resources and takes one of the prime populations of livestock in Africa and the country has around 44.3 million cattle, 23.6 million

sheep, 23.3 million goats and 2.3 million camels and also the country has 7th-10th level in the world (Central Statistical Authority). The skin removal rate is 7% for cattle, 33% for sheep and 37% for goats. The country produces 2.7 million hides, 8.1 million sheepskins and 7.5 million goatskins annually (Ethiopian Business Development Services Network, 2010).

The country has a comparative advantage in producing leather and leather products because of its large supply of livestock readily available at competitive rate. But this industry is not as developed as its age. Now a day these footwear industries face a huge competition, from low production cost/high production volume countries such as China, and. Vietnam. China is dominating the domestic market, as a result some local industries becomes out of the domestic market, which means the footwear industry are facing the greatest challenge because of the rapidly changing business environment with respect to global competition, market performance, and changing technology. Therefore the country spent more than a million USD each year to import shoes products.

Competitiveness of the nation does not have a concrete consensus definition, most scholars defined it as the ability of nations to provide products as or more effectively and efficiently compared to their competitors and to stay in business to have the capacity to exploit existing market opportunities and generate new markets (Robert D. Atkinson, 2013). So, competitive firms can achieve some desired results in terms of profit, price, return, or quality of products.

The concept of competitiveness was extended to the national level by Michael Porter (1990). Porter emphasized that it is firms rather than nations which compete domestically and/or internationally. Porter‘s competitive advantage of the nation is based on an analysis of four sets of variables; (1) factor circumstances, (2) demand circumstances, (3) related and supporting industries, and (4) firm system and structure. Those four sets of variables interdependently influence national competitive advantage. Those four sets of variables are known more commonly as Porter‘s Diamond of national advantage.

There are several societies who give definition for competitiveness and develop appropriate metrics for evaluating the competitive power, but the term is still ambiguous. Continuing debates attempt to give the right schematic structure that aids to investigate competitiveness..

Nevertheless, there are many considerable factors which affect the competitiveness of a sector, such as raw materials, market condition, labor availability, country institutions, labor cost, energy cost, infrastructure, efficiencies, technology, innovativeness, capital investment, managerial competencies and productivity (Arzu inal, 2003).

The underlying thought of the conversations is firmly identified with the expanding number of studies that investigate the connection among seriousness and technological capabilities. Researchers such as Porter (1990), Fagerberg (1988, 1996), Kaldor (1981), Lall (2001), OECD (1992) and Wignaraja (2003) banter next to different researchers, who are as yet attempting to characterize intensity with just cost related components and furthermore, feature the centrality of non-cost based variables, explicitly the innovative factor. For instance, Wignaraja (2003) and Fagerberg (1988, 1996) mention, the fundamental shortcoming is the condition of worldwide intensity just with markers of relative costs or unit costs. Absence of non-price based factors is a very simplified outlook as the empirical revisions have also recommended.

Both macroeconomic viewpoint and microeconomic standpoint disregard the impact of technological growth and capabilities on competitiveness. In actuality, there is a solid positive connection between innovative factor and seriousness as bolstered by different researchers. Thus, both of these perspectives have been enhanced in the most recent decades and the mechanical factor has been characterized as the key driver of the competitive advantage. Therefore, the objective of this research work is to examine the technological factors that affect competitiveness of the Ethiopian footwear industry. And finally it proposes a competitiveness model.

1.3 Statement of the Problem

The competitiveness of the footwear industry of Ethiopia is becoming very low and faces challenges from highly emerged countries such as china and Vietnam. For example 17.4 and 11.6 percentage of total exported leather shoes covered by the two countries but Ethiopia has a total of 0.01% which is very low (world top exports report, 2018). In the present conditions, higher productivity and efficient use of available resources have practically gone beyond a choice and turned into inevitability; this necessity becomes more tangible due to the acceleration of the world industry; if neglected, industries will lose their competitiveness and are forced to give up to imported cheap and poor quality goods.

Over the past decade several weaknesses and problem areas have been identified in domestic footwear industry. The comparative advantage of the Leather sector, such as availability of livestock population, cheap labor force, availability of big tanneries (soaking capacity), open access to Europe and U.S, has the potential to make the industry one of the most competitive industries if the existing local and international market opportunities are exploited and utilized in an efficient and effective manner, however the reality gives a different picture. Now a day new designs for exporting manufacturers has encouraged modern and scientific process. But the Ethiopian Footwear industries are relatively far away from this modern process. Still they are producing in the previous way of production, which is difficult to compute. And also the practice of the country in shoe export activities is insignificant and is in low standard as compared with other African countries.

According to performance of Shoe export to USA, EU, most shoe producers are not in a position to respond to foreign wholesalers and retailers requests due to their limited capacity to fulfill the foreign importer's order in the required quantity, quality and time. (Shoe export performance report to US, USAID/Fintrac report)

Evidently, competitive countries have consistently invested in their human and technical capacity to improve their productivity and efficiency and by which to remain in the competitive global markets. Contrarily domestic industry has lagged behind competing countries and the industry consequently struggles to be competitive against countries that have made sufficient investments in their technology. As a result of this, the leather footwear industries are described by low

efficiency, weak working environments; poor connection with customers and suppliers inadequate use of resources, and lowly managerial capabilities. These issues can influence the seriousness of the organizations in the worldwide markets, and making almost impossible to compete even in the local market and causes increasing of imports of finished products from abroad and enforced the country to spent millions of dollars. These problems can related with technology because according to Ryding, (2010), Technology is a set of processes, tools, work methods, approaches and equipments used to produce the products and services. So, despite the preceding studies gives useful knowledge, this study will bring more insightful image of the subject from the viewpoint and its consequence on the competitiveness angles.

Cognizance of technological factors and their impact on competitiveness and discussing with those issues will benefit the sectors develop their competitiveness in the overseas markets. Also, it will support the decision makers at industry and national level to expand export competitiveness by decreasing or eliminating the technological barriers of the industry. So the objective of this research work is to examine the technological factors that disturb competitiveness of the Ethiopian footwear industry.

1.4 Research Questions

This research work targeted to answer the following questions in the selected industries:

1. What are the main technological factors that affect the competitiveness of selected industries?
2. What method of evaluation and analysis can be used to identify the technological factors?
3. What measure should be taken to improve the competitiveness of this manufacturing sector?
4. How to reduce the technological barriers that affect the competitiveness and their impact?

1.5. Objective

1.5.1 General Objective

The general objective of this research work is to analyze the technological factors and their impact on competitiveness of the footwear industry of Ethiopia and develop a competitiveness model.

1.5.2 Specific Objectives

This research work specifically aims to:

- Assess the key technology features, strengths and weaknesses of the footwear processing industry of Ethiopia.
- Analysis of the technological factors influencing the competitiveness of footwear products in Ethiopia.
- Provide the best competitiveness model and recommendations to stimulate growth and improve competitiveness of this industry through technology.
- Validating the developed or adapted hypothesis.

1.6 Significance of the study

A study on competitiveness is important for a number of reasons. First, there is a direct linkage between productivity growth and sustained economic growth. Secondly, The findings of this study will help all stakeholders those found in the chain of footwear industry of Ethiopia by identifying and analyzing the technological factors those affect its competitiveness. Finally, this study will enrich the existing knowledge on similar issues. Besides, it will be also taken as source of reference for further studies on the subject or similar fields.

1.7 Scope of the study

The research is limited to the selected six shoe production industries. This study only focuses on technological factors and competitiveness of shoe sub sector of Ethiopia located in Addis Ababa and to identify their gap and develop a competitiveness model that will indicate intervention areas based on international best practices.

1.8 Limitation of the Study

All research work have their own limitations and this study is restricted to the selected six shoe production industries which means the study consider factories already involved in export operations, it could be difficult to judge about the other footwear industries not involved yet. The finding of this research work may not help to generalize the whole footwear industries operating in Ethiopia even though they are engaged in export. . Lastly, this study employed 5 Likert scale only, it might limit the range of answers that could be provided by the respondents.

1.9 Organization of the Study

The whole research work will encompass up to six main chapters which will be presented as follows.

- The First chapter discusses about the introduction and research justification that covered background of the study, statement of the problem, significance of the study, scope and limitation of the study and the thesis outline.
- The Second chapter will concern with related literatures reviews on: Conceptual and working definitions of terms, followed by competitiveness and its measurement, the relationship between Technological factors and competitiveness, Conceptual Framework.
- The Third chapter will discuss the research methodology which includes the research design, sampling techniques; data collection and data analysis method are combined.
- The Fourth chapter will discuss with the result analysis and interpretation. The factor analysis and its result, the strength and weakness of the companies are presented.
- In chapter five the best competitive model will develop and discuss.
- The last chapter, chapter six, will present the study conclusion part that encompasses conclusions, recommendations and direction for future researches.

CHAPTER TWO

2. LITERATURE REVIEW

To do any research activity it is important to review what has been done on the area of the topic to have more theoretical knowledge and understanding related to the problem.

2.1. Definition of terms and concepts

Competitiveness: can be defined as the capability of a country or companies to bring products and services that meet the quality criteria of the domestic and oversea markets at prices that are competitive and deliver satisfactory profits on the resources spent in producing them (Feigenbaum, 1991).

Technology is defined as the procedures or ways of doing works which is most often made up of information or machinery. Also, it has been recognized as necessary skills and knowledge to produce goods and services which is the mixture of human insight, intelligence and natural rules (Tahmasbi & Tavakol, 2009). Technology is also defined as a set of processes, tools, work methods, approaches and equipment's used to produce the products and services (Ryding, 2010).

Technological factors are variables that are being used for evaluating available alternatives with respect to technological capabilities. Organizations consider it an important tool for improving operations and functions. (AA, Ahsan Ali Shaw, 2018).

Industry: means any systematic activity carried on by co-operation between an employer and his workmen (whether such workmen are employed by such employer directly or through any agency, including a contractor) for the production, supply or distribution of goods or services with a view to satisfy human wants or wishes. Industry refers to an organized human skills and efforts to produce something more valuable and useful from the gifts of natural resources and primary products (Standard Industrial Classification).

Manufacturing: can be defined as the use of tools and labor to make things for use or sale. The term may refer to a range of human activity, from handicraft to high tech, but is most commonly applied to industrial production in which raw materials are transformed into finished goods on a large scale (Standard Industrial Classification).

Footwear refers to garments worn on the feet, which originally serves to purpose of protection against adversities of the environment, usually regarding ground textures and temperature. Footwear in the manner of shoes therefore primarily serves the purpose to ease the locomotion and prevent injuries (Nework times).

The Footwear industry consists of companies engaged in the manufacturing of footwear such as dress shoes, sneakers, slippers, boots, galoshes, sandals, athletic and trade related footwear. The industry also includes footwear parts such as shoe laces, buckles, clasps, inner soles, heels and padding (Nework times).

Manufacturing industry refers to any business that transforms raw materials into finished or semi-finished goods using machines, tools and labor (Standard Industrial Classification).

Product flexibility: The ability to introduce novel products, or to modify existing ones (Slack, 1987). It is the ease with which new parts can be added or submitted for existing ones (Sethi and Sethi, 1990).

Machine flexibility: deals with the variety of operations that the machine can perform without incurring high costs or expending a prohibitive amount of time in switching from one operation to another (Gupta and Somers, 1996).

Productivity: achievement of better utilization of process technology, labour and material resources, (Corrêa, 1992),

Product quality: manufacturing of products with high performance and conformance to standards (Corrêa, 1992),

2.2 Measuring Competitiveness

Different scholars over the time tried to define competitiveness in order to find a solid definition about what competitiveness is all about. Although several papers investigate competitiveness empirically or discuss its merit for social welfare such as living standards improvement, yet, there is no agreement on its definition or on exact methods to measure it, Competitiveness is a multi-dimensional concept (Laure, 2010): in order to define it is necessary to take into account a number of variables (both quantitative and qualitative); single measures of competitiveness do not capture all the elements of the concept. OECD states that competitiveness is the ability of

companies, industries, regions, nations, and supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis" (Hatzichronoglou, 1996).

As well competitiveness can be defined as the ability to face competition and to be successful when facing competition. Competitiveness would then be the ability to sell products that meet demand requirements (price, quality, quantity) and, at the same time, ensure profits over time that enable the firm to thrive (Laure, 2010).

Competition may be within domestic markets (in which case firms, or sectors, in the same country are compared with each other) or international (in this case, comparisons are made between countries). Competitiveness is therefore a relative measure and a broad concept and there is no agreement on how to define it, or how to measure it precisely (Laure, 2010). Therefore many scholars often employ their own definition and choosing a specific measurement method. Previous studies have shown that the indicators and drivers of competitiveness have multidimensional and complex relationships. Competitiveness can be considered as "all around" in nature as a number of variables should be jointly adopted to measure it. Many scholars and institution examines competitiveness along two different levels: competitiveness of national economies (macroeconomic level) and competitiveness of firms/ industries (microeconomic level). But the question is "how to measure or analyze competitiveness in each level"? Yet there is no common consensus on it. As a rule, macroeconomic view is the outlook that identifies what global competitiveness is in terms of cost related factors. Interestingly, microeconomic viewpoint attempts to recognize firm level intensity with non-cost based elements researching competition among organizations.

As indicated by Wignaraja, (2003) and Nelson, (1992), Mostly a macroeconomic view manages inside and outer equalization at the nation level and spotlights on the impact of cost based elements to the opposition. A microeconomic view essentially manages a company's inner elements that make a firm solid or powerless. Indeed, no matter which indicator is favored or criticized as an alternative for real exchange rate. The issue is the basic quality of all these acknowledged or dismissed intermediaries 'cost as well as cost based'. This issue features the for the most part discussed weakness of the macroeconomic viewpoint. As Wignaraja (2003) and

Fagerberg (1988, 1996) sign, the fundamental shortcoming is the condition of worldwide intensity just with markers of relative costs or unit costs. Nonappearance of non-value factors is a too disentangled view as the observational investigations have additionally proposed. Additionally Porter (1990) features this downside. His announcements, this is a narrow scope for the public strategy. In the same way Nelson, (1992) states another weakness of the macroeconomic outlook; the assumptions that the industries market are adequately competitive and efficient and they do not have any technological limitations that can reduce their competitive power.

Fagerberg (1988) tries to answer the question whether the technological development has an influence on the worldwide competitiveness and development across the countries. The results achieved support a positive correlation among them. Additional study implemented by Fagerberg (1996) supports the positive connection between change in the technological capacity and the competitiveness. Kaldor (1981; in Fagerberg, 1996) put emphasis on the important effect of differences in technological capabilities on the competitiveness: "Basically in a rising world economy the development of exports is essentially to be described by the income elasticity of overseas countries for a country's products; but it is a matter of the innovative ability and adaptive capacity of its producers whether this income elasticity will tend to be relatively big or small."

Both macroeconomic outlook and microeconomic outlook neglect the impact of technological development and capabilities on competitiveness. In reality, there is a direct relationship among technological factor and competitiveness as highlighted by various scholars (such as; Fagerberg (1988, 1996), Lall (2001) and Wignaraja (2002, 2003)). Accordingly, both of these interpretations have been enriched in the last years and the technological factor has been taken as the key driver of the competitive advantage (Arzu, 2003).Basically, studies about competitiveness of a nation or a firm can be classified into two major groups based on the methodological approach; result-oriented competitiveness analysis and determinant-oriented competitiveness analysis. Result-oriented approach tries to analyze from results, such as productivity and efficiency. On the other hand, determinant-oriented studies identify the determinants of competitiveness to compare competitiveness based on the determinants. Such as

natural resource, cost of labor and production inputs, financial and technological infrastructure, accessibility to the markets, and institutional and regulatory frameworks so on (Hatzichronoglou, 1996).

From the above finding and arguments of different scholars we can observe that technology has most important role and has given major emphasis in competitiveness analysis and measurement, but it shouldn‘t be the only tool but also other factor should also considered to firm or nationwide competitiveness analysis such as natural resource availability, quality of products, productivity and so, all affecting a nation‘s competitiveness.

2.3. Technological factors and competitiveness

Technological factors are influences that have an impact on how an organization operates that are related to the equipment used within the organization’s environment. Due to increased reliance on equipment, technological factors currently exert a considerably effect on the success of a business than they did many years ago. These technological factors can include materials, machines and processes that can present opportunities and treats but it is vital for competitive advantage and is a successful drive in globalization.

The rapid development of technology requires quick reaction by manufacturers in order to survive in an emerging competitive environment and keep up with new trend and innovative service which other competitors might be utilizing (Yang and Ying, 2013). Due to the rapid growth of technological innovation, the product life cycle of new and other products is much shorter than earlier. Reducing the delivery time in these markets reduces costs and creates value.

In today’s highly competitive market where technological innovation and its growth are very significant, time to market or on-time delivery is a very important aspect, among many other things, in order to achieve high level of product success introducing a new product faster, increase project velocity, profitability, customer satisfaction and overall sales volume are necessary to complete on time, to budget, and with appropriate technical performance/quality. In the recent times, projects tend to be constrained with respect to time, cost, and quality specifications, and the ability to deliver a project quickly(Echeme & Okwara, 2016). This is especially important for manufacturing organizations where in most cases other parties

(suppliers, contractors) are also involved. Many manufacturing industries have been characterized with a lot of problems such as products do not meet the specified requirement, inefficient execution process which cause delay and schedule slippage. These problems can result to negative consequences like lower market share, lower margins, capital loss, and maybe loss of customers'. These problems affect the productivity of industries and the satisfaction of their customers because when there is delay in supply or delivery of an order production is affected equally. The product is not delivered as scheduled as a result of one technological factor or the other.

Within every sector, developments in technology directly reflect the priorities of the industry they serve. So in the highly competitive world of fast moving consumers' goods (FMCG), technological factors have evolved to enable firms to be commercially alert and responsive to change. As every department in manufacturing industry understand their role in the cross functional processes, fully supported by technologies and systems aligned to the unique need of the industry, productivity is greatly improved.

Technological factors influence all activities in a company's value chain and technology which particularly affects a company's productivity and competitiveness in the field of manufacturing. Products manufactured and sold to the customer, processes used to make the products and information system use to integrate the various areas of a company are each a part of the technology in use and are expected to show an impact on the performance of the manufacturing system (Echeme & Okwara, 2016).

High technology has become like a force of nature, it transforms the economy, schools, consumer's habits, and the very character of modern life. The reason while multinationals enjoy foreign competition is because of their superior and up to date technology which enables them to enjoy economies of scales and quality products (Holger, Alexander & Murakozy 2009).

Technological factors upgrade/enhance technology in the sense that it makes technology to be constantly changing. This means that businesses must change in order to keep up. Technological factors bring about new technology which can be used to improve productivity. Robotics is a new technology and can work 24 hours a day, if necessary, can do jobs, do not need regular

breaks and usually quicker, are consistently more accurate and can work in dangerous situations, like bomb disposal. Changes in technology are the only source of permanent increases in productivity (Gorman 2014).

In a research conducted on Canadian manufacturing industries, it was decomposed that technological progress has been the main driving force of productivity growth (Mahamat 2009). Latest technology improves productivity to a greater extent. Automation and information technology help to achieve improvements in material handlings, storage, communication system and quality control (Ubani 2012).

Effective use of manufacturing technology is a means for the achievement of flexibility to changes in production volume to changes in job shop schedule and to changes in the type of product to be manufactured. High quality products are not solely a result of the application of comprehensive systems of quality management, rather quality is also influenced by the technology used in manufacturing which e.g. emphasis on smooth running machines with low deviation of tolerances, scrap and rework as well as the use of machines with automated inspections. Low cost are influenced by the manufacturing technology as well e.g. through economics of scale as well as economics of scope, low down time of equipment caused by production stoppages, short set up time and a low percentage of rework and scrap. It also has the role of ensuring a plant's ability to meet customer's demands regarding on-time delivery and short delivery time production.

Most times the ratio of output obtained from input resources are usually abysmal and poor affecting the productivity of manufacturing firms. As a result of poor productivity occasioned by poor technological capabilities, manufacturing firms are plagued with the inability to meet up with ordered quantity requirements on schedule, within budgeted cost and quality specifications.

Poor technological capabilities results in problems to manufacturing firms and hinder the successful implementation and delivery of manufacturing projects. Prominent among these problems are: the project deliverables do not meet specified quality or quantity requirements leading to rejection or excessive reworks. The cost implications of these reworks also increase the cost of production, and as such profitability is low. The low level of technological

capabilities and poor work flow also cause issues such as inefficient execution process, which cause schedule slippages and delay in the delivery of manufacturing projects.

According to Jimmy Lewin (2012), Technological factors can influence the decisions you make when considering entering a new market or the launch of a new product or service. Indeed, technology has placed market research within reach of even the smallest competitor. It is critically important for any business activity.

2.4 Propositions and Conceptual framework of the study

As concerns technological variables there is an absence of wide-going hypothesis base to distinguish the center mechanical components of assembling ventures in creating nations. However, some efforts to identify different technological factors have been proposed by applicable literatures. For example, Echeme & Okwara, (2016) have identified that technological factor for improved productivity of manufacturing projects in the south-east, Nigeria. The identified technological factors contributory to this level include; the size and capacity of plant, level of repairs and maintenance, level of waste reduction, and efficient materials management. And also According to Jimmy Lewin, (2012) some of the technological factors: Cost Benefit of new technology, Life cycle of technology, Market awareness & acceptance, Benefits of Automation, Intellectual property, Using social media, Innovation in industry, Impact of the internet in business, Research & Development, Communication infrastructure, Investment and budget, Know customer. But in general several export barriers in developing countries have been suggested by relevant literatures. For example Tesfom *et al.* (2006) described the internal export barriers (company barriers and product barriers) and external export barriers (industry barriers, export market barriers and macro environment barriers) of small and medium-sized manufacturing firms. And also Kuppusamy, J. & Anantharaman, R.(2014) studied A critical review of barriers to export business, they found Barriers are classified into internal (knowledge, finance, human resource, marketing, market research, benefits, risks and cost) and external (payment, competition, political and economic condition, customers, currency risk, political and economic risk).

In keeping with this argument, the study has explored the technological factors connected with trade issues, for example, the organization, the item qualities, the business structure, the fare showcasing that influence the competitiveness of Ethiopian footwear industries. As a whole, for the reason that literature and empirical studies look over; this research work has developed the conceptual framework by driving the framework of Tesfom *et al.* (2006).

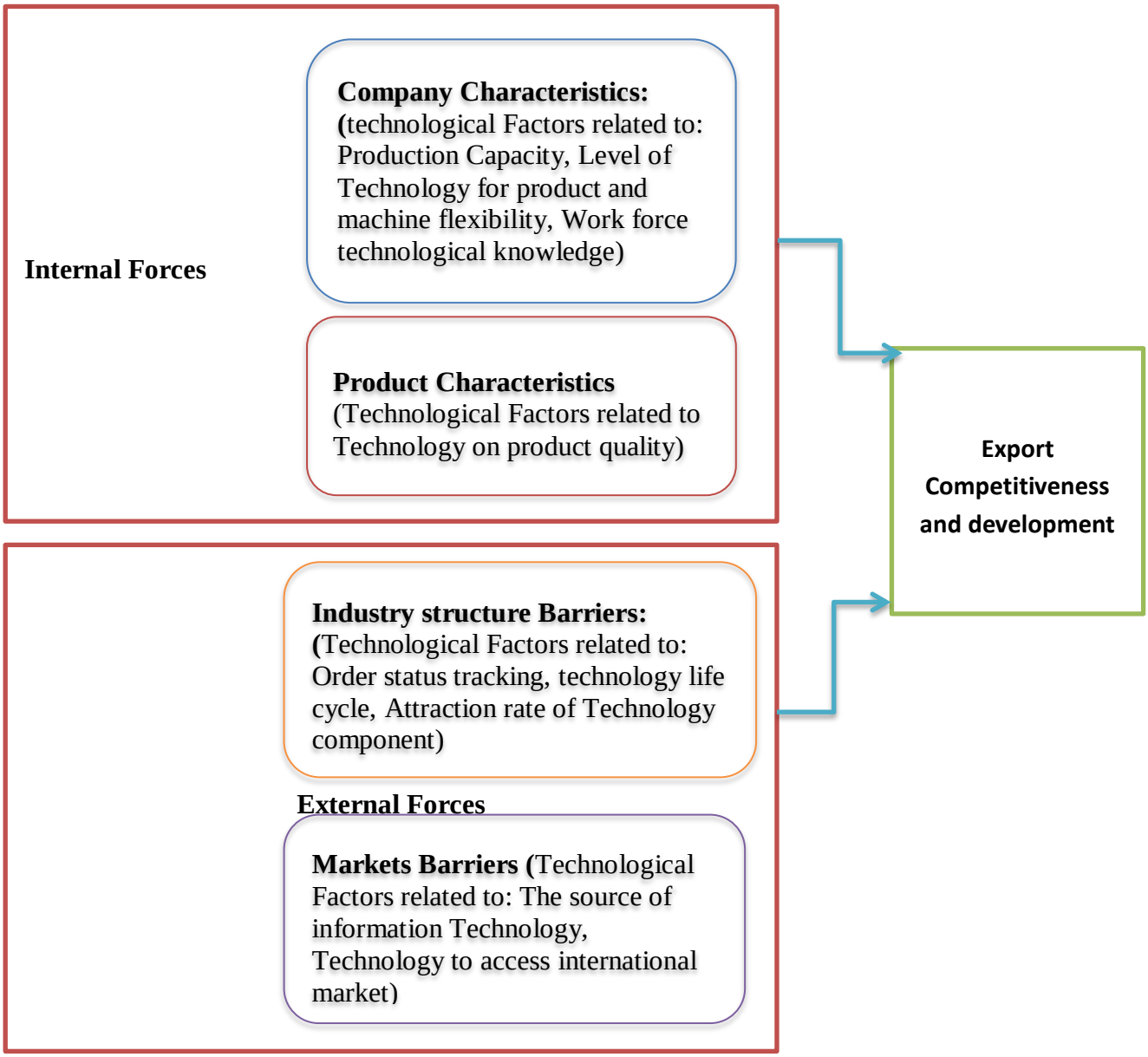

Figure 2.1 Conceptual framework of the research (Source: Modified from Tesfom *et al.* 2006).

A. Factors related to Level of Technology for product and machine flexibility

Over time, with the advent of computers and microprocessors, inflexibility in process technology gave way to flexibility. Over the last decade, flexibility became the mark of new technology called Advanced Manufacturing Technologies (AMT). Several conceptual schemes have been offered to grapple with the flexible nature of AMT. These schemes make valuable contributions to understanding AMTs. Flexibility as a competitive weapon in the arsenal of any firm practices its activities in a turbulent environment is required for coping with uncertainty. Uncertainty according to Cheng et al., (1997) and Narian et al., (2000) emerge from two perspectives: marketing function and manufacturing function. Flexibility is the ability to respond effectively to changing circumstances (Mandelbaum, 1978). Therefore, flexibility as a multi-dimensional concept (Sethi and Sethi, 1990) can be used for addressing and analyzing the relationships between marketing and operations functions where the emphasis should place on using the different dimensions of flexibility in coping with changes associated with marketing and operations functions, particularly, when dealing with business environment. Product and process flexibility as a means to meet customer demands are vital for today's companies to survive in business considering the competitive environment they operates (Vollmann et al. 2005; Davies, 1998). In the same vein, Kara et al. (2002) argue that new product flexibility gives a firm the ability to create new products quickly. This is an attribute that has become extremely important in many industries. As technology advances at an ever-increasing rate, and customers become more sophisticated, rapid product introduction can give firms a *significant* competitive advantage.

Based on the above argument, it can be concluded that new product and machine flexibility should be taken into consideration, as companies need to increase their market shares by gaining new customers in order to develop the competitive advantage. Hence:

H1; technological barriers related to Level of Technology for product and machine flexibility can affects the competitiveness of Ethiopian footwear industries.

B. Technological factors related to Technology life cycle

When a company is implementing any technologies, platforms, or even new products based on new technologies, it is important that they recognize if the technology is growing or disappearing, or if there are any trades-offs with regards the technology´s future (McCarthy, 2003; Burgelman et al., 2004; Gao et al., 2013). The technology life cycle, in particular, is a valuable tool in understanding the impact of industrial change on jobs and employment (Ford and Ryan 1981). Technologies, such as a numerical control technology, a microelectronics technology, or a data-processing technology exhibit patterns of development in which they are introduced slowly at first, become more widely adopted as intensive research and development efforts lead to improved performance, and are then replaced by a new, superior technology. A clear understanding of the technology cycle can provide signals of impending changes in products and production processes.

Technology life-cycle is a pattern of technology performance over time (Albert et al., 2015, Khalil, 2000). Ideally a company has a different mixture of product development as both "defender of the current technology" and "attacker of the new technology" (O'Reilly and Tushman, 2013; Wheelwright and Clark, 1992). Although the inertia of staying in the market with the current profitable technology is a powerful incentive for managers (Asthana, 1995), the managers should design the technology and product development portfolio in a way that it guarantees not only short term success but also long term victory for the company (Burgelman et al, 2004; Albert et al, 2015). Therefore companies must evaluate the future situation of each technology and the respective probabilities of success (McCarthy, 2003). In view of that, the following proposition is constructed.

H2; Technological factors related to Technology life cycle can affects the competitiveness of Ethiopian footwear industries.

C. Factor related to Attraction rate of Technology component

Introduction of new technologies and systems of production in industries demands careful planning and scheduling for increasing productivity, efficiency and success of industries in production and services (Masoumi, Bagheri, & Arabi 2013). In the developed countries / complex industries, machines and equipment with wide range of scientific and technological achievements are used. These machines are equipped with the scientific system of maintenance

management and Spare parts management which reduces production cost and increase output. Petronius in (Martins 2015) says that the spare parts and maintenance facility aims to keep them operating in conditions for which it was designed. The first seeks to correct, restore productive capacity. The second aims to perform work such as spare parts, oil, grease, cleaning, suggested in the manufacturers manuals. Duffua *et al* (2002) opined that maintenance is not just about ensuring proper function of machine and equipment (in order to continue to fulfill it intended purpose) but also play a key role in achieving company's goals and objectives by improving productivity and profitability as well as overall performance efficiency. In order to maintain high operational reliability, spare parts and components need to be available to maintenance personnel to avoid unnecessary delays and costs. One must ensure that the availability and accessibility of spare parts will not increase the downtime in case of failures. As each time unit of downtime is costly, unavailability must be avoided and thus, there is a challenging tradeoff between spare parts holding costs and the cost of unavailability. Even though the holding costs are high, organizations will suffer a greater financial loss due to the cost of downtime and therefore tend to keep a great number of technological components kept as inventory (Wong, Van Oudheusden & Cattrysse, 2007; Lin, Basten, Kranenburg & Van Houtum, 2017). The problem of Attraction rate of Technology component had also adversely affected the country machine tools. These problems have been seen as technological factors that influence manufacturing productivity in Ethiopian footwear industries. So, we expect the following hypothesis:

H3: Factor related to Attraction rate of Technology component can affect the competitiveness of Ethiopian footwear industries.

D. Technological Factors related to Technology on product quality

Quality standard problems imply as one of the most critical situations for beginning and continuing in the global markets. As Christensen & Da Rocha, (1987), mentions bundling, satisfying shippers quality guidelines and building up legitimate structure and picture for send out business sectors are associated with this boundary. There are a few quality standard issues in less created world. As Lall (1991), stated that a manufactured goods that sells well in a developing country may not qualify to sell at all in the developed world. The majority of the quality issues are the result of lacking information about market needs, item attributes and

production advancements. As mentioned by Figueiredo & Almedia, (1988) & Cardoso, (1980) the product quality problems are initiated due to unavailability of resources to qualify the overseas market needs, lowly quality control techniques, low quality level of raw material, similarly Brooks & Frances, (1991) states quality problems are caused due to packaging and labeling requirements, product design and specification.

In manufacturing industries, to overcome the competition problem and to retain the share of the market, it is necessary to constantly improve the quality of the product without the increase in the price. The price is influenced by the cost of production, which in turn is influenced by waste, rework, rejection and downgrading rates. Attention to quality assurance can reduce the process waste, which results in a quality production and company's growth and profitability. From the above explanations, we expect the following hypothesis:

H4; Technology on product quality can affect the competitiveness of Ethiopian footwear industries.

E. Factors related to Production Capacity

The size and capacity of plant in manufacturing firms matter a lot. When consumers' demands are high, the size and capacity of firm's plant would not meet consumers demand. This is also affected if consumers require less products than potentially producible, plants will not work at full productive capacity. Large firms tend to have stronger capacity than small ones to learn technologies management practices that would enhance their productivity.

Haiyang, Li & Zhou (2010) stated that large firms are systematically found to be more productive than small ones. For example a large firm may count on economies of scale when designing and implementing new technologies or a training strategy. That is not always true in the sense that there are small firms whose productivity is high because the size and capacity machines used are high. It does not always follow that large firm are systematically found to be more productive than small ones Foreign firms typically enjoy technological superiority and strong management capabilities and their technologies and management practices can be transferred to or imitated by domestic (small) firms in emerging markets. Geroski (1998) claims that size may have a direct effect on competitiveness, that is as a variable that ceteris paribus

improves efficiency, or indirect, that is conditioning the effect of other variable on productivity as they will show different patterns of behaviors for small and large firms.

Earlier research papers such as Sharma and Kesner, (1996) Mitchell, (1994) strongly support the effect of firm size on business survival and variance in operating performance. They argue that firm size is a basis of competitive advantage in the sense that larger companies tend to be more efficient than their smaller counterparts and have better resources to survive economic downturns. The causal relationships between size and profitability have been widely tested with ambiguous results.

Several studies suggest that a positive relationship exists between company size and profitability (Lee and Giorgis, 2004; Ravenscraft, 1983; Samiee & Peters, 1990; Ural and Acaravcı, 2006). Bigger firms are presumed to be more efficient than smaller ones. The market power and access to capital markets of large firms may give them access to investment opportunities that are not available to smaller ones (Amato and Wilder, 1985). From the above explanations, we expect the following hypothesis:

H5; Factors related to Production Capacity can affect the competitiveness of Ethiopian footwear industries.

F. Factors related to Work force technological knowledge

Johnson (1991) argued that the complexity of future sophisticated technologies will demand higher levels of expertise, requiring more complex skills and knowledge. Modern technologies process requires linking and recognizing new knowledge, which in turn requires the internal advancement of human capabilities and knowledge. Any technological advancement is said to impact the performance of organizations in a positive way, which therefore affects the employees' productivity and performance (Mumford, 2000). However, the improved performance and productivity levels can only happen if the proper resources are utilized in an effective and efficient manner (Dauda, 2009). The proper use of technologies in the workplace can help employees be more effective in their job performance, which improves the organizational performance. Nonetheless, it is important to recognize that the present successes are based on past-improved performances; and in order to maintain a long lasting organizational

success, organizations have to continue nurturing their workforce with the needed skills and knowledge to best address the future needs and demands of the company's performance. The workforce performance is intimately linked to technological changes and technological innovation. Technological change could effectively be managed through human resource joint approach. Dauda,(2009) which incited teamwork, collaboration and open mindedness. According to the resource-based theory, organizational resources are extremely important for the firm's development, and that human capital is a key resource of a firm. The function of this resource depends on the employees' ability and enthusiasm, and on efficient human resource management (Mumford, 2000). From the above explanations, Factors related to Work force technological knowledge such as insufficient skill to adapt high technology machines, Incapability to supply quantity on continues basis, Lack of knowledge to locate foreign marketing opportunity has an impact on the competitiveness of the manufacturing industries. Therefore, we expect the following hypothesis:

H6; Factors related to Work force technological knowledge can affect the competitiveness of Ethiopian footwear industries.

G. Technological Factors related to access international market

According to Dr. Ashish Mathur, (2012), the international markets are becoming more popular and intense with high level of competition impacting the ethics of doing business. The planning and control for the international business has to be accurate and has to be done accurately. International markets, planning and control are vital to inform day-to-day operation and the development of sustainable long-term strategic direction for any organization. In addition, plans must be flexible enough to deal with the uncertainty that is an inevitable part of business in international marketing. We are familiar with the planning process in the local market, which reflects our local culture. We are at ease with a customer base with which we are familiar and in which self-reference criteria help rather than hinder the planning process.

There are various differences between domestic marketing and international marketing. Due to a language barrier it is more difficult to obtain and interpret research data in international marketing. Promotional messages and export marketing researches needs to consider numerous cultural differences between different countries. (Bennett, Roger; Jim Blythe (2002). Technology

is bringing a new dimension to old school marketing and bringing in a revolution. Going by definition technology means" the making, usage, and knowledge of tools, machines, techniques, crafts, systems or methods of organization in order to solve a problem or perform a specific function" whereas the marketing terminologies states technology as a mode or a medium which helps marketer propagate his or her deliverables to the end user. The technology has been dynamic throughout right from television advertisements to internet marketing (Dr. Esha Jain & Ashank Yadav). He also conclude that, Technology is a major factor and tool for the marketers to reach the masses and the target audience. With amalgamation of technology and marketing, industries had reaped beautiful fruits which could have been never achieved. Therefore Marketing blends art, applied science and technology, which means technology has a vital role to access international markets.

From the above explanations, we expect the following hypothesis:

H7; Technological factors to access international market can affect the competitiveness of Ethiopian footwear industries.

H. Technological Factors related to Order status tracking

Order status tracking is one indispensable issue that pioneers of sending out organizations need to have as information. One of the most rehashed hindrances regarding sending out concerns the time and convention necessities in order to satisfy with remote and residential market guidelines. The procedural necessities can force by free foundations, for example, banks, dispatching associations and insurance agencies. According to Moini, (1997), numerous manufacturing industries determine customs documentation, shipping arrangements and other export procedures too problematic to manage, these leads to extreme costs, time consumption and red tape, which encourage a negative attitude toward managing exports.

the precondition for export firms are Knowledge, skills and adequate information concerning export administrative procedures, which means when the company desires to raise its export activity it is required to know the export processes. And also, lack of sufficient information about export actions have been listed as export barriers in several theoretical revisions (Haidari, 1999). Mainly, for less experienced pioneers, outside documentation and records are problematical to manage (Dymsza, 1983). As expressed by Cateora and Graham (2001), remote governments do

various controls on organizations that sell products in their business sectors. For example; section limitations, value controls, charge rates and trade controls. The force of these controls may transform the abuse of fare openings into an exhausting, costly and delayed undertaking, which ruin numerous little firms from wandering into abroad markets (Leonidou, 2004). Therefore, it is induced that the Order status tracking barriers such as Lack of automated process, Lack of technology on export documentation, Lack of automated transportation of raw material, Low freight level to foreign market and Problems in making arrangement for getting paid are impeding the competitiveness of Ethiopia footwear industry. Therefore, the following proposition is built.

H8. Technological Factors related to Order status tracking can affect the competitiveness of Ethiopian footwear industries.

I. Technological Factors related to the source of information Technology

Technology and Communication helps businesses grow and prosper, creates relationships, strengthens the effectiveness of organizations, and allows people to learn about one another. Technologies, such as the Internet, mobile phones, social media, and customer relationship management systems greatly affect the way companies communicate with prospective customers. These new forms of communication are changing the media landscape and the type of messaging strategy organizations use. Many of the consumers and business professionals seek information and connect with other people and businesses from their computers and phones. With access to many sources of information and an interest in interactive media, consumers may collect more product information on their own. Work environments are also changing, with more people having virtual offices, texting on their cell phones, or communicating through social media sites such as Facebook, LinkedIn, Pinterest, and Twitter. As the media landscape changes, the money that organizations spend on different types of communication and technology will change as well. Once companies have developed products and services, they must communicate the values and benefits of the offerings to current and potential customers (Dr. Esha Jain & Ashank Yadav, 2017).

Greenwood and Jovanovic (1999) investigated the relationship between the Information Technology (IT) Revolution and the stock market changes. They found that the ratio of market capitalization to GDP tripled from 1985 to 1996 when the companies related to the IT industry. From the above arguments barriers related to The source of information Technology such as Poor/ insufficient source of information to market communication with respect to foreign countries, Lack of export promotion program and Lack of facilities to access international market has a negative impact on the industries.

H9; Factors related to the source of information Technology can affect the competitiveness of Ethiopian footwear industries

CHAPTER THREE

3. METHODOLOGY OF THE RESEARCH

In this part of the research, the strategy of the exploration that used to gather the information for this examination has been portrayed. It contains the research design, design of sampling and techniques, data collection and data analysis techniques and the reliability test have been involved.

3.1. Research Strategies and Designs

The study presented in this research is an exploratory method based on both primary and secondary sources of information. The primary source is the industries where data were collected by administering questionnaire, while the secondary sources include published books, journals, periodicals, reports, newspaper and websites. The population of the study consists of all selected footwear enterprises operating in Addis Ababa Ethiopia State. However, the study will adopt purposive and simple random sampling techniques to draw the sample from the population. The interview method is also used to elaborate some core issues raised on the questionnaire. Respondents were interviewed in face to face at random across the study area which is represented from industries, government authorities and expertise. Under exploratory research methods, quantitative data collection techniques are designed to support the Qualitative data.

3.1.1. Sample and Sampling Techniques

The objective of sampling is to provide a practical means of enabling the data collection and processing components of research to be carried out as ensuring that the sample provides a good representation of the population (Shehada, 2015). According to MTI complete number of big business enlisted in the leather division in Addis Ababa bunch is 500 of which 269 are associated with footwear fabricating and there are around a total of 17 footwear factories; 1 in Tigray region, 1 in Dukem, and 15 in Addis Ababa. Out of the total leather footwear factories, the assessment of 6 shoe factories was conducted around Addis Ababa. Addis Ababa has been selected for the reason that it is a key business area in the country and it plays a potential role in connecting footwear manufacturing partnerships from other regions. To restrict the example size of the objective populace, the measurable recipe created by Yamane (1967) is utilized.

$$n = \frac{N}{1+N(e)^2} = \frac{900}{1+900(0.1)^2} = 90$$

Where n = test size, N= the complete populace, and e = edge blunder (accepted 10%) and certainty level or mistake liberated from 90%. averagely assuming 150 numbers of permanent employees in each selected factories. so the total population (sample frame) is 900. the disproportional separated examining method was utilized to choose 6 industrial facilities from the aggregate. Because of disproportional testing method was principally because of contrasts in the quantity of chairmen and their readiness to have an impact in the overview. After the quantity of respondents in every processing plant was resolved, this study has used purposive sampling technique to select the leaders or owners, because dependable data is almost certain acquired from top chiefs of the organizations. The Selected Factory names and their comparing number of respondents are set in Table 3.1 underneath.

Table 3.1: The Selected Factory names and their comparing number of respondents

No.	Factories name	Establishment year	Questionnaires Distributed	Number of respondent
1	Anbessa Shoe Factory plc.	1939	15	11
2	TikurAbay Shoe Factory share com.	1948	15	11
3	Peacock Shoe Factory plc.	2001	15	10
4	Huajian Shoe Factory share com.	2012	15	12
5	Ramsay Shoe Factory share com.	1995	15	10
6	Kangaroo Shoe Factory plc.	1982	15	9

3.1.2. Data Collection Methods and Measurement

To give sufficient explanation for the questions posed it is essential to carryout both quantitative and qualitative research on the status of Ethiopian footwear industries based on primary and secondary sources of data. Primary data collection can be done in different method; from those methods in this research a survey method with a questionnaire was used. Data collected from selected (representative) footwear industries and The companies among others were selected

based on the following performance indicators, but not limited to; by the number and range of products and services provided, growth value of production, investment in fixed asset, manpower development and willingness for cooperation (based on previous researcher experience). Sekaran and Bougie (2010) identify that face to face interaction helps to clarify the questions on the spot, to give some details about the topic and enable respondents to give honest response; it is less costly and consumes comparably short time. Furthermore, respondents were deliberately approached during the face-to-face interaction. In line with this point, the questionnaire was collected on the basis of face to face interaction. It is important for research output if maximum respondents are willing to participate but some unwilling respondents were encountered.

Secondary data were also gathered from Central Statistical Agency, Leather Industry Development Institute, Ministry of Trade and Industry and different scientific articles, journals and magazines and previous research thesis have been used to enrich the information.

3.1.3. Data Analysis

After primary and secondary data are collected, it should analyze in accordance with the objective of the research. To analyze the technological factors and its impact on competitiveness, this study used factor analysis (FA), to well and easy understand the subject. Bartholomew (2008), states that factor analysis is a statistical tool that primarily shows the validity and reliability of observed and co-related variables. Besides, it focuses on the inter-relationships between large amounts of variables. Factor analysis method makes factors that are expressed well by the set of variables. These well expressed variable set is given a specific common name which will be a common concept and before providing such common name called factor. In the factor analysis, there must be sufficient correlations between the items so as to have high factor loadings. The higher factor loadings show the best linear combinations of the variables. The factor loadings vary from +1 to -1 in which the factor value close to ±1 will have a maximum explanation of the factor. The rotated component matrix is one of the methods used to develop factor loading. From the three categories of factor analysis such as, exploratory factor analysis, confirmatory factor analysis and structural equation modeling. In this research, the exploratory factor analysis will be applied for data simplification purpose; to obtain a better-specified and valid data for extra data analysis. As per Norris (2009) exploratory factor examination is a

technique inside the factor investigation and it is utilized to discover the connections between estimated factors. The strategy of the factor examination that utilized in this investigation is figured beneath. In this research work, factor analysis applied for three main reasons: Which are

1. giving a general outline, to understand all factors those affect competitiveness
2. To identifying and correlating different variables or factors.
3. To get a better specified and valid data.

Vichea (2005) recognized that the range of the measuring variables in 5 - point Likert scale is

$$\frac{(n-1)}{n} = \frac{(5-1)}{5} = 0.8$$

Where n is numbers of rates in each the questionnaire which is equals to 5. Mean value of the variables ranges within:

- 1.00-1.79 is accepted to be considering as no problem level.
- 1.80-2.59 are accepted to be considering as less problem level.
- 2.60-3.39 are accepted to be considering as middling problem level.
- 3.40-4.19 are accepted to be considering as higher problem level.
- 4.20-5.00 are accepted to be considering as greatest problem level.

This mean worth span has been utilized principally to comprehend the unmistakable measurements of the factors picked up utilizing the SPSS programming yet in addition applied to

decipher the discoveries of the examination in supplement of the factor stacking results.

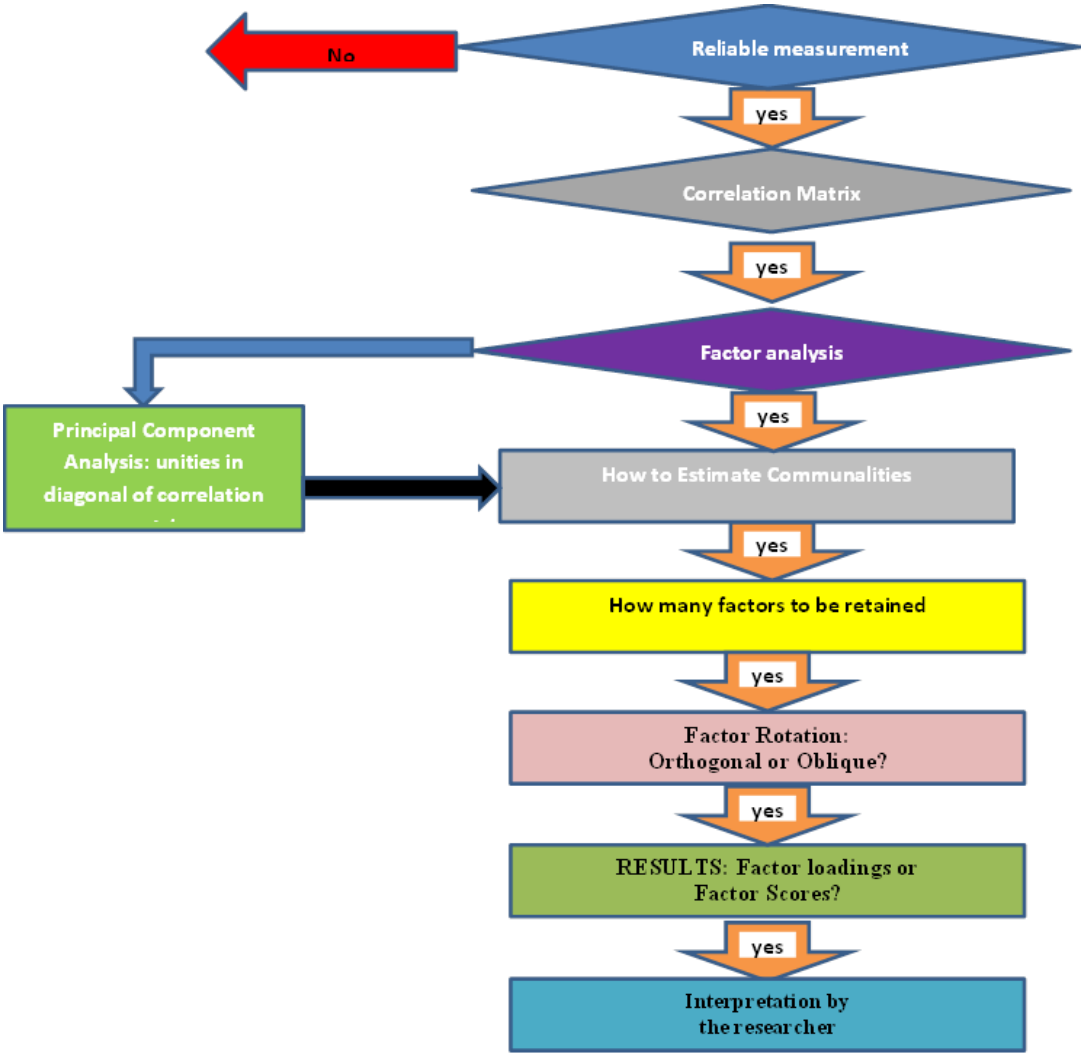

Figure 3.1: factor analysis procedure (Source: Adapted from (Rietveld & Van Hout, 1993))

3.1.4. Validity and Reliability

The honesty of a research results revolves on two key testing methods: reliability and validity. As Saunders et al. (2009) states that. the degree to which a tool measures what it is supposed to be measuring is known as Validity. And Zikmund, (2003) defined as Likert scale is defined as a measure of attitudes designed to allow respondents to show how strongly they agree or disagree with cautiously intended statements that vary from very positive to very negative towards an attitudinal object (Zikmund, 2003). The variables mentioned in the empirical studies concerning

technological barriers to exportation holds a set of statements in which respondents were asked to rate the most important problems among the 30 items presented, using a 5 - point Likert scale that varying from 1 (strongly disagree) to 5 (strongly agree).Saunders et al. (2009) defines reliability as the degree to which the data collection techniques would produce reliable findings. To determine the reliability of the data collection instrument, two main methods are promoted by Cohen et al. (2007); the split half coefficient and the Cronbach's alpha coefficient.

Cronbach's alpha coefficient is commonly used and most popular method of checking true reliability. This study incorporated Cronbach's alpha coefficient in SPSS, Version 20, which provides the extent of the internal consistency between the items. To develop the Cronbach's Alpha, connections among the things has been planned. A decent relationship among things gives a higher estimation of Cronbach's Alpha. Thus, the higher Cronbach's Alpha worth shows a higher legitimacy. In light of the general guideline, the quantity of perceptions must be more than 50 however 100 or more is suggested. A Cronbach's Alpha with a correlation under 0.5 is insupportable factor analysis that will be omitted from the list of observation and preserved as not valid data for additional analysis.

Table 3.2:-Rule of thumb alpha value

α=Range	**Remark**
$0.9 < \alpha < 1.0$	Marvelous
$0.8 < \alpha < 0.9$	Meritorious
$0.7 < \alpha < 0.8$	Middling
$0.6 < \alpha < 0.7$	Mediocre
$0.5 < \alpha < 0.6$	Miserable
$0.0 < \alpha < 0.5$	Unacceptable

Source: www.statisticshowto.com

3.1.4.1. Sampling Adequacy Measurement (MSA)

Kaiser-Meyer-Olkin (KMO): the KMO assesses the examining ampleness, which ought to be more than 0.5 for an adequate factor examination to proceed with. On the off chance that any couple of factors has a rate beneath this number, the analyst needs to drop one of them from the examination. The off-slanting components should all way to deal with zero out of a decent

model. There is all inclusive show that factor investigation is dismissed when test size is under 50 (Field, 2005).

Table 3.3: KMO and MSA Threshold Values

value of KMO	**Adequacy of the correlations**
Above 0.90	Excellent/ Marvelous
0.80-0.89	Very good/ Meritorious
0.70-0.79	Good/ Middling
0.60-0.69	Satisfactory/ Mediocre
0.5-0.59	Poor/ Miserable
Below 0.5	Unacceptable

Source: www.statisticshowto.com

Bartlett's test: is an additional sign of the strength of the correlation between items. This evaluates the variables that the initial correlation matrix is an identity matrix. Field (2000), explained that there are two vital things with respect to the correlation matrix. The items should have a relationship to each other but they should not link too highly as this would make problems in determining the exceptional impact of the items to a factor. This Bartlett's test has to be important: when the original correlation matrix is an identity matrix, there would be no relations among the items.

CHAPTER FOUR

4. DATA ANALYSIS AND RESULT DISCUSSION

This chapter discuss with the research finding. The factor analysis and its result are present by the use of SPSS computer programming software. Before going on to the principle information investigation and understanding segments the examination of the respondents segment information and Descriptive Statistics of technological components have been talked about.

4.1. Data Analysis

4.1.1. Demographic data of Respondents and response rate

This section gives response rate and the respondent demographic profiles. Most of the participants were willing and responded the questionnaire as a result sufficient number of data has been gained. Though the overall number of observation/sample size for this study was decided to be 90, the fully answered questionnaire for analysis was 63 which bring in an Answer rate of 70%.

$$(2)\ \text{Answer Rate} = \frac{\text{finalized questionaire}}{\text{finalized} + \frac{\text{finalized}}{(\text{finalized}+\text{incomplete})} * (\text{rejections} + \text{not reached})}$$

$$(3)\ \text{Answer Rate} = \frac{63}{63 + \frac{63}{(63+0)} * (17+10)} = 70\%$$

Where, finalized means accurately answered; incomplete means number of participants who didn't answer the questionnaire properly, rejections means unwillingness of respondent to cooperate in answering the questionnaire, and not reached means participants who were not easily reached for the researcher. From the survey information about demographic profiles of the respondents such as gender, age, level of education and work experience of the respondents were presented under this Table 4.1.

Table 4.1: Respondent demographic profiles

Items	Description	Frequency	Percentage
Gender	Male	48	76%
	Female	15	24%
	Total	63	100%
Age interval	25-30	9	14.3%
	31-35	15	23.8%
	36-40	16	25.4%
	41-45	13	20.6%
	46-50	5	7.9%
	above 50	5	7.9%
	Total	63	100%
Educational Level	preparatory school and below		
	diploma certificate	24	38%
	bachelor science	32	51%
	master degree and above	7	11%
	Total	63	100%
Work Experience	1- 5 Yrs.	14	22%
	6-10 Yrs.	31	49%
	11-15 Yrs.	11	18%
	16-20 Yrs.	4	6%
	above 20 Yrs.	3	5%
	Total	63	100%

As offered in Table 4.1, an example size of 90 respondents was chosen for this examination work, from this 17 respondents have dismissed to reply to the survey, 10 were not reached and zero respondents were ineligible,. The other 63 respondents get an answer pace of 70%. It implies they have suitably replied and restored the poll to the analyst. The sample involved 24% female and 76% male respondents in the research. This shows that most of the participants were

males as they are expected in industries of developing nations. As presented in the above table the academic qualifications of the respondents. The percentage on level of education among participants was 38 (51%) holds university degree whereas 7 (11.1%) holds master degree and above. This means that nearly half of the footwear manufacturing industries employees has bachelor degree and they had adequate qualifications to be able to provide sufficient information. The percentage of executives and leaders experience show that 6 -10 years (49.2%), 1-5 years (22.2%), and 11-15 years (17.5%) experience. Therefore almost all respondents that participated in the study have substantial experience in the footwear industry

4.1.2. Sampling Acceptability Test and Reliability Analysis

Reliability Analysis was accompanied to check the reliability of collected data. The reliability scale known by the value of Cronbach's alpha. The Cronbach's alpha value of this study is 0.908, which is considered as acceptable and looked marvelous. Normally if the value of Cronbach's alpha is greater than 0.60 it is taken as reliable.

Table 4.2 the technological factors Reliability analysis

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.908	.900	30

KMO and Bartlett Test: in exploratory factor analysis before going to the results there are prerequisites to be gained; one of the prerequisite tests is the Kaiser–Meyer–Olkin (KMO) which justifies the appropriateness of exploratory factor analysis. The Kaiser–Meyer–Olkin value of the complete questionnaire is 0.75 and the Kaiser–Meyer–Olkin value of the variables such as level of technology flexibility regarding product, process and machinery changes (0.624), technology life cycle (0.605), attraction rate of technology components (0.5), effect of technology on product quality (0.669), Production Capacity (0.5), Work force technological knowledge (0.61), Technology to access international market (0.5), Order status tracking (0.506), and the source of information Technology (0.545). All are greater than or equal to 0.5, which shown that the sample is sufficient. The other prerequisite test is the Bartlett test, a chi-square value of this study is 1010.241 with 435 degree of freedom and the p-value of the total questionnaire is 0.000,

which is zero probability. The P-value of Work force technological knowledge is 0.005, Technology to access international market is 0.027 and the source of information Technology is 0.003 and the P-value of the remaining variable is 0. This outcome tells that the correlation matrix has supportable relationships among at minimum of two variables.

Generally, based on this KMO value and all other measurements, the sampling size acceptability was ranges as middling and appropriate for factor analysis

Table 4.3: The Result of KMO and Bartlett's Test

KMO and Bartlett's Test		
KMO/ MSA		.750
Bartlett's Test of Sphericity	Approx. Chi-Square	1010.241
	Degree of freedom	435
	Sig.	.000

4.1.3. Respondents answer for Technological factors

On a five-point likert scale, alternating from strongly disagree to strongly agree, thirty variables were measured. Therefore, the descriptive statistics value of the data gathered is calculated. Normally, the mean, variance, and standard deviation value are provided on the table below.

Table 4.4 Technological Factors Descriptive Data

Factors	**Statistic (N)**	**Mean**	**Standard deviation**	**Variance**
Factors related to Level of Technology for product and machine flexibility				
Inadequate Technology level of the company	63	3.95	.682	.465
Lack of investment for a new technology	63	3.97	.695	.483
Lack of process innovation	63	4.08	.655	.429
High sensitivity of products to fashion	63	3.08	.576	.332
Group mean		3.77		

Factors related to Technology life cycle				
Lack of facilities for production expansion	63	3.76	.665	.442
Lack of facilities in quality control/inspection	63	3.57	.499	.249
Lack of research development and designing facilities	63	3.63	.576	.332
Lack of experimental facilities	63	3.57	.560	.313
Group mean		3.63		
Factor related to Attraction rate of Technology component				
scarcity of power sources	63	3.30	.528	.279
Unavailability of spare part of the machines	63	3.67	.568	.323
Group mean		3.485		
Factors related to Technology on product quality				
Lack of adequate quality of raw material	63	3.76	.499	.249
Product quality problems	63	4.03	.671	.451
Difficulty in meeting importer's product quality standard	63	4.02	.660	.435
Difficulty in Meeting export packaging and leveling requirement	63	3.67	.539	.290
Group mean		3.87		
Factors related to Production Capacity				
Too small in size to initiate export operation	63	4.02	.553	.306
insufficient stock	63	2.75	.671	.451
Group mean		3.385		
Factors related to Work force technological knowledge				
Insufficient skill to adapt high technology machines	63	3.62	.580	.336

Incapability to supply quantity on continues basis	63	3.76	.499	.249
Lack of knowledge to locate foreign marketing opportunity	63	3.89	.479	.229
Group mean		3.756		
Barriers related to Technology to access international market				
Lack of adequate export marketing research	63	4.14	.470	.221
Poor image/style of products in foreign market	63	3.98	.421	.177
Insufficient foreign demand	63	3.87	.421	.177
Group mean		3.996		
Factors related to Order status tracking				
Lack of automated process	63	3.94	.246	.060
Lack of technology on export documentation	63	3.59	.557	.311
Lack of automated transportation of raw material	63	3.78	.522	.272
Low freight level to foreign market	63	3.83	.423	.179
Problems in making arrangement for getting paid	63	3.68	.563	.317
Group mean		3.764		
Factors related to The source of information Technology				
Poor/ insufficient source of information to market communication with respect to foreign countries	63	3.89	.317	.100
Lack of export promotion program	63	4.19	.669	.447
Lack of facilities to access international market	63	3.67	.596	.355
Group mean		3.916		

Key: - By considering Vichea (2005), measurements and decision rules, take the mean value of individual items for the interpretation section so the items with the interval 4.20 to 5 which are taken as strongly agreed level: the variables with the interval 3.40 to 4.19 which are accepted as agreed level, and the variables with the range 2.60 to 3.39 and 1.80 to 2.59 which are measured as average and disagreed level respectively and the variables with the interval 1 to 1.8 which are accepted as strongly disagreed level. For the purpose of interpretation and data simplification the group mean value are taken by dividing the values of every technological factor in to the number of items involved in each factors. Therefore three of the technological variables such as the High sensitivity of products to fashion, scarcity of power sources and insufficient stock fall within the average intervals and the other technological variables fall within the agree interval.

4.2. Factor Analysis

4.2.1. Correlation of the Technological factors

A correlation matrix is a table which provides the correlation coefficients among each variable in the analysis. Before the factor analysis, inter-correlations of the items should be tested. If inter-correlations are found to be over .90, the items have a high linear relationship and possibly repetitive. Therefore one of the items should be avoided from the table.

4.2.2. Communalities of Technological Variables

Communalities show the total amount of variance an original variable shares with in other every single variable in the analysis. Initial communalities are estimates the variance in every variable, which is count by all factors. Extraction communalities are evaluations of the variance in every single variable count by the components in the factor solution.

Table 4.5 Communalities of technological factors

Communalities		
Description	**Initial**	**Extraction**
inadequate Technology level of the company	1.000	.739
Lack of investment for a new technology	1.000	.600

Lack of process innovation	1.000	.642
High sensitivity of products to fashion	1.000	.656
Lack of facilities for production expansion	1.000	.700
Lack of facilities in quality control/inspection	1.000	.744
Lack of research development and designing facilities	1.000	.758
Lack of experimental facilities	1.000	.774
scarcity of power sources	1.000	.712
Unavailability of spare part of the machines	1.000	.751
Lack of adequate quality of raw material	1.000	.614
Product quality problems	1.000	.692
Difficulty in meeting importer's product quality standard	1.000	.660
Difficulty in Meeting export packaging and leveling requirement	1.000	.681
Too small in size to initiate export operation	1.000	.794
insufficient stock	1.000	.796
Insufficient skill to adapt high technology machines	1.000	.728
Incapability to supply quantity on continues basis	1.000	.653
Lack of knowledge to locate foreign marketing opportunity	1.000	.773
Lack of adequate export marketing research	1.000	.710
Poor image/style of products in foreign market	1.000	.786
Insufficient foreign demand	1.000	.779
Lack of automated process	1.000	.780
Lack of technology on export documentation	1.000	.699
Lack of automated transportation of raw material	1.000	.727
Low freight level to foreign market	1.000	.764
Problems in making arrangement for getting paid	1.000	.795
Poor/ insufficient source of information to market communication with respect to foreign countries with respect to foreign countries	1.000	.823

Lack of export promotion program	1.000	.774
Lack of facilities to access international market	1.000	.725

As indicated by Hinton, (2014) SPSS expect that 100% of the fluctuation of each and every factor is normal difference, which permitted every factor a collection of 1.000. But, if it has extracted the variables it worked out how much of the dissimilarity of each variable can be described by the extracted factors and provides a modified value of communality. Factor loadings show the connection among a variable and each factor however it is additionally used to recognize how much a specific variable shares for all intents and purpose with all elements. A similarly high collection call attention to that a variable shares extraordinarily for all intents and purpose with different factors connected as a gathering. A low communality means that the variable has a weak connection with the other variables. Commonness for any factor is the summation of the squared stacking factors for that variable. For instance, the commonness for " Lack of facilities to access international market " is $(0.603)^2 + (0.391)^2 + (-0.103)^2 + (-0.022)^2 + (-0.366)^2 + (0.069)^2 + (-0.019)^2 + (-0.118)^2 + (0.21)^2 = 0.725$, where 0.603, 0.391,- 0.103, - 0.022,- 0.366, 0.069, - 0.019, - 0.118, and 0.21 are the factor loadings of the variable from factor 1 through factor 9 individually. As a last point, all factors proposed in this examination have communalities more than or equivalent to 0.6 and not exactly or equivalent to 0.9. Accordingly, all items can pass for further analysis which means that there is no variable with poorly correlated and highly correlated.

4.2.3. Variance of Technological Factors

Likewise with the factor loadings, the level of complete change of primary factors portrayed by the variables can be useful. As we know common variance is correlation squared Thus, if every single loading is squared and added, that sum divided by the number of factors permit an evaluation of the variance in a set of variables explained by a factor.

Table 4.6: All out Variance clarified for the Technological Factors

Total Variance Clarified									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.981	29.937	29.937	8.981	29.937	29.937	4.795	15.984	15.984
2	2.819	9.398	39.336	2.819	9.398	39.336	3.538	11.795	27.779
3	1.907	6.355	45.691	1.907	6.355	45.691	2.531	8.437	36.216
4	1.635	5.449	51.140	1.635	5.449	51.140	2.221	7.403	43.619
5	1.595	5.315	56.455	1.595	5.315	56.455	2.135	7.117	50.736
6	1.420	4.734	61.190	1.420	4.734	61.190	1.678	5.592	56.328
7	1.283	4.275	65.465	1.283	4.275	65.465	1.669	5.563	61.891
8	1.138	3.794	69.259	1.138	3.794	69.259	1.665	5.550	67.441
9	1.050	3.499	72.758	1.050	3.499	72.758	1.595	5.317	72.758
Extraction Method: Principal Component Analysis.									

As explained in Table 4.6, the fluctuations of the factor when pivot are changed. For test, before rotation, factor 1 considers 29.937% of the change however after pivot, it checks just 15.984% of the fluctuation. The Exploratory Factor Analysis (EFA) of 30 things representing to hindrances towards trading bring about nine technological factors explaining 72.758% of the all out change. It is additionally conceivable to state, 72.758% of the change of the technological factors was depicted by the 9 separated parts. From first - ninth of the variables have clarified 15.984, 11.795, 8.437, 7.403, 7.117, 5.592, 5.563, 5.550, and 5.317 percent of the change individually. As indicated by Field (2000) and Rietveld and Van Hout (1993), there are three general guidelines that are proposed for deciding what number of variables to be recalled. These are; 1) keep factors with an eigenvalue greater than 1 only; 2) second, take the factors which, in total, count about 70-80% of the difference and 3) make scree - plot and hold all elements before the limit (Field, 2000) and Rietveld and Van Hout, 1993).Therefore in this research work the first

rule of thumb; keep factors with an eigenvalue greater than 1 only was used as a measure to decide the factors to be recalled. Accordingly, all nine factors with eigenvalues of greater than 1 have been applied for further analysis.

4.2.4. Un-rotated Component Matrix for the Technological Factors

A symmetrical revolution has been utilized trying to accomplish basic structure, permitting the elements to be associated. The factor structure has been checked and the variables are determined a name where the proposed factors are not proper. According to Bryant & Yarnold, (2004), exploratory factor examination allows the PC to discover straight factors which explain the hypothetical most extreme estimation of normal difference in a connection grid which would characterize the hidden factor model that best fits the information. The segment network table shows the factor loadings for every factor on the un-pivoted segments.. In nature, SPSS displays all loadings in the component matrix table; but, in this study all factor loading results less than 0.4 are italicized in the output. Field (2005), states that this un-rotated component matrix is not mainly significant for interpretation but it makes it easy. However these correlations can help to make an interpretation of the factors. And the un-rotated factors may contain many variables with large loadings, which can make interpretation difficult. For instance, “Lack of automated transportation of raw material” has factor loadings of 0.502 and 0.458 on factor 1 and 2 respectively, and also “Lack of automated process” has 0.448 and 0.408 factor 2 and 3 respectively (see appendix 1). Loading result of this item on the two factors is very near to each other and makes the interpretation complex. To solve this difficulty, it requires further analysis of a rotated component matrix.

4.2.5. Rotated Component Matrix of the Technological Factors

Field (2000) clarified that in the main segment investigation a few factors have high loadings on the most significant factor and little loadings on every other factor. For this situation Varimax with Kaiser Normalization pivot strategy was useful to make the understanding of a factor examination simple. That is, after the underlying outcome was discovered, the loadings were pivoted. Turn is a method of expanding high loadings and diminishing low loadings. In view of this the least difficult conceivable structure is accomplished. The consequences of the EFA

introduced that the 30 realized mechanical factors could be minimized to 9 fundamental measurements with Eigenvalues of more prominent than 1, for which a reasonable name is named dependent on the substance of the stacked factors in each factor. The nine factors identified from the rotated component matrix with Varimax with Kaiser Normalization rotation are presented in Table 4.7 below.

Table 4.7 Rotated Component Matrix

Rotated Component Matrix									
	1	2	3	4	5	6	7	8	9
Problems in making arrangement for getting paid	**.798**	.153	.154	.030	.162	.182	.082	-.041	-.209
Lack of technology on export documentation	**.719**	.326	.048	.068	-.008	-.102	-.032	.232	-.062
Lack of adequate quality of raw material	**.686**	-.053	-.004	-.177	.020	-.017	.327	-.025	.012
Lack of experimental facilities	**.643**	**.419**	.249	.042	.066	-.015	-.153	-.298	-.063
Lack of adequate export marketing research	**.597**	.006	.000	.124	-.196	-.105	.058	-.211	**.492**
Lack of process innovation	**.527**	.182	.258	**.446**	.159	-.035	-.193	-.005	.031
Insufficient skill to adapt high technology machines	**.480**	.372	.181	.371	-.319	-.030	.208	-.086	-.185
Unavailability of spare part of the machines	**.470**	**.447**	**.411**	-.036	.373	.132	.033	-.049	.028
Product quality problems	**.444**	.277	.149	**.440**	.116	-.063	.295	.312	.020
scarcity of power sources	.064	**.787**	.252	-.101	.012	.060	-.051	-.071	-.067
Lack of automated transportation of raw material	.121	**.682**	-.063	.316	.047	.025	-.034	.181	.326
Lack of facilities to access international market	.135	**.594**	.108	**.518**	.029	.219	-.007	.157	-.008
Lack of investment for a new technology	.359	**.544**	.152	.044	.273	-.024	.258	.006	-.090
Lack of research development and designing facilities	.348	**.526**	.118	.203	.135	-.364	.007	.384	-.077

Difficulty in Meeting export packaging and leveling requirement	.222	**.500**	.174	.071	-.212	.182	.070	**.477**	-.188
Difficulty in meeting importer's product quality standard	**.421**	**.426**	.229	.156	.242	-.203	.309	.166	-.046
insufficient stock	.011	.161	**.853**	-.032	-.070	-.037	.177	-.050	-.045
Too small in size to initiate export operation	.310	.202	**.729**	.177	.067	-.042	.009	.216	.203
Lack of facilities for production expansion	**.468**	.366	**.497**	.031	.077	-.128	.234	.148	.020
Poor image/style of products in foreign market	-.191	.029	-.084	**.819**	.200	-.071	.044	-.097	.123
inadequate Technology level of the company	**.520**	.067	.308	**.568**	-.002	.016	.061	.150	-.142
Insufficient foreign demand	.215	-.054	-.102	.206	**.797**	-.130	-.008	.149	-.046
Poor/ insufficient source of information to market communication with respect to foreign countries	-.093	.262	.101	.061	**.770**	.272	.047	.053	.245
Lack of automated process	.060	.142	-.010	.031	.141	**.850**	.021	.101	.038
Lack of knowledge to locate foreign marketing opportunity	.204	.159	.147	.200	.355	**-.565**	.192	-.113	-.385
Lack of facilities in quality control/inspection	.015	-.028	.087	.050	.092	.042	**.850**	-.027	-.007
High sensitivity of products to fashion	.379	.116	.283	.010	-.257	-.145	**.565**	.053	-.091
Low freight level to foreign market	-.120	.059	.064	-.021	.176	.119	-.027	**.829**	.091
Lack of export promotion program	-.111	-.018	.154	.111	.224	.269	-.026	.146	**.762**
Incapability to supply quantity on continues basis	.261	-.009	**.434**	.237	-.017	.265	.115	.201	**-.464**

4.2.5.1. Conceptual Arrangement of Technological Factors

Each factor stacking is a level of the significance of the variable in deciding each factor. Factor loadings convey an indispensable job for smoothing the translation of the aftereffects of the factor examination. After the pivoted framework happens, a portion of the proposed factor names were not commonsense along these lines; they may set a name dependent on reasonable arranging of the technological factors as underneath.

1) Factors related to Level of Technology for product and machine flexibility: Based on the suggested factors, the variables specified on factor 1 are mainly related to Level of Technology for product and machine flexibility. Thus, the factor is separated into two subclasses. These are factor related to level of technology for product flexibility and machine flexibility. In this discussion, the proposed factor names are not changed, they are called as factor related to level of technology for product flexibility and machine flexibility. So, they have been discussed independently in the interpretation area below. Problems in making arrangement for getting paid, Lack of technology on export documentation, Lack of adequate quality of raw material, Lack of experimental facilities, Lack of adequate export marketing research, Lack of process innovation, Insufficient skill to adapt high technology machines.

2) Factors related to Technology life cycle: Six variables are loaded into the second factor. These are Difficulty in meeting importer's product quality standard, scarcity of power sources, Lack of automated transportation of raw material, Lack of facilities to access international market, Lack of investment for a new technology, Lack of research development and designing facilities.

3) Attraction rate of Technology component: The variables that made up this factor are; Unavailability of spare part of the machines, Lack of facilities for production expansion, insufficient stock, too small in size to initiate export operation, Incapability to supply quantity on continues basis.

4) Factors related to Technology on product quality: The three variables that included in this factor are Product quality problems, inadequate Technology level of the company, Poor image/style of products in foreign market.

5) Factors related to Production Capacity: The two items loaded into the fifth factor are Insufficient foreign demand, Poor/ insufficient source of information to market communication.

6) Factors related to Work force technological knowledge: The sixth factor links two technological barriers that are Lack of automated process, Lack of knowledge to locate foreign marketing opportunity.

7) Barriers related to Technology to access international market: The two variables that involved into this component are Lack of facilities in quality control/inspection, High sensitivity of products to fashion.

8) Factors related to Order status tracking: The two variables that involved into this component are Low freight level to foreign market, difficulty in Meeting leveling and export packaging criteria,

9) Factors related to the source of information Technology: Out of the 3 variables proposed, only one items related to the source of information Technological barriers are loaded into this factor. This item is Lack of export promotion program.

4.3. Interpretation of the Result

According to Field (2000), described that in the principal component analysis factor loading results are essential for the interpretation of the factors. In this case Varimax with Kaiser Normalization rotation method was helpful to make the interpretation of a factor analysis easy. So the value of factor loading in the exploratory factor analysis provided the nine technological factors. Furthermore to supplement the factor loading the measurements and decision rules of Vichea (2005) have also been applied.

4.3.1 Factor Related To Level of Technology for Product and Machine Flexibility

Factor Related to Level of Technology for Product Flexibility: participants were requested to reply their answer about the technological barriers related to the level of technology for product flexibility and accordingly the Problems in making arrangement for getting paid (0.798), Lack of technology on export documentation (0.719), Lack of adequate quality of raw material (0.686), Lack of adequate export marketing research (0.597**)**, have become critical barriers of the

industries. Based on Vichea (2005), rule of measurements and decision the Problems in making arrangement for getting paid (M=3.68), Lack of technology on export documentation (M=3.59), Lack of adequate quality of raw material (M=3.76), Lack of adequate export marketing research (M=4.14**)**, are rated as higher problem level.

Factor Related to Level of Technology for Machine Flexibility: according to the output of the rotated component analysis, the items involved in the technological barriers related to the level of technology for machine flexibility with their corresponding factor loading results are Lack of experimental facilities (0.643), Lack of process innovation (0.527), Insufficient skill to adapt high technology machines (0.480), all of the respondents are asserts that Lack of experimental facilities (M=3.57), Lack of process innovation (M=4.08), Insufficient skill to adapt high technology machines (M=3.62), are rated as higher problem level.

4.3.2 Factors related to Technology life cycle

From the factors related to Technology life cycle, the significant variables in hindering the export competitiveness of the industries are Six variables such as Difficulty in meeting importer's product quality standard, scarcity of power sources, Lack of automated transportation of raw material, Lack of facilities to access international market, Lack of investment for a new technology, Lack of research development and designing facilities, The factor loadings of the variables are (0.426, 0.787, 0.682, 0.594, 0.544 and 0.526) respectively. Majority of the respondents are asserts that Difficulty in meeting importer's product quality standard(M=4.02), Lack of automated transportation of raw material(M=3.78), Lack of facilities to access international market(M=3.67), Lack of investment for a new technology(M=3.97), Lack of research development and designing facilities(M=3.63), are is rated as higher problem level whereas scarcity of power sources(M=3.30), are rated as middling problem level in affecting the export industries.

4.3.3 Attraction rate of Technology Component

Based on the result of the rotated component matrix, this factor involves; Unavailability of spare part of the machines, Lack of facilities for production expansion, insufficient stock, too small in size to initiate export operation, Incapability to supply quantity on continues basis. The factor

loadings of these variables are 0.411, 0.497, 0.853, 0.729, and 0.434 respectively. By using the mean values of the items: insufficient stock (M=2.75) is ranked as medium problem level while Unavailability of spare part of the machines (M=3.67), Lack of facilities for production expansion (M=3.76), too small in size to initiate export operation (M=4.02), Incapability to supply quantity on continues basis (M=3.76) are ranked as higher problem level.

4.3.4 Factors related to Technology on product quality

The main technological barriers associated to quality of the product are involved such as; Product quality problems with factor loadings and mean values of 0.440 and 4.03, inadequate Technology level of the company with factor loadings and mean values of 0.819 and 3.95, and Poor image/style of products in foreign market, with factor loadings and mean values of 0.568 and 3.98 correspondingly. This items are highly hampering the export competitiveness of the industries and ranked as higher problem level.

4.3.5 Factors related to Production Capacity

There are two technological variables linked to production capacity, which imposing the competitiveness of the footwear industry. The variables with their factor loadings, and mean values are “Insufficient foreign demand (0.797 and 3.87) and Poor/insufficient source of information to market communication with respect to foreign countries (0.77 and 3.89) correspondingly. The respondents affirmed that the Production Capacity barriers have a very significant impact on the export operation.

4.3.6 Factors related to Work force technological knowledge

Two variables were analyzed under the Factors related to Work force technological knowledge**.** These items are “Lack of automated process and Lack of knowledge to locate foreign marketing opportunity with factor loading result of 0.85 and 0.565. The participants responded that the two variables have been ranked as high problem level as their mean values are 3.94 and 3.89.

4.3.7 Barriers related to Technology to access international market

The factor comprises the lack of facilities in quality control/inspection and High sensitivity of products to fashion. Participants were requested to provide their perceived answers to what level

these barriers hinder the companies from exporting successfully. With The factor loading result, both the lack of facilities in quality control/inspection (0.85) and High sensitivity of products to fashion (0.565) are significant obstacles. And also by using mean values: “lack of facilities in quality control/inspection (M=3.57) is rated as higher problem level whereas High sensitivity of products to fashion (M=3.08) are grouped as medium problem level.

4.3.8 Factors related to Order status tracking

Two variables are found important in measuring the order status tracking barriers. These are “Difficulty in Meeting export packaging and leveling requirement and Low freight level to foreign market. The values of factor loading of the items are (0.477 and 0.829) respectively. And their mean values grouped both of the items as a higher problem level: “difficulty in Meeting export packaging and leveling requirement (M=3.67) and Low freight level to foreign market (M=3.83).

4.3.9 Factors related to the source of information Technology

The last component that derived from the principal component analysis with a varimax rotation is about the source of information Technological barriers. Out of the three variables proposed, only one item related to the source of information Technological barriers become important ones in this view with (0.762 and 4.19) factor loadings and mean value respectively. This item is Lack of export promotion program. And it ranked by the participants as high problem level.

To finalize that based on this research findings, the intention with respect to the technological factors such as level of technology flexibility regarding product, process and machinery changes, technology life cycle, attraction rate of technology components, effect of technology on product quality, Production Capacity, Work force technological knowledge, Technology to access international market, Order status tracking and The source of information Technology are negatively affect export competitiveness of manufacturing industries” is supported.

4.4. Hypothesis Testing

In order to check the internal consistency of results among groups and within groups, it is necessary to compare according to an independent variable by using the One-Way ANOVA test

4.4.1. Hypothesis test related to technological factors

Hypothesis : -H0: There are no significant differences in the opinions of respondents according to the proposed technological factors, regarding the factors such as Factors related to Level of Technology for product and machine flexibility, Technological factors related to Technology life cycle, Factor related to Attraction rate of Technology component, Technological Factors related to Technology on product quality, Factors related to Production Capacity, Factors related to Work force technological knowledge, Technological Factors related to access international market, Technological Factors related to Order status tracking and Technological Factors related to the source of information Technology at significance level $\alpha = 0.05$

In order to test this hypothesis One Way ANOVA statistical test is used. The results illustrated in Table 4.8 shows that, df (53,9), F(critical)= 2.81, P>0.05. From this the result of each p value (Sig.) is greater than the level of significance $\alpha = 0.05$ the value of F test for the nine major factors (2.2, 2.258, 2.671, 2.417, 2.19, 1.153, 1.305, 2.136, and 0.704) are less than the value of critical value (2.81). Thus, the null hypothesis is accepted, which means that there are no significant differences in the opinions of respondents with regarding the major technological factors at significance level $\alpha = 0.05$.

Table 4.8. One-way ANOVA test according to the opinions of respondents

		Sum of Squares	df	Mean Square	F(test)	Sig.
Factors related to Level of Technology for product and machine flexibility	Between groups	12.684	53	.239	2.200	.102
	Within groups	.979	9	.109		
	Total	13.663	62			
Factors related to Technology life	Between groups	9.280	53	.175	2.258	.095
	Within groups	.698	9	.078		

cycle	Total	9.978	62			
Factor related to Attraction rate of Technology component	Between groups	12.454	53	.235	2.671	.058
	Within groups	.792	9	.088		
	Total	13.246	62			
Factors related to Technology on product quality	Between groups	10.380	53	.196	2.417	.078
	Within groups	.729	9	.081		
	Total	11.109	62			
Factors related to Production Capacity	Between groups	12.232	53	.23	2.19	.101
	Within groups	.95	9	.105		
	Total	**13.182**	62			
Factors related to Work force technological knowledge	Between groups	7.947	53	.150	1.153	.440
	Within groups	1.170	9	.130		
	Total	9.118	62			
Barriers related to Technology to access international market	Between groups	4.287	53	.081	1.305	.352
	Within groups	.558	9	.062		
	Total	4.845	62			
Factors related to Order status tracking	Between groups	4.989	53	.094	2.136	.099
	Within groups	.400	9	.044		
	Total	**5.389**	62			
Factors related to The source of information Technology	Between groups	6.948	53	.131	.704	.797
	Within groups	1.677	9	.186		
	Total	8.625	62			

4.5. The Strengths and Weaknesses of the selected footwear industries

Footwear industries have their own strengths and weakness with respect to their export proficiencies, capabilities, properties, knowledge, practice and so on. In this segment, the relative quality and shortcoming of the individual manufacturing plants with detail to the innovative

variables have been talked about. To effectively comprehend their positive and negative parts, based on the number of employees the sampled factories divided into two subcategories, Subsequently, bunch 1 has 3 industrial facilities and furthermore bunch 2 has 3 manufacturing plants. They have employees less than 550 and greater than 550 respectively. Note that, this grouping of factories is subjective. It is targeted to see and clarify where the technological factors are overweight in each factory. To this end, to determine the ranges of the problem level where each factories belong to the measurements and decision rules implemented by Vichea (2005) have been used. This analysis helps for the strategy makers and managers of the selected factories to identify topmost factors and their influence on the export competitiveness.

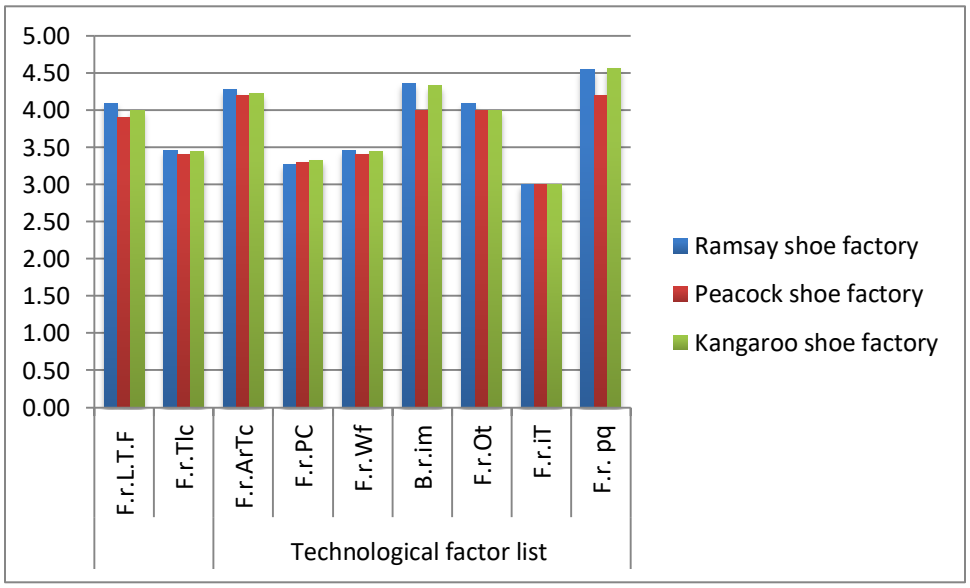

Figure 4.1: Comparison on Group 1 factories

In Ramsey Shoe factory case; the product quality barriers (M=4.55), international market barriers (M=4.36), and factor related to attraction rate of technology component (M=4.27) are rated as greatest problem level whereas factor related to level of technology and order status tracking barriers with (M=4.09) followed by factor related to technology life cycle (M=3.45) and work force technological knowledge barriers (M=3.45) are rated as higher problem level and the remaining two factors such as information technological barriers (M=3) and factor related to production capacity (M=3.27) are rated as middling problem level, the respondents from peacock Shoe factory are rated the product quality barriers (M=4.2), international market barriers (M=4),

and factor related to attraction rate of technology component (M=4.2), order status tracking barriers with (M=4) and factor related to level of technology (M=3.9) as higher problem level factor related to technology life cycle (M=3.4), work force technological knowledge barriers (M=3.4) information technological barriers (M=3) and factor related to production capacity (M=3.3) these are ranked as moderate problem level. In the case of Kangaroo shoe factory; the product quality barriers (M=4.56), international market barriers (M=4.33), and factor related to attraction rate of technology component (M=4.22) are rated as greatest problem level whereas factor related to level of technology (M=4) and order status tracking barriers with (M=4) followed by factor related to technology life cycle (M=3.44) and work force technological knowledge barriers (M=3.44) are ranked as high problem level, similar to the factories information technological barriers (M=3) and factor related to production capacity (M=3.33) are rated as moderate problem level.

Note that " F.r.L.T.F.= factor related to level of technology, F.r.Tlc= factor related to technology life cycle, F.r.Artc = factor related to attraction rate of technology component, F.r.PC = factor related to production capacity, F.r.Wf= work force technological knowledge barriers, B.r.im= international market barriers, F.r.Ot = order status tracking barriers, F.r.iT= information technological barriers, F.r.pq = factor related to product quality barriers.

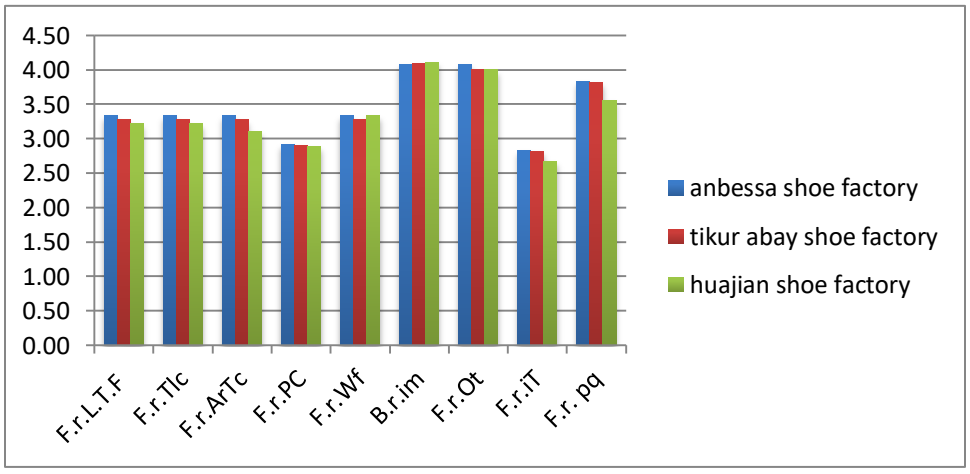

Figure 4.2: Comparison on Group 2 factories

Like majority of the other factories, the product quality barriers (M=3.83), international market barriers (M=4.08), and order status tracking barriers with (M=4.08) are recognized by the

respondents as higher problem level, followed by factor related to attraction rate of technology component (M=3.3), factor related to technology life cycle (M=3.33), factor related to level of technology (M=3.33), work force technological knowledge barriers (M=3.3), factor related to production capacity (M=2.92) and information technological barriers (M=2.73) are evaluated as medium problem level for Anbessa shoe factory. In case of Tikur abay shoe factory; the international market barriers (M=4.09), product quality barriers (M=3.82), and order status tracking barriers with (M=4) are recognized by the respondents as higher problem level, followed by factor related to attraction rate of technology component (M=3.27), factor related to technology life cycle (M=3.26), factor related to level of technology (M=3.2), work force technological knowledge barriers (M=3.11), factor related to production capacity (M=2.92) and information technological barriers (M=2.63). The range is similar to anbessa's problem level the only difference is individual mean value. Generally, when compare huajian shoe factory with the others, it has not been greatly affected by the technological factors. However, international market barriers (M=4.11), and order status tracking barriers with (M=4) are graded as high problem level while all the remaining factors except the information technological barriers (M=2.4) are valued as average problem level. Finally, to compare and contrast, the combinations of the two subgroups of the factories are figured in figure below.

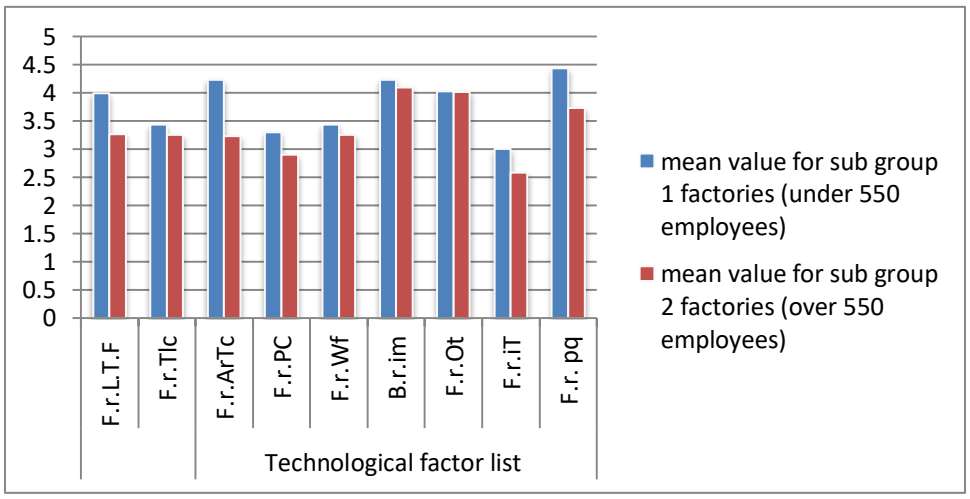

Figure 4.3: Comparison between Group 1 & 2 factories

the participants from subgroup 1 have ranked the product quality barriers (M=4.43), international market barriers (M=4.23), and factor related to attraction rate of technology component

(M=4.23) are rated as greatest problem level whereas factor related to level of technology (M=3.99), order status tracking barriers with (M=4.03), factor related to technology life cycle (M=3.43) and work force technological knowledge barriers (M=3.43) are rated as higher problem level and the remaining two factors such as information technological barriers (M=3) and factor related to production capacity (M=3.3) are valued as average problem level.

the participants from subgroup 2 factories have placed that barriers related to international market (M=4.09), order status tracking barriers with (M=4.02) and factors related to product quality (M=3.73) are ranked as high problem level where as the remaining factors such as factor related to attraction rate of technology component (M=3.23), factor related to technology life cycle (M=3.25) and work force technological knowledge barriers (M=3.256), factor related to level of technology (M=3.27), and factor related to production capacity (M=2.9) are rated as middling problem level, except information technological barriers (M=2.58) which assessed as less problem level. As a whole, subgroup 1 factories have relatively more difficulties compared to subgroup 2. Because large companies may have more capabilities and involvements abroad, have easier access to recognition, have more knowledge and experience about export marketing and relatively can supply the quantity needed.

CHAPTER FIVE

5. DEVELOPING A COMPETITIVENESS MODEL

5.1 Metrics of competitiveness

Due to the maximization of competition in the world and there is a diversified interest in the competitiveness strategy. All individuals of the world for example businessmen, governments, engineers, economists and media members all consider to have knowledge about what competitiveness is. They also put forward general strategies linked to the competitiveness. Alternatively, there are several societies who give definition for competitiveness and develop appropriate metrics for evaluating the competitive power. But it is still unclear. In broad, there are two different outlooks; macroeconomic view is the outlook that identifies what global competitiveness is in terms of cost related factors. In contrast, microeconomic outlook that identifies competitiveness with non- cost related factors considering competition among companies.

Indeed, no matter which indicator is favored or criticized as an alternative for real exchange rate. The problem is the common behaviors of all these accepted or rejected alternatives cost based'. This problem highlights the mostly discussed limitation of the macroeconomic outlook. As Wignaraja (2003) and Fagerberg (1988, 1996) indication, the main weakness is the equation of universal competitiveness only with meters of relative unit costs. Absence of non-cost based factors is a very simplified outlook as the empirical revisions have also recommended. Similarly Porter (1990) highlights this shortcoming. His statements, this is a narrow scope for the public strategy.

Based on theoretical evidences in the literature survey as reinforced by various scholars (such as; Fagerberg (1988, 1996), Lall (2001) and Wignaraja (2002, 2003)). There is a strong positive relationship between technological factor and competitiveness. Accordingly, both of these interpretations have been enriched in the last years and the technological factor has been taken as the key driver of the competitive advantage.

And also this study analyses the impact of technological factors on the competitiveness of Ethiopian footwear industries. The finding of this study shows that all the technological factors examined in this research are affecting the export competitiveness of the footwear factories. But as many scholars, institution and previous studies have shown that the indicators and drivers of competitiveness have multidimensional and complex relationships. Competitiveness can be considered as all around in nature as a number of variables should be jointly adopted to measure it. For example productivity and efficiency are often cited as indicators or measures of competitiveness, and the European Commission considers it as the most reliable indicator for competitiveness over the long term (European Commission, 2008).

According to Garvin, (1988), Quality is a powerful strategic weapon in international competition and trade. Improved quality reduces waste and increases productivity, further improvements in quality and productivity enable firms to increases their market share and to charge higher prices for their products, which, results in higher profitability. Hence many world class firms use quality as a best weapon for strengthening their competitive position. Ashok and Jaideep (1999) measured quality quantitatively using quality competitive Index (QCI) by considering each quality factors and sub factor. QCI was used to determine the degree to which a firm's quality practices and policies are instrumental in improving its competitiveness.

To ending this discussion the microeconomic angle lonely would not be enough to examine a firm level competitiveness. In the same way, an examination of international competition limited solely to the macroeconomic viewpoint would not be appropriate. The combination of the improved outlooks would examine the competitiveness more systematically. For instance, the competitiveness analysis at the micro level does not determined by the cost related factors lonely but also together with the non-cost factors such as the technological factor, which means it is also important to study from the perspective of both factors.

Based on this ground, the finding of this study shows that the competitiveness of Ethiopian footwear industries in the Global market were highly affected by technology, but it is not the only factor and many prior researchers shows the competitiveness of manufacturing industries in the global market highly affected by productivity, technology, quality, price and time factors so in order to become effective the integration of this study result and prior research findings are

useful that means continuously improving all these factors and developing the production process increase their competitiveness in the global market. Therefore, developing a competitiveness model for these industries in the global market is compulsory as they had a significant economic contribution in the development of the country. So in order to develop a competitiveness model the researcher includes those factors as the main drivers of competitiveness.

To improve the competitiveness of the Ethiopian footwear industries in the global market the WATCH model was preferable by this study. The reason is firstly, this model is easy to understand based on the industries problems. Secondly, it can integrate both the price based and non-price based factors. Thirdly, it shows the continuous improving of the factors affecting these industries competitiveness and measuring the performances of these industries to satisfy customers in the global market. Fourthly, most competitiveness analysis model including Porter diamond model do not give attention for the production system, this create gap to study the effect of actual production operation of the company for competitiveness, But this alternative model gives attention for production technology system because it has a direct impact on competitiveness through quality, cost, price and timeliness.

5.1.1 Productivity

Productivity is a measure of the rate at which outputs of goods and services are produced per unit of input (labour, capital, raw materials, etc.). Higher productivity leads to a reduction in cost of production, reduces the sales price of an item, expands markets, and enables the products to compete effectively in the world market. In fact the strength of a country, prosperity of its economy, standard of living of the people and the wealth of the nation are very largely determined by the extent and measure of its production and productivity. Improving productivity can have connotations of economizing on the use of inputs, for example, adopting efficient production processes that minimize waste. Equally, improving productivity can have connotations of yielding more output for example, using resources in activities or with technologies that generate more output. Competitions of these footwear industries require increasing the comparative advantages on products with technologies. Through innovation they

can find new methods of production process, new products development, new raw materials and inputs, or new ways of organizing to make better products at lower cost.

5.1.2 Technology

Technology may be defined as all the knowledge, products, processes, tools, methods and systems employed in the creation of goods or in providing services. Technological factors can include materials, machines and processes that can present opportunities and treats but it is vital for competitive advantage and is a successful drive in globalization.

Developing the production technology of footwear industries through innovation and adoption of modern technology will increase the competitiveness of their products in the global market. As technology is used to develop new products and higher quality level, better design and shorter delivery time, then it reduce the proposed and other factors of technology can affect the competiveness of these industry.

Totally as every department in those footwear industries understand their role in the cross functional processes, fully supported by technologies and systems aligned to the unique need of the industry used to reduce production time, to increase flexibility levels, reliability, to improve customer service and to enhance the development of competitive advantages and productivity is greatly improved.

5.1.3 Quality

In order to compete globally; they would have to produce shoes of world-class quality. This meant producing better product but at reasonable competitive prices. If Quality is introduced and managed correctly, will: Eliminate waste; Cut inventories; Improve customer satisfaction; and Enhance profitability. That means it can be improved through improvement in the production process. A better way is to improve the production process, the quality of these industry products/shoes can be improved by improving the value adding activities along their supply chain, improving the production technology, improving the working environment of inter functional departments and developing a communication system throughout the supply chain.

From different researcher's outlook in combination with preceding research output, the proposition with respect to the above two factors of competitiveness i.e. "productivity and quality are important in impeding the export competitiveness of the industries". And also from

the result of this study and theoretical suggestions with concern to the technology is also supported.

5.2 What is WATCH model

Equipment that is used to measure the time variation or durations in competitiveness is known as *Watch*. A watch is a timepiece, typically worn either on the wrist or attached on a chain (Messele K. 2013). The Watch is used to measure time in hours, minutes, seconds and microseconds in the competition. Hence, to be competitive in a fast changing industrialized world the productivity, technology, quality and time are basic drivers for this footwear industries competitiveness in the global market. The basics can be modeled using this WATCH model to enhance the competitiveness and performance measures for sustainable development of the firms. Besides if the counters are indicated in one direction the model indicates the simultaneous improvements made on quality, technology and productivity of these firms. In addition the respective speed of the counters indicated the immediate solutions made on these factors for competitiveness in the Global market.

Similar to the model for traditional fashion processing identified by Mesele (2013), has mentioned that the meaning of WATCH Model for the footwear processing can be explained as follows as

W: **Work hard with Firms operation**; improving the value adding activities along their supply chain. So plan to communicate and maintain continuous personal contact with key people at partner organizations even if up to suppliers of suppliers. Success on this front makes it possible to develop new opportunities from existing relationships. Deep trust and extensive sharing of information is required. Use a range of competitive and market sources to develop the intelligence to spot and evaluate potential partners. Best partnership is not only from the supplier perspective as a result the customers themselves should be considered. Capture and adopt best practices. Build on the knowledge gained in alliances by sharing information and leveraging collaboration-created assets across the parent company and maximize day to day performance.

A: **Analyze the production process using system engineering** (*people, product, machine and process*): System Engineering is an interdisciplinary approach encompassing the entire technical

effort to evolve and verify an integrated and lifecycle balanced set of system people, product, and process solutions that satisfy customer needs. It integrates all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation. Systems engineering considers both the business and the technical needs of all customers with the goal of providing a quality product that meets the user needs. Therefore, this can be used as the best tool for these products to be competitive in the global market.

T: **Technologically suit to user and environment**: The production technology and the products of the factories must be suitable for customers considering the fluctuations of environmental temperature on the globe. Currently, the environmental temperature is changing from time to time which affects persons not to wear warm and uncomfortable shoes. Therefore, these footwear industry producers must consider this factor while producing for international market.

C: **Change the product varieties with customers' need:** Product diversification or flexibility in design, style and need of customers is imperative to increase the competitiveness of these products in the global market.

H: **high quality to Satisfy customers and increase productivity**: Quality can be defined as an assembly of conformance to specification (production) and conformance to requirement or fitness for purpose (marketing) that is aimed at the needs of customers today and in the future.

For footwear industry, to satisfy customers is not a project or a contract but it is a continuous improvement process to boost their competitiveness in the global market. Footwear industry customers need high quality products in time and with acceptable prices.

5.3 Elements of WATCH model and its application

In a WATCH model productivity equivalent to hour's measure of the watch, technology equivalent to minute measures of the watch and quality equivalent to second measures of the watch and records of firms competitiveness. All these counters are counting continuously to measure the duration the competitors' time; similarly continuously improving in productivity, technology and quality is used to measure or increase the competitiveness of the firm. The chain

rings of the WATCH represent the close relationship between suppliers, and customers of firms. And The Watch cannot be used by a customer without the proper fittings of the chains to tie at hand. The representation of counters and their function on the competition is;

Hours counter as Productivity; these industries must evaluate their productivity like a rotation of hour counter is used to measure the day length and their productivity is also used to measure continuously the efficient utilization of all the resources to produce the products.

Minute Counter as Technology; footwear production process is highly affected by technology in their competitiveness to support the production process and satisfy customer next to productivity as minute is used to measure time next to hour. Therefore, the firms must continuously improve the production technology like the minute counter to increase the competitiveness of the products.

Second counter as Quality; like the fastest measure of time next to microsecond is second, quality is the first factor affecting these industries which needs the fastest and continual measure to improve their competitiveness in the global market.

Rotation of the counters: represents the continuous improvements made in the value adding activities of the firms producing these products with respect to productivity, quality and Production technology.

Circular ring (edge) of watch: the circular portion (edge) of the watch represents changes or innovations applied in productivity, technology and quality on the firms to be competitive in the global market.

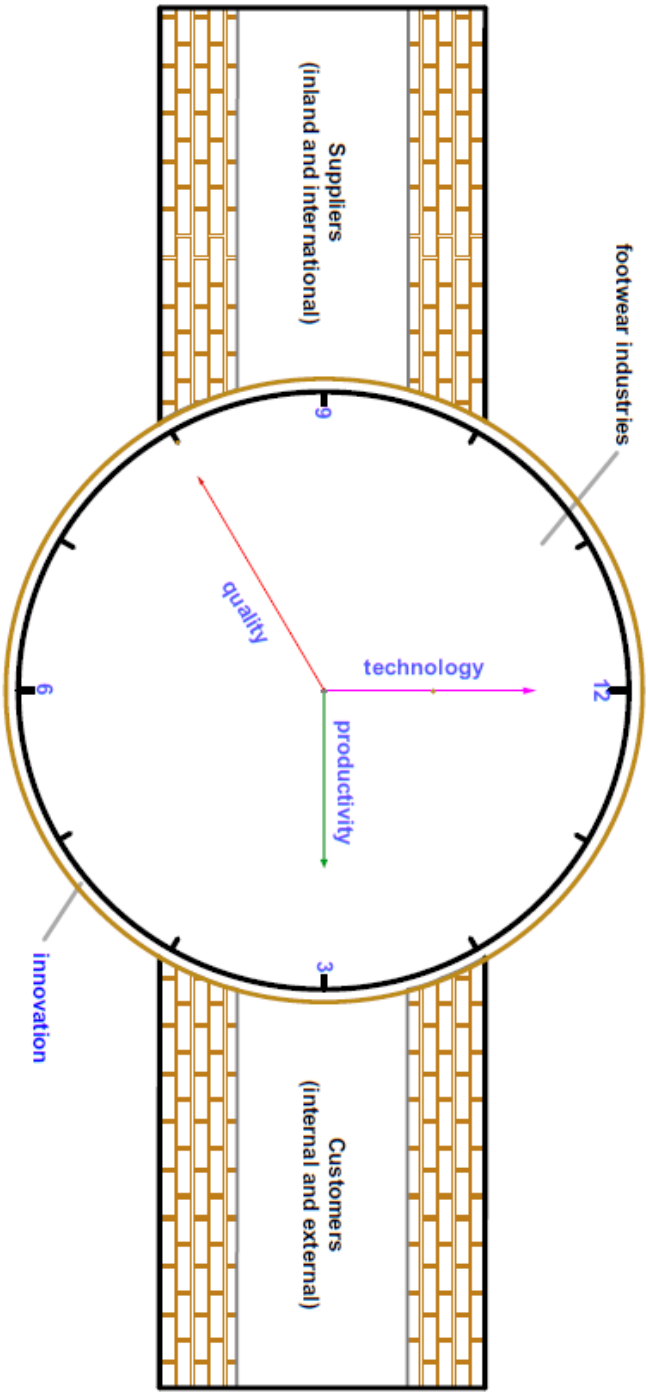

Figure 5.1 WATCH Model (source: adopted from Messele K. 2013)

In general, the WATCH model is used to evaluate the performance measures and improve the competitiveness of these industries by taking a fastest measure on the highly affecting factors.

The watch is counting continuously to measure the time length, whereas the quality, technology and productivity are critical measures for competitiveness of the footwear industries to be solved and improved continuously depending on the speed indicated on the watch.

In a Watch model the manager of the firm is used as a coach to improve factors hindering their competitiveness in the global market and measure the performances of these industries. Therefore, the Manager has to create strategies to improve the factors like productivity, quality and speed in today's dynamic markets and technologies. Firms are running in the competition track and watched by their customers and competitors in the global market. Besides, the firm is watching their competitors and their customers' desire to measure their capacity of producing products as per customers satisfactions satisfy and win the competition. The customers are watching, enjoying and evaluating the competition between firms in the global market depending on quality, flexibility, and technological capability suit to their satisfaction. The model also includes the close relationship between suppliers, the firm and customers (SCM) to indicate the successful competitiveness of the firms in the global markets. The chain shape of the Watch indicated the complexity of the supply chain and the suppliers were used as engines for firms in the competitiveness of these products in the global market. In general, a WATCH model is used to watch the competitiveness of footwear industries in the Global Market.

CHAPTER SIX

6. CONCLUSION, RECOMMENDATION AND FUTURE WORK

6.1. Conclusion and Summary

This study analyses the impact of technological factors on the competitiveness of Ethiopian footwear industries. The design of this research was an exploratory one based on both primary and secondary sources of information. Under this method, quantitative data collection techniques were designed to support the Qualitative data. The researcher administered 90 questionnaires for the purposively selected 6 shoe factories and 63 were effectively used. Before going to the analysis of the data, the KMO value, Cronbach's alpha and Bartlett test is tested for the purpose of checking the reliability of data, so the KMO value is 0.75, Cronbach's alpha is 0.908, and the Bartlett test gives a chi-square value 1010.241 and 435 degree of freedom. And also a p-value of the total questionnaire is 0.000, confirmed the reliability analysis of the data and the sampling is suitable for factor analysis. To supplement the factor loading in the interpretation section the measurements and decision rules of Vichea (2005) have also been applied. The summary of the descriptive statistic result of the 30 technological variables ran with SPSS, version 20.

From the factor analysis techniques, Accordingly, the name of the factors are level of technology flexibility regarding product, process and machinery changes, technology life cycle, attraction rate of technology components, effect of technology on product quality, Production Capacity, Work force technological knowledge, Technology to access international market, Order status tracking and The source of information Technology. All the technological factors mentioned here are important in impeding the barriers. The factor loading result and the mean value shows that all the technological factors examined are affect the export competitiveness of the factories. And the propositions were tested by using one way ANOVA hypothesis testing and all nine technological factors have been supported or fullfilled. To see the selected shoe factories strengths and weakness, a mean value comparison result was calculated. And the study proofs the relative large factories are less exposed to internal forces than the relative small factories do.

Competition in the Global market indebted only through developing the indigenously designed diversified products by adopting technologies; continuously improving in the design, flexibility, quality and services of the products.

The finding of this research indicated that the competitiveness of Ethiopian footwear industries in the Global market were highly affected by technology and also previous researches result shows that in addition to technology other factors such as productivity and quality have a significant role in competitiveness. Therefore; to satisfy the customers in a dynamic competitive world and customer drive in economy a WATCH model is essential to explore the competitive advantages of these industry using innovations on productivity, technology and quality of the production processes in time with acceptable price.

A WATCH model is used for sustainable competitiveness of this industry in the Global market through innovation and continuous improvements on productivity, technology, and quality to deliver the product at the right time and with acceptable price. The Model shows the close relationship between suppliers, the firm and customers to signify the competitiveness of the industry through SCM in the Global market. This model also used to measure continuously the performance measures of these products production process too.

6.2. Recommendation

From the results of study, the following points have been recommended.

- Technology is one of the major determinants of competitiveness. Therefore, the factory should improve their technology in organized and sustainable way so that to compete in the market place.
- It is recommended that the factories will be beneficiary if they implement the proposed model on operational level by considering basic drivers of competitiveness in the production and other process in the factory. Because these is an organized and shows the continuous improving of the factors (price based and non-price based) affecting these industries competitiveness and measuring the performances of these industries to satisfy customers in the global market.
- It is strongly recommended that competitiveness improvement through the integrated model should be considered as normal task of every employee within the factory. For better coordination of the technique, In a Watch model the manager of the firm is used as a leader to improve factors hindering their competitiveness in the global market and measure the performances of these industries. Therefore, the Manager has to create strategies to improve the factors like productivity, quality and speed in today's dynamic markets and technologies. The leaders should set up a standing productivity team. The proposed members of this team includes multidisciplinary working group within the factory. This small working group involves a mix of participants, including production staff, quality controllers, middle management and technicians.
- The last recommendation is because of globalization the competition between organizations is increasing from time to time and the need of customers is changed accordingly. So the factories should have research and development process supported by technology, so it is recommended to have this process for the design and development of different types of shoe styles by identifying customers' needs and requirements, and for introducing new tools and techniques.

6.3 Future Work

The following points are recommended based on the output and the limitations of the research work. Further investigation is proposed covering enormous geological and hypothetical highlights. It is likewise prescribed to utilize enormous example size so as to build the representativeness of the populace. Future study recommended to identify additional competitiveness indicators and technological factors which are not considered in the examination because of time and information deficiency, and furthermore to use advanced statistical tools for further understanding. The Impact of technological factors on the intensity of Ethiopian footwear businesses covering all production lines of the nation and the effect of different competitiveness markers in footwear enterprises is a potential study area for future researchers.

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Appendices

Appendix 1: Un-rotated Component Matrix for the technological factors

Component Matrix									
	Component								
	1	2	3	4	5	6	7	8	9
Lack of facilities for production expansion	**.774**	*-.095*	*-.113*	*.110*	*.148*	*-.025*	*.154*	*.099*	*-.106*
Difficulty in meeting importer's product quality standard	**.753**	*.009*	*.141*	*.168*	*.069*	*-.086*	*.038*	*.164*	*.066*
Product quality problems	**.732**	*.104*	*.146*	*.142*	*-.089*	*.246*	*-.117*	*.144*	*.028*
Unavailability of spare part of the machines	**.731**	*.139*	*-.067*	*-.146*	*.317*	*-.214*	*.098*	*-.126*	*-.003*
Lack of technology on export documentation	**.706**	*-.142*	*.027*	*-.212*	*-.079*	*-.088*	*-.250*	*.194*	*-.145*
Problems in making arrangement for getting paid	**.701**	*-.223*	*.038*	*-.260*	*.251*	*-.018*	*-.315*	*-.148*	*.010*
Lack of research development and designing facilities	**.697**	*.101*	*.135*	*.155*	*-.266*	*-.236*	*-.035*	*.264*	*-.146*
inadequate Technology level of the company	**.693**	*-.055*	*.131*	*.033*	*-.167*	*.348*	*-.137*	*-.220*	*-.147*
Lack of experimental facilities	**.682**	*-.194*	*.017*	*-.420*	*.026*	*-.220*	*.103*	*-.185*	*-.001*
Lack of investment for a new technology	**.680**	*.059*	*.042*	*.041*	*.117*	*-.230*	*.027*	*.059*	*.244*
Insufficient skill to adapt high technology machines	**.672**	*-.311*	*-.076*	*-.056*	*-.311*	*.169*	*.010*	*-.077*	*.200*
Too small in size to initiate export operation	**.671**	*.114*	*-.196*	*.096*	*.114*	*.168*	*.301*	*-.057*	*-.385*
Lack of process innovation	**.647**	*.078*	*.210*	*-.234*	*-.119*	*.122*	*.012*	*-.210*	*-.212*

Lack of facilities to access international market	**.603**	*.391*	*-.103*	*-.022*	*-.366*	*.069*	*-.019*	*-.118*	*.210*
Difficulty in Meeting export packaging and leveling requirement	**.550**	*.097*	*-.443*	*.159*	*-.251*	*-.066*	*-.256*	*.120*	*.014*
High sensitivity of products to fashion	**.505**	**-.451**	*-.133*	*.240*	*.097*	*.218*	*.063*	*.201*	*.144*
Lack of automated transportation of raw material	**.502**	**.458**	*-.046*	*-.181*	*-.328*	*-.044*	*.134*	*.266*	*.178*
scarcity of power sources	**.502**	*.141*	*-.334*	*-.061*	*-.129*	**-.453**	*.238*	*-.034*	*.214*
Incapability to supply quantity on continues basis	**.470**	*-.110*	*-.207*	*.291*	*.026*	*.162*	*-.284*	**-.419**	*-.093*
Lack of adequate quality of raw material	**.423**	*-.392*	*.077*	*-.189*	*.362*	*.103*	*-.211*	*.225*	*.048*
Poor/ insufficient source of information to market communication	*.234*	**.712**	*.166*	*.015*	**.425**	*-.147*	*.078*	*-.090*	*.130*
Lack of export promotion program	*.001*	**.618**	*-.093*	*-.213*	*.261*	*.367*	*.284*	*.197*	*-.126*
Low freight level to foreign market	*.106*	**.513**	*-.216*	*.356*	*.014*	*.024*	*-.332*	*.310*	*-.331*
Lack of automated process	*.123*	**.448**	**-.408**	*-.209*	*.243*	*.163*	*-.357*	*-.251*	*.278*
Insufficient foreign demand	*.273*	*.363*	**.633**	*.088*	*.287*	*-.133*	*-.220*	*-.051*	*-.114*
Lack of knowledge to locate foreign marketing opportunity	**.444**	*-.239*	**.544**	*.347*	*-.026*	*-.279*	*.116*	*-.099*	*.008*
Poor image/style of products in foreign market	*.108*	*.384*	**.485**	*.098*	*-.359*	*.381*	*.175*	*-.216*	*.176*
Lack of adequate export marketing research	*.346*	*-.225*	.120	**-.539**	*.044*	*.344*	*.195*	*.273*	*-.045*
insufficient stock	**.433**	*-.140*	*-.365*	*.320*	*.189*	*.042*	**.471**	*-.248*	*-.178*
Lack of facilities in quality control/inspection	*.210*	*-.144*	*.054*	**.426**	*.366*	*.321*	*.058*	*.168*	**.475**

Appendix 2: Factor Loadings, Eigenvalue, Variance and Communalities

Rotated Component Matrix For technological factors				
Description	Component			
	Factor loading	Eigen value	Variance explained	Communalities
Factors related to Level of Technology for product and machine flexibility		**4.795**	**15.984**	
Problems in making arrangement for getting paid	.798			.795
Lack of technology on export documentation	.719			.699
Lack of adequate quality of raw material	.686			.614
Lack of experimental facilities	.643			.774
Lack of adequate export marketing research	.597			.710
Lack of process innovation	.527			.642
Insufficient skill to adapt high technology machines	.480			.728
Factors related to Technology life cycle		**3.538**	**11.795**	
scarcity of power sources	.787			.712
Lack of automated transportation of raw material	.682			.727
Lack of facilities to access international market	.594			.725
Lack of investment for a new technology	.544			.600
Lack of research development and designing facilities	.526			.758
Difficulty in meeting importer's product quality standard	.426			.660
Attraction rate of Technology component		**2.531**	**8.437**	
Unavailability of spare part of the machines	.411			.751
insufficient stock	.853			.796
Too small in size to initiate export operation	.729			.794
Lack of facilities for production expansion	.497			.700

Incapability to supply quantity on continues basis	.434			.653
Factors related to Technology on product quality		**2.221**	**7.403**	
Product quality problems	.440			.692
Poor image/style of products in foreign market	.819			.786
inadequate Technology level of the company	.568			.739
Factors related to Production Capacity		**2.135**	**7.117**	
Insufficient foreign demand	.797			.779
Poor/ insufficient source of information to market communication	.770			.823
Factors related to Work force technological knowledge		**1.678**	**5.592**	
Lack of automated process	.850			.780
Lack of knowledge to locate foreign marketing opportunity	.565			.773
Barriers related to Technology to access international market		**1.669**	**5.563**	
Lack of facilities in quality control/inspection	.850			.744
High sensitivity of products to fashion	.565			.656
Factors related to Order status tracking		**1.665**	**5.550**	
Difficulty in Meeting export packaging and leveling requirement	.477			.681
Low freight level to foreign market	.829			.764
Factors related to the source of information Technology		**1.595**	**5.317**	
Lack of export promotion program	.762			.774

Appendix 3: Questionnaires

Addis Ababa Institute of Technology

School of Mechanical and Industrial Engineering

Post Graduate Program in Industrial Engineering

Study on "Impact of technological factor on the Competitiveness of Ethiopian Footwear Industry."

Dear Sir / Madam

First, I would like to present my appreciation and thanks to you for taking your time and effort to complete this questionnaire. This questionnaire aims to study "Impact of technological factor on the Competitiveness of Ethiopian Footwear Industry." This is a part of partial Fulfillment of Master of Science in Mechanical Engineering in the field of Industrial Engineering at Addis Ababa University, researcher **Dereje Teshome** under the supervision of **Dr. Gulelat Gatew and Dr. Gezahegn Tesfaye.**

Questionnaire contents:

This questionnaire is divided into two main sections:

1. General Information
2. Ranking the Technological factors

Thank you for your cooperation.

Email:-derejeteshome196@gmail.com

phone number: +2519 21 11 40 89

Section 1 General Information

I. Profile of the Company

Name of the company _____

Date of Establishment _____

Company location _____

II. Personal Data (not necessary to write your Name!)

Name:_____

Current position (GM, Production Head, shift leader, etc)_____

Education level _____

Service year _____

Gender _____

Age _____

Section 2 Ranking the Technological factors

For evaluation purpose nine technological factors are selected as main determinant for competitiveness of the footwear industry of Ethiopia. Based on your experience and observation Please indicate you level of agreement with the following scale of agreement (1-5).

No	Technological factor list	Ranking				
		Strongly disagree	**disagree**	**Neutral**	**agree**	**Strongly agree**
1	**Factors related to Level of Technology for product and machine flexibility**	**1**	**2**	**3**	**4**	**5**
a.	Technology level of the company is adequate					
b.	Lack of investment for a new technology					
c.	Lack of process innovation					
d.	High sensitivity of products to fashion					
2	**Factors related to Technology life cycle**					
a.	Lack of facilities for production expansion					
b.	Lack of facilities in quality control/inspection					
c.	Lack of research development and designing facilities					
d.	Lack of experimental facilities					
3	**Attraction rate of Technology component**					
a.	scarcity of power sources					
b.	Unavailability of spare part of the machines					

4	**Factors related to Technology on product quality**					
a.	Lack of adequate quality of raw material					
b.	Product quality problems					
c.	Difficulty in meeting importer's product quality standard					
d.	Difficulty in meeting export packaging and leveling requirement					
5	**Factors related to Production Capacity**					
a.	Too small in size to initiate export operation					
b.	insufficient stock					
6	**Factors related to Work force technological knowledge**					
a.	Insufficient skill to adapt high technology machines					
b.	Incapability to supply quantity on continues basis					
c.	Lack of knowledge to locate foreign marketing opportunity					
7	**Barriers related to Technology to access international market**					
a.	Lack of export marketing research					
b.	Poor image/style of products in foreign market					
c.	Insufficient foreign demand					
8	**Factors related to Order status tracking**					

a.	Lack of automated process					
b.	Lack of technology on export documentation					
c.	Lack of automated transportation of raw material					
d.	Low freight level to foreign market					
e.	Problems in making arrangement for getting paid					
9	**Factors related to The source of information Technology**					
a.	Poor/ insufficient source of information to market communication with respect to foreign countries					
b.	Lack of export promotion program					
c.	Lack of facilities to access international market					

Appendix 4: Respondents' Responses for the Questionnaires

No	Technological factor list	Ranking(frequency of the scale/percentage %)				
		Strongly disagree	**disagree**	**Neutral**	**agree**	**Strongly agree**
1	**Factors related to Level of Technology for product and machine flexibility**	**1**	**2**	**3**	**4**	**5**
a.	Inadequate technology level of the company			16/25.4	34/54	13/20.6
b.	Lack of investment for a new technology			16/25.4	33/52.4	14/22.2
c.	Lack of process innovation			11/17.5	36/57.1	16/25.4
d.	High sensitivity of products to fashion		8/12.7	42/66.7	13/20.6	
2	**Factors related to Technology life cycle**					
a.	Lack of facilities for production expansion		1/1.6	20/31.7	35/55.6	7/11.1
b.	Lack of facilities in quality control/inspection			27/42.9	36/57.1	
c.	Lack of research development and designing facilities			26/41.3	34/54	3/4.8
d.	Lack of experimental facilities			29/46	32/50.8	2/3.2
3	**Attraction rate of Technology component**					
a.	scarcity of power sources		2/3.2	40/63.5	21/33.3	
b.	Unavailability of spare part of the machines			24/38.1	36/57.1	3/4.8
4	**Factors related to Technology on product quality**					
a.	Lack of adequate quality of raw material		1/1.6	14/22.2	47/74.6	1/1.6
b.	Product quality problems			13/20.6	35/55.6	15/23.8

c.	Difficulty in meeting importer's product quality standard			13/20.6	36/57.1	14/22.2
d.	Difficulty in meeting export packaging and leveling requirement		1/1.6	20/31.7	41/65.1	1/1.6
5	**Factors related to Production Capacity**					
a.	Too small in size to initiate export operation			9/14.3	44/69.8	10/15.9
b.	insufficient stock		24/38.1	31/49.2	8/12.7	
6	**Factors related to Work force technological knowledge**					
a.	Insufficient skill to adapt high technology machines		3/4.8	18/28.6	42/66.7	
b.	Incapability to supply quantity on continues basis			17/27	44/69.8	2/3.2
c.	Lack of knowledge to locate foreign marketing opportunity			11/17.5	48/76.2	4/6.3
7	**Barriers related to Technology to access international market**					
a.	Lack of export marketing research			3/4.8	48/76.2	12/19
b.	Poor image/style of products in foreign market			6/9.5	52/82.5	5/7.9
c.	Insufficient foreign demand			10/15.9	51/81	2/3.2
8	**Factors related to Order status tracking**					
a.	Lack of automated process			4/6.3	59/93.7	
b.	Lack of technology on export documentation			28/44.4	33/52.4	2/3.2
c.	Lack of automated transportation of raw material			17/27	43/68.3	3/4.8
d.	Low freight level to foreign market			12/19	50/79.4	1/1.6

e.	Problems in making arrangement for getting paid		1/1.6	20/31.7	40/63.5	2/3.2
9	**Factors related to The source of information Technology**					
a.	Poor/ insufficient source of information to market communication with respect to foreign countries with respect to foreign countries			7/11.1	56/88.9	
b.	Lack of export promotion program			9/14.3	33/52.4	21/33.3
c.	Lack of facilities to access international market			25/39.7	34/54	4/6.3