

Addis Ababa University
Addis Ababa Institute of Technology



School of Mechanical and Industrial Engineering
(Industrial Engineering Stream)

Labor Productivity Measurement and Improvement:
In Case of Ethiopian Medium and Large Footwear Industry

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October, 2018
Addis Ababa

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A thesis submitted to school of Graduate Studies of Addis Ababa University in
partial fulfillment of the requirements for the Degree of Masters of Science in
Mechanical Engineering
Industrial Engineering Stream

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Addis Ababa, Ethiopia

October, 2018

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SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING

This is to certify that the thesis prepared by Abdi Angerasa, entitled: Labor Productivity Measurement and Improvement: In Case of Ethiopian Medium and Large Footwear Industry and submitted in partial fulfillments of the requirements for the degree of Master of Science (Mechanical and Industrial Engineering) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Declaration

I, Abdi Angerasa, declare that the Masters Research thesis entitled “**Labor Productivity Measurement and Improvement: In Case of Ethiopian Medium and Large Footwear Industry**” is my original work and no material has been submitted previously for the award of any other academic degree. The research work was done under the guidance of Dr. Ephrem Gidey and Mr. Daniel Ashagrie (Co-Advisor), at Addis Ababa University, Addis Ababa Institute of Technology in School of Mechanical and Industrial Engineering.

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Acknowledgements

Above all, I give thanks, glory and honor to the almighty God for giving me patience and strength to overcome the difficulties that I have faced on the way to execution of this study.

It is a great privilege to express my heartfelt gratitude to my Advisor, Dr. Ephrem Gidey, Lecturer at Addis Ababa Science and Technology University, and President of Ethiopian Industrial Engineers Association (EIEA), for his priceless support, encouragement, guidance, supervision and useful suggestions throughout this thesis work. I consider myself fortunate to work under his supervision. His constant moral boosting and marvelous scientific thoughts brought a perfect shape to this manuscript. I would also like to express my deep gratitude and thanks to Daniel Ashagrie, PHD student at Addis Ababa Institute of Technology, for his unreserved, friendly, valuable comments and suggestions.

I am very much thankful to all my classmate friends in the School of Mechanical and Industrial Engineering, some of whom include Getu G., Mihiret G., Tewoldual T., Yordanos Z. and Anwar M. They all made my stay so joyful by giving me timely information, valuable suggestions, experience-sharing and encouragement while accomplishing this study. My admiration also goes to PHD students and administrative workers in the School of Mechanical and Industrial engineering, such as Shimelis T. and Gezahegn T., who have given me constructive comments and assisted me during analysis work.

It is my sincere pleasure to acknowledge my family, relatives and friends whose encouragement and support became my strength such as Mezgebu Angerasa, Daniel Diriba, Dinke A., Balu A., Gelane A., Baye A., Chara A., Belay Tadesse, Hawi Wondimu, Tekalign Lemma, Begna Chala, Aboma Tariku, Nuredin Hussien, Anteneh Kahsaye, Kasahun Hailu, Dereje Tolasa, Werkinesh Kifle and others. The love and encouragement of those people is really indispensable. I have paramount admiration to their support and encouragement throughout the period of my study.

Finally, I want to thank government offices and private companies which were cooperative to give me necessary data and valuable suggestions during the data collection processes. Accordingly, I would like to thank Ministry of Industry and Ethiopian Leather Industry Development Institute. Moreover, I would also like to give thanks to management members and employees of Anbessa Shoes SC, Tikur Abay Shoe SC, Kangaroo Shoes Factory, OK Jamaica Shoes Factory, Peacock Shoes Factory, Modern Zege Leather Products PLC, Mohan PLC and ELICO Fontenina Shoe Factory, who were willing to give me necessary data.

(Abdi Angerasa Galmessa)

Abstract

The success factor for a manufacturing firm depends on awareness and management of its productivity level that results from measurement. This study focuses on labor productivity measurement and improvement using the Ethiopian Medium and Large Footwear Industry (EMLFI) as a case. The objectives of the study were to assess the existing labor productivity measurement system in EMLFI subsector; to study labor productivity levels and the productivity growth of the subsector; to investigate drivers that affect labor productivity; and to devise applicable labor productivity measurement and improvement approaches for the footwear industry. Both qualitative and quantitative data were collected using questionnaire, secondary data, observation and informal interviews. The data collected from secondary and primary sources were analyzed using tools such as SPSS, MS Excel, AMOS software and QI Macros 2018; as well as using techniques such as descriptive statistics, and correlation and regression analysis. The result of the measurement indicated that footwear companies' average labor productivity had magnitude of 1.83, 1.98, 2.09, 2.15 and 2.19pairs/day/person from 2006EC to 2010EC respectively which showed small magnitude; and their respective average annual labor productivity index were 1.07, 1.09, 1.06 and 1.06 from 2007EC to 2010EC which also showed very slow improvement. These findings indicated that there are some problems related to labor productivity. Accordingly, 6 new steps to measure labor productivity are developed and a new labor productivity improvement model has also been devised. Therefore, footwear companies are recommended to practice the new measurement approach and apply the new labor productivity improvement model in order to continually improve their labor productivity.

Key words: *labor, productivity, footwear, company, LP, measurement, improvement, determinant*

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List of Acronyms

€	Euro
5Ms	Manpower, Machine, Money, Management and Materials
CLRI	Central Leather Research Institute
EC	Ethiopian Calendar
EMLFI	Ethiopian medium and large footwear industry
FDDI	Footwear Design and Development Institute
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
GVA	Gross Value Added
HDI	Human Development Index
LIDI	Leather Industry Development Institute
LP	Labor productivity
MFP	Multi Factor Productivity
MOIT	Ministry of Industry and Trade
OECD	Organization for Economic Cooperation and Development
SC	Share Company
SOP	Sequence of process
SPSS	Statistical Package for Social Sciences

Chapter One: Introduction

1.1 Introduction

The manufacturing sector is an engine for the economy of many countries in the world. However, the growth and contribution of this sector to the Ethiopian economy is at its infant stage (Roma & Tesfahunegn, 2015). Ethiopia has a comparative advantage in leather industry which is among the manufacturing sectors. Sub-sectors in the leather industry include tannery and leather products including footwear, gloves, leather garment, wallets, belts, bags and etc. Footwear manufacturing subsector has shown an increase in Ethiopian economic growth contribution in recent times. In order to make footwear manufacturing processes more efficient and effective by focusing on proper utilization of input resources, productivity improvement is indispensable. At the national level, growing productivity leads to a higher standard of living, holds inflation in check and enhances international competitiveness. In the highly competitive and globalized market places today, one of the important improvement tools for each decision making is productivity measurement (Coelli, et al., 2005).

In recent years, the study of measurement system has become a focal area by academicians and practitioners. Accordingly, the success factor for a manufacturing firm in general depends on awareness of the firm's performance level that resulted from measurement. While expressing the significance of measurement, (Halachimi, 2002) once said, if you cannot measure it, you do not understand it; and if you cannot understand it, you cannot control it; and if you cannot control it, you cannot improve it. Quantifying what is being carried out by a manufacturing company remains a challenge for a long period in time. If companies cannot quantify what they manufacture, they cannot understand the process. This implies that they are disposed to losing their control over their decisions and actions. The direct consequence of being incapable to control their decisions and actions is that the companies will not be able to improve their processes, products or services. They become incompetent. Their growth, continuity and existence will eventually be in question. Therefore, unless it is measured it cannot be well managed and unless it is well managed it cannot be productive and profitable. One of the internal factors for this measurement is the productivity related measurement system.

Productivity, a term used to represent the output to input ratio, has categories based on the inputs used for productivity measurement purposes. Some of the inputs in productivity measurement include materials, labor, capital, energy, facility and land. Productivity can also be categorized as total factor productivity, multifactor productivity and single factor productivity. One of the most prominent single factor productivity in the production of many goods and services is the labor productivity. Labor productivity is an important economic indicator that is closely linked to economic growth, competitiveness and living standards within an economy. Although the labor force in Ethiopia is abundant and trainable, its measurement system is vague and its proper usage is generally in question.

Therefore, bearing in mind the current scenarios of measurement problems and importance of the LP; examinations of the LP measurement system and improvement methods are dealt in this study. Moreover, the factors affecting the LP of Ethiopian medium and large footwear industry are probed in order to investigate the determinants of the LP. Data are collected from different sources using quantitative and qualitative methods of data collection; presented, analyzed and interpreted for devising new approaches to LP measurement and improvement.

1.2 Background of the Study

The production of shoes in Ethiopia dates back from the late 1930s when Armenian merchants founded two shoe factories in Addis Ababa namely Tikur Abay and Anbessa Shoe factories. These were nationalized by the military government in 1974 and remained the largest and second largest shoemakers in Ethiopia. These factories nurtured number of shoemakers, who opened their own factories in Addis Ababa. Although these factories and others were started through time; the knowhow and application of technology, trained manpower, productivity and quality application in the factories was inadequate and traditional. The concept of productivity and capacity utilization started after the foundation of LIDI in 1991 which has made its best effort to boost up productivity of the leather sector as a whole and footwear subsector in particular. The institute has undertaken benchmarking and twinning programs in collaboration with the Indian institutes FDDI and CLRI in order to share their experiences. Although productivity has shown some improvements in the past few years, a lot of effort is still required to enhance competitiveness of the footwear companies.

On the other hand, productivity management has for long been accomplished by many successful firms in order to enhance their day-to-day practices (Ephrem, 2014). Productivity measurement and improvement were some of the mechanisms to express achievements of those processes. A firm becomes what it measures (Arie, 2005; Yitagesu, 2017) and what is measured is given attention. The resources effectiveness and efficiency are measured in order to be aware of the amount of each resource used for a specified amount of outputs. Measurement helps know and react towards better resource management and profitability of the firm. Productivity processes how efficiently production inputs such as labor and capital, are being used in an economy to produce a given level of output. Measurement of productivity of an industry and its profitability is a very important factor for management. Labor productivity measurement and its improvement help the firm how well it is utilizing its labor resources.

The way in which a firm manages its employees is also increasingly recognized as central key to execution of its strategy. Labor productivity is a measure of economic performance that compares the amount of goods and services produced (output) with the number of hours worked to produce those goods and services (Bureau of labor statistics, 2018). The productivity of labor is directly determined by a number of factors, thus it is essential for any industry to study and identify those factors and take an appropriate action for improving its productivity (Attar, et.al, 2014). However, there are also other measures of productivity that contributes to efficiency, effectiveness, quality, quality of work life and innovation.

This study dwells on studying the existing labor productivity measurement system of Ethiopian medium and large footwear industry, measuring the labor productivity levels and its growth, identifying the drivers of labor productivity and devising a better approach for measuring the factor as it is a prominent factor or input resource. This helps to react and manage the disputes that happen due to labor resource inefficiency, less utilization and in effectiveness that would otherwise damages the profitability of the firm and a country as a whole.

Despite the consistency with which the theoretical and normative connection is made between human resource management and firm level performance outcomes, firms elect to follow strategies that require employees to behave in certain ways. The central questions are thus which practices will stimulate behavior in agreement with the firm's chosen strategy, and how certain types of rewards come to be used. The emphasis in this body of work is upon compensation, incentive, reward and control systems.

1.3 Problem Statement

Productivity growth is a key to improving Gross Domestic Product (GDP) per capita, and living standards. However, human capacity utilization has hardly been increased in the last fifteen years (OECD, 2015). Recently, Raggl (2015) investigated the relationship between human capital and total factor productivity in the Middle East and North Africa region covering the period between 1980 and 2009. His findings suggest that human capital plays an important role in changing the efficiency in which existing input factors are used. The study found very low labor productivity due to inadequate education. Hailu & Tanaka (2015) also showed that despite Ethiopia's abundant human resources, the quality of the labor force is generally low. There is a lack of practical, systematic, and targeted worker training programs and implementation methods that can improve workers' production efficiency and productivity in the companies.

Firms regularly use measures of workers' performance to approximate productivity (Sauremann, 2016). However, in Ethiopia a few efforts have been made to identify approaches that can be used to measure the productivity of companies. In a preliminary assessment of data from the Leather Industry Development Institute (LIDI), data has been collected from the export oriented leather and leather products companies but the performance was hardly calculated and specifically the productivity was assumed only roughly. This leads to a lot of imperfection and misinterpretation. The data gathered was too large and found to be complicated and difficult to analyze and measure performance as there is no clear approach with regard to key performance indicators. Moreover, the preliminary data collected from LIDI shows that the labor productivity driving factors are not identified.

On the other hand, the export level of some Ethiopian companies determines their performance (CSA, 2011). This is mainly when it is observed by government institutions primarily established for supporting the companies. For instance, ten year (2003-2012) export performance of leather and leather products factories, and five year average export performance of textile factories is very low (Tomas, 2011). So, if leather and leather products manufacturing companies export

more of their products to international market it is concluded that they are better performing companies compared to others which are exporting less or none. This is a very unidirectional type of measurement. After gaps are established in performance, the natural reaction is to take actions to correct the situation by setting a measurement system for productivity, which is the basic factor for productivity measurement as a whole. Thus this study will measure labor productivity levels and productivity growths and identify the driver factors that affect productivity and based on this devise approaches for future improvement.

1.4 Research Questions

- How is the labor productivity measurement carried out in Ethiopian Medium and Large Footwear Industry EMLFI in today's business environment?
- What is the current level of EMLFI labor productivity and its growth?
- What are the drivers that affect labor productivity in the EMLFI?
- What would be applicable labor productivity measurement and improvement approaches that improve productivity of EMLFI?

1.5 Objectives of the Study

General Objective

The main objective of the study is to examine existing labor productivity measurement system and assess the factors affecting labor productivity in order to devise applicable productivity measurement sets and productivity improvement approaches suitable for Ethiopian Footwear Industry.

Specific Objectives

- To assess the existing labor productivity measurement system in Ethiopian Medium and Large Footwear Industry
- To study labor productivity levels and its productivity growth in the subsector
- To investigate drivers that affect labor productivity in the subsector
- To devise applicable labor productivity measurement and improvement approaches for the footwear industry

1.6 Scope of the Study

The study focuses on *local Ethiopian footwear companies*, which have actual production capacity of *more than 400 pairs of shoes per day* and which are actively *involved in export market*, in order to examine their labor productivity assessment, measurement and identification of factors affecting their improvement approaches. (Note on demarcation: *>400 pairs/day* - because these groups of companies have similar production supporting technologies; and *local and export oriented* – because government supports these local Ethiopian footwear industry).

1.7 Significance of the Study

The significance of the study is to provide solutions to the existing labor productivity measurement system problems and to put better approaches to the labor productivity systems. Businesses can only be properly controlled if they are measured (Fasika, *et al.*, 2013). Practitioners and managers say unless it is measured it cannot be controlled. Labor, one of the prominent company resources, should be measured for its productivity and for better management. Better results such as better demand management, improved quality and workers motivation and generally, a hopeful working environment can be created by use of superior measurement and management systems. The study can also be a base for further similar studies in the field because there are few researches carried out on the field despite the study's variety of benefits.

Currently most managers suffer from data overload and they even comment commonly as “we measure everything that walks and moves, but nothing that matters”. The managers also complain as the daily reports are not worthy because the report contains something that does not add value to the organizational success. This implies that the existing measurement system is not significantly improving productivity of firms. Moreover studies also showed that it is common to observe heatedly arguing production floor workers over some extents of presentation (Dixon *et al.*, 1990; Andersen, 1993; Lynch and Cross, 1991). The root cause for those issues is dwelt in imprecise measuring systems. As a result formulating an appropriate labor productivity measurement system and identification of its determinants can support companies in their route to success.

1.8 Limitations of the Study

In some companies relevant and organized data were not available. Some companies like Walia Leather and Leather Products PLC were not under production during the study.

Chapter Two: Related Literature Review

2.1 Introduction

“Performance is the umbrella term of excellence and includes profitability and productivity as well as other non-cost factors such as quality, speed, delivery and flexibility. Performance can both be used when discussing a company or activity from an internal (i.e. input) as well as external (i.e. output) point of view” (Tangen, 2005; Tangen, 2004 and Yitagesu, 2017). Therefore in order to measure the performance of a manufacturing or service industry the measure of productivity is a basic requirement.

Performance measurement is called as vital signs of companies (Gruenberg, 2004) since without performance measures no decision can be made. Productivity measurement with regard to all or some of the manufacturing resources or inputs can be valued in the same manner because productivity is one pillar of performance. Moreover, the opportunity to make the right allocation of resources and to set the right priorities for improvement is dwelt in productivity or performance measurement. The findings of the inquiry of the Royal Society of Arts, Manufacturers and Commerce (RSA) indicates that a company must use relevant performance measures for the achievement of sustainable business success in the demanding world marketplace (RSA, 1994).

Productivity is defined in many ways. Horner and Talhouni stated “A popular concept in the USA, and increasingly in the UK, is the concept of earned hours. It relies on the establishment of a set of standard outputs or norms for each unit operation. Thus, a number of earned hours are associated with each unit of work completed”.

Understanding critical factors affecting productivity of both positively and negatively can be used to prepare a strategy to reduce inefficiencies and to improve the effectiveness of business performance.

In this literature topics including productivity, labor productivity, labor productivity improvement index and the factors affecting the productivity improvement of labor are dealt with.

2.2 Productivity and Purposes of Its Measurement

Productivity is a multi-dimensional thought whose definition varies based on the purpose for which the definition is set. Productivity is defined as a ratio of a volume measure of output to a volume measure of input use (Koch, 1996). Productivity is the ratio between the amount produced and the amount of resources used in the course of production where the resources may be combination of 5Ms.

The main objective of productivity measurement is productivity improvement (Sahay, 2005). In this regard the objectives of productivity measurement include technology, efficiency, real cost savings and living standards (OECD, 2001). As coated from OECD (2001) the objectives of productivity management are briefly described as follow.

Technology as objective of productivity: A frequently stated objective of measuring productivity growth is to trace technical change. Technology has been described as “the currently known ways of converting resources into outputs desired by the economy” (Griliches, 1987) and appears either in its disembodied form (such as new blueprints, scientific results, new organizational techniques) or embodied in new products (advances in the design and quality of new vintages of capital goods and intermediate inputs). In spite of the frequent explicit or implicit association of productivity measures with technical change, the link is not straight forward.

Efficiency as objective of productivity: The quest for identifying changes in efficiency is conceptually different from identifying technical change. Full efficiency in an engineering sense means that a production process has achieved the maximum amount of output that is physically achievable with current technology, and given a fixed amount of inputs (Diewert and Lawrence, 1999). Technical efficiency gains are thus a movement towards “best practice”, or the elimination of technical and organizational inefficiencies. Not every form of technical efficiency makes, however, economic sense, and this is captured by the notion of allocative efficiency, which implies profit-maximizing behavior on the side of the firm. One notes that when productivity measurement concerns the industry level, efficiency gains can either be due to improved efficiency in individual establishments that make up the industry or to a shift of production towards more efficient establishments.

Real cost savings as objective of productivity: A pragmatic way to describe the essence of measured productivity change. Although it is conceptually possible to isolate different types of efficiency changes, technical change and economies of scale, this remains a difficult task in practice. Productivity is typically measured residually and this residual captures not only the above-mentioned factors but also changes in capacity utilization, learning-by-doing and measurement errors of all kinds. Harberger (1998) re-stated the point that there is a myriad of sources behind productivity growth and labelled it the real cost savings. In this sense, productivity measurement in practice could be seen as a quest to identify real cost savings in production. Benchmarking production processes. In the field of business economics, comparisons of productivity measures for specific production processes can help to identify inefficiencies. Typically, the relevant productivity measures are expressed in physical units (e.g. cars per day, passenger-miles per person) and highly specific. This fulfills the purpose of factory-to-factory comparisons, but has the disadvantage that the resulting productivity measures are difficult to combine or aggregate.

Living standards as objective of productivity: Measurement of productivity is a key element towards assessing standards of living. A simple example is per capita income, probably the most common measure of living standards: income per person in an economy varies directly with one measure of productivity, value added per hour worked. In this sense, measuring productivity helps to better understand the development of living standards. Another example is the long-term trend in multifactor productivity (MFP). This indicator is useful in assessing an economy’s underlying

productive capacity (“potential output”), itself an important measure of the growth possibilities of economies and of inflationary pressures.

Employee performance measurement uses indicators of performance and their indicators named as quantity, quality, timeliness, cost effectiveness, absenteeism /tardiness, creativity, adherence to policy, gossip and other personal habits, personal appearance /grooming, manager appraisal, self-appraisal, peer appraisal, team appraisal, assessment center, 360-degree or full circle appraisal and management by objectives /MBO (Hakala, 2008). However, not all are considered directly in a specified case, i.e. in some cases some indicators such as quantity and timeliness are considered whereas in other cases quality may be given less emphasis.

Improvement generally means to pursue upgrading chances in day-to-day life (Bakerjian, 1993). Improvement also demands repeatedly asking ‘why?’ and a determined refusal to stop the search for the best single way (Shingo, 1992). Most studies on manufacturing performance improvement reflect the experiences and situations of the developed world. There are mainly four key criteria to adopt the improvement which are the present position of the company, the weaknesses of the company, the improvement categories available and vision of the company (Gezahegn, 2009). Labor resource is one wing of company issues and hence not all criteria are necessarily considered but the relevant ones only.

2.3 Productivity Computation

There are different types of core productivity indicators that include single factor productivity, partial (multifactor) productivity and total factor productivity (Babaeinesami, 2016; Sumanth, 1984).

$$\text{Total factor productivity} = \frac{\text{All Output produced}}{\text{All input involved in the production of the output}}$$

$$\text{Multifactor productivity} = \frac{\text{Output}}{\text{Labor} + \text{Material} + \text{Energy} + \text{Capital} + \text{Miscellaneous}}$$

Single factor productivity:

$$\frac{\text{Output}}{\text{Labor}} \quad \frac{\text{Output}}{\text{Material}} \quad \frac{\text{Output}}{\text{Capital}}$$

$$\text{Labor Productivity} = \frac{\text{Units produced}}{\text{Labor hours used}}$$

Output and inputs are often expressed in dollars when multi-factors are involved.

“Rising productivity is the main driver of long-run economic growth and productivity growth is perhaps the single most important indicator of an economy's health—it drives real incomes, inflation, interest rates, profits and stock prices” (ENERCON, 2018). Economic analysts toss around the term “productivity growth” as if there were one widely agreed definition. Based on the

definition and arguments made by different practitioners, academicians and institutes it may be possible to characterize productivity as under (Kanathi, et.al, 2006):

- *Become efficient*: output increases with little or no increase in input;
- *Expand*: both output and input grow with output growing more rapidly;
- *Achieve breakthroughs*: output increases while input decreases;
- *Downsize*: output remains the same and input is reduced; and
- *Retrench*: both output and input decrease, with input decreasing at a faster rate;

Productivity Improvement (PI) is the result of managing and intervening in transformation or work processes. Productivity is the relationship between the outputs (O) generated from a system and the inputs (I) that are used to create those outputs. Mathematically, productivity increase comes about if either of the following options occurs in a manufacturing/service business.

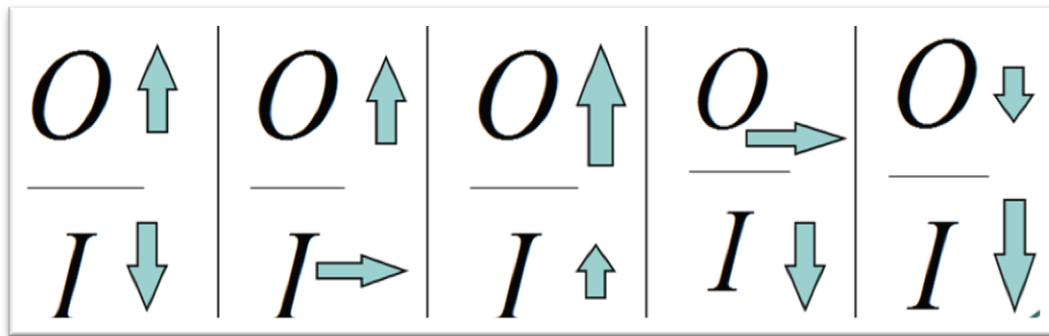


Figure 1: Scenarios for productivity increase

For the labor intensive manufacturing footwear sector in order to maintain/improve its productivity a special attention is required to be provided to avoid the factors that are influencing. There are many different productivity measures. The choice between them depends on the purpose of productivity measurement and, in many instances, on the availability of data. Broadly, productivity measures can be classified as single factor productivity measures (relating a measure of output to a single measure of input) or multifactor productivity measures (relating a measure of output to a bundle of inputs). Among those measures, value-added based productivity is the single most frequently computed productivity statistic, followed by capital- MFP and capital-energy-materials (KLEMS) MFP.

Table 1: Main productivity measures

Type of output measure	Type of input measure			
	Labour	Capital	Capital and labour	Capital, labour and intermediate inputs (energy, materials, services)
Gross output	Labour productivity (based on gross output)	Capital productivity (based on gross output)	Capital-labour MFP (based on gross output)	KLEMS multifactor productivity
Value added	Labour productivity (based on value added)	Capital productivity (based on value added)	Capital-labour MFP (based on value added)	-
	Single factor productivity measures		Multifactor productivity (MFP) measures	

Source: OECD, 2001

The difficulty of labor productivity is that it is an incomplete gauge of efficiency. Firms can lift output per man-hour may be caused by more investment and training workers with better machinery or technology. One virtue of TFP over labor productivity is that TFP is a better proxy for an economy's return on capital. If faster labor productivity growth is entirely the result of heavy capital spending by companies, it may not deliver good financial returns. Another virtue of TFP over labor productivity is that comparisons between countries may be less distorted by national differences in the way real output is measured (ENERCON, 2018).

2.4 Labor Productivity

Labor productivity is also measured in various approaches based on which the measurement is required. It can be defined as the ratio of production volume to man heads. It is also defined as a ration of production volume to man hours. Moreover, it can be measured by dividing the business unit's net sales (in millions of dollars) by the number of workers, or it is the ratio of output (net sales in millions of dollars) to the input number (of labor) (Koch, 1996). LP is also defined as the quantity of production output per unit of labor, which can be represented by the number of hours worked, the number of employees or the number of workers (and other unemployed staff) (Stocker, *et al*, 2015). But those definitions lag the considerations of values of different skills of the manpower. So, LP has been defined further as the ratio of production output to the summation of different skilled manpower in which the manpower coefficients are fixed for the different skills based on the nature of the firm. This definition helps incorporate the issue related to different manpower skills ignorance.

Despite the potential of labor in Ethiopia, it has not yet exploited its manpower resource to any considerable extent. For instance productivity per head of labor (in thousands of dollars) in Tunisia was over 7 times greater than that in Ethiopia and more than double in South Africa in 1995 to 1998 (Berhanu, 2002). So, LP of Ethiopia is very low when compared to other countries. Less labor productivity of Ethiopia implies though there exists abundant labor force there are still

less international competition. Ethiopia (and many African countries) is typical of this case because they had abundant labor but there is less competition (Berhanu, 2002). Chinese had an abundant labor force with less price and low raw material price that helps for competition which helped it to compete in trade market. But Ethiopia had the same case, actually very lesser labor force price when compared with China, but it did not compete in trade market. This indicated that low labor force and raw material prices do not guarantee better competitiveness. This is mainly due to the labor productivity related problems in the Ethiopian footwear subsector.

Researchers use various measures of productivity based on availability of data and researcher's skills to determine the approach used. Most analysts focus on labor productivity (ENERCON, 2018) as an important economic indicator that is closely linked to economic growth, competitiveness, and living standards within an economy. Labor is the dominating factor in the production of many goods and services as in general other inputs in production are proportional to the number of employees or the quantity of output. Banks, insurance companies and education and public sector services are among typical services with such characteristics. There is no standard computation of LP, similar to productivity, and the following approaches are generally used.

Labor productivity:

$$\frac{\text{Output}}{\text{man heads}} \quad \text{or} \quad \frac{\text{Output}}{\text{labor hours}} \quad \text{or} \quad \frac{\text{Output}}{\text{labor cost}}$$

$$\text{or} \quad \frac{\text{GDP at constant prices}}{\text{Number of employed persons}}$$

For above indication, the first three formulas come under category of GVA, but the last formula comes under GDP.

The most commonly used measures of input are workforce jobs and number of people in employment (man heads), worked hours, and labor cost. That is input is measured either by total employment (head count), the total number of hours worked of all persons employed, or labor cost. The third formula tries to reflect LP in terms of the input labor price/cost, but price issue arises while measuring the profitability of the company (Tangen, 2005).

In order to get the general contribution of the labor to a specified firm performance or as a general to the country, most measurements related to labor use GDP per hours worked as a unit. Here a general to specific approach was conducted i.e. productivity is calculated by dividing each country's GDP by the average number of hours worked annually by all employed citizens where hours worked include full-time and part-time workers time, while at the same time excluding holidays and vacation time (Time, 2015). Accordingly countries are ranked and most productive countries are identified. In 2015, time magazine has posted on its website 25 most productive countries in the world were Luxembourg, Ireland, Norway, Belgium and United States with respective GDP per hour worked \$93.4, \$87.3, \$81.3, \$69.7 and \$68.3 (Time, 2015), and none of

these were from Africa. Ethiopia's case was not computed and included by this source (magazine) and comparison was not made. But the researcher argues that this approach needs to be reversed i.e. specific to general. Firms' productivities could be computed from grass root level and this helps to know the real related problems for continuous productivity improvement. Generally, depending on the need of measurement, resource productivity (specifically LP) can be calculated at different levels. At the macro level (for whole economies), for example, GDP is usually applied as the economic variable, while at the low level GVA (Gross Value Added) is most commonly applied (Stocker, *et al*, 2015). On the micro level, productivity is quantified by product-based or a company-based approach (Bleischwitz, *et al*, 2007, Stocker, *et al*, 2015). GDP considers the productivity and also profitability. On the other hand GVA considers company wise productivity calculation which has ability to reveal the related causes of problems and would be better considered for further calculations.

It is also generally accepted that the number of hours worked is the most appropriate measure of input (Ovidiu, *et al.*, 2011) because a simple headcount of employed persons can hide changes in average hours worked, caused by the evolution of part-time work or the effect of variations in overtime, absence from work or shifts in normal hours. This means that total employment is less recommended as a measure of productivity because it neither reflects changes in the average work time per employee nor changes in multiple job holdings and the role of self-employed persons (nor in the quality of labor) (Babaeinesami, 2016). The current Ethiopian footwear company labor productivity shows that 3- 4 pairs of shoes per person are produced per eight hours day on the average.

Ethiopia's HDI value and rank

Ethiopia's Human Development Index (HDI) value for 2015 is 0.448— which put the country in the low human development category—positioning it at 174 out of 188 countries and territories (Jahan and Jespersen, 2016b). The HDI is a summary measure for assessing progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. A long and healthy life is measured by life expectancy at birth. Knowledge level is measured by mean years of education among the adult population, which is the average number of years of education received in a life-time by people aged 25 years and older; and access to learning and knowledge by expected years of schooling for children of school-entry age, which is the total number of years of schooling a child of school-entry age can expect to receive if prevailing patterns of age-specific enrolment rates stay the same throughout the child's life. The standard of living is measured by Gross National Income (GNI) per capita expressed in constant 2011 international dollars converted using purchasing power parity (PPP) conversion rates.

A study made on Ethiopian footwear industry indicated that average labor productivity (value added per unit of wage) for the years 1995-1999 was 1.97 which is very low, and less than half when compared with Turkey's performance before 1970s (Turkey was ranked 71st on worlds HDI) (Berhanu, 2002).

2.4.1 Labor Hours worked

Labor productivity measures have traditionally defined the labor input as the sum of all hours worked by employees, proprietors and unpaid workers (OECD, 2001). As a result, an hour worked by a highly experienced production manager and an hour worked by a newly hired helper in stitching section is treated as equal amounts of labor. It does not matter who was actually working or what kind of job workers held. All workers are treated as if they were identical (Bureau of Labor Statistics, 1993).

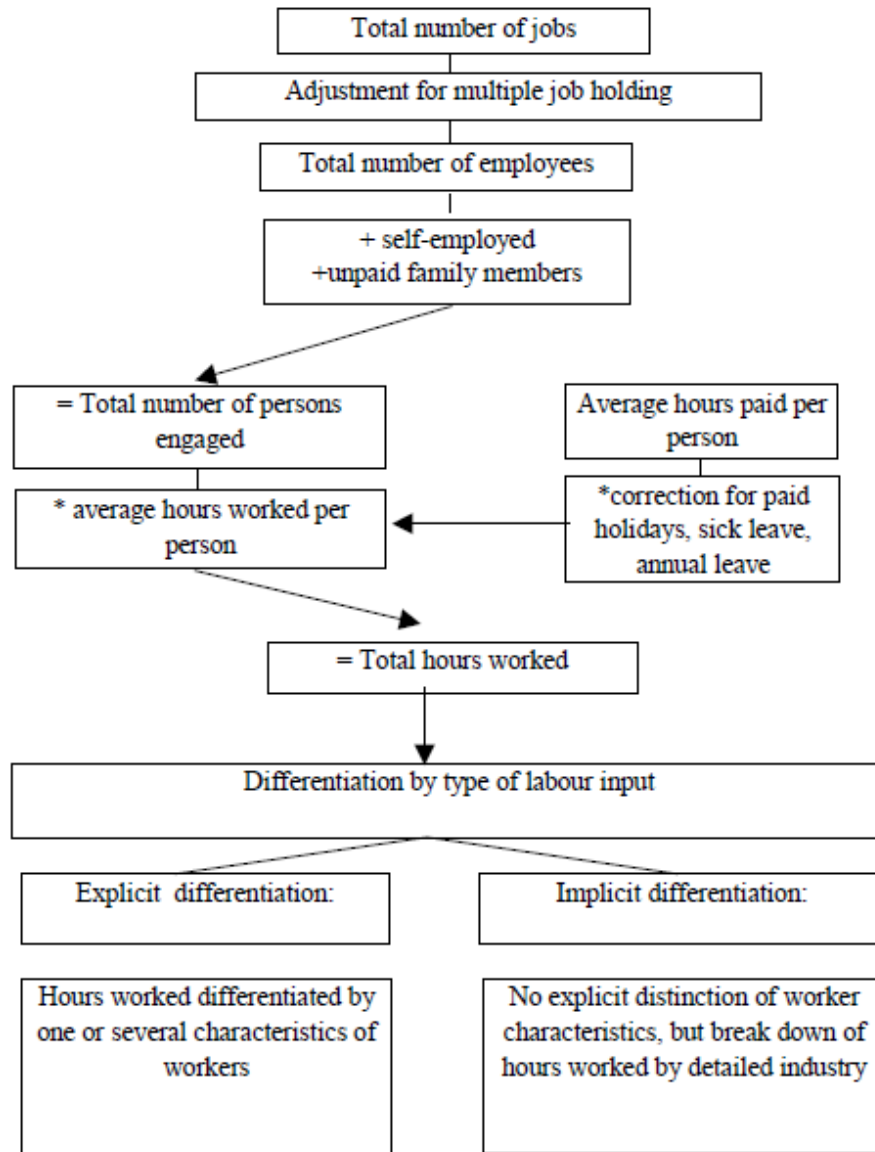


Figure 2: Measures of labor input (Source: OECD, 2001)

There are different concepts related to measures of working time which include hours actually worked, hours usually worked, hours paid for, contractual hours of work, overtime hours of work and absence from work hours (ILO, 2008). Hours actually worked: hours actually spent on productive activities, hours usually worked: the typical hours worked during a short reference

period such as a week over a longer observation period, hours paid for: the hours worked for which remuneration is paid, contractual hours of work: the hours' time that individuals are expected to work based on work contracts, overtime hours of work: the hours actually worked in excess of contractual hours, absence from work hours: the hours that persons are expected to work but do not work (OECD, 2015).

Out of all these mentioned measures of time, the total hours actually worked by all people involved in production is considered as input (OECD, 2015). Accordingly the hours actually worked are defined as the hours spent directly on productive activities or in activities in relation to them (maintenance time, cleaning time, training time, waiting time, time spent on call duty, travelling time between work locations) (ILO, 2008). It can also be defines as the time spent in between these hours when the person continues to be available for work (for reasons that are either inherent to the job or due to temporary interruptions) including short resting times. Conversely it does not include annual leave and public holidays, longer breaks from work (e.g. meal breaks), commuting time (when no productive activity is performed) and educational activities other than on-the-job training time (ILO, 2008 and OECD, 2015). This means the actual worked hours are used for productivity calculation in spite of the payment issues. On the other hand if some hours are not actually used for production but some payment made for workers due to other reasons, the hours should be omitted from the input.

2.4.2 Labor Productivity Index

An index is a way of expressing, in percentage terms, the change in some variable from a given point in time to another point in time. For example, suppose that an output is increased by 10 percent from an initial year (2016) to a subsequent year (2017). The index for our arbitrarily chosen base year of 2016 would be 100.0 while the index for 2017 would be 110.0. Conversely, if output had declined in 2017 by 10 percent, the 2017 index value would be 90.0.

For measuring productivity of a specified time (Static): $p(1)=O(1)/I(1)$ in a given period of time (suppose $t_1 = 2016$). This is useful for benchmarking purposes. In the same way, productivity for the subsequent year $t_2 = 2017$: $p(2)=O(2)/I(2)$; then $p(2)/p(1)$ yields a dimensionless index that reflects change in productivity between periods (Productivity definition, 2018).

Labor productivity index is calculated by using the index of industry output divided by an index of hour inputs, and it is found by dividing the current output and inputs for their respective outputs and inputs of the preceding unit of time.

Labor productivity index:

$$\frac{Q_t}{Q_0} \div \frac{L_t}{L_0}$$

Where:

$\frac{Q_t}{Q_0}$ = the Index of output in the current year,

$\frac{L_t}{L_0}$ = the index of labor input in the current year,

t = the current year, and
o = the base year.

The following steps are used for calculation of LP index:

- a. For an industry producing a single uniform or homogenous product, simply the above index value can be used for labor productivity improvement calculations.
- b. In case when an industry produces more than one type of products the above approach is modified by Tornqvist formula as follows (...).
 - i. The output is calculated as

$$\frac{Q_t}{Q_{t-1}} = \exp\left[\sum_{i=1}^n w_{i,t} \left(\ln \frac{q_{i,t}}{q_{i,t-1}}\right)\right]$$

Where:

$\frac{Q_t}{Q_{t-1}}$ = The ratio of output in the current year (t) to the previous year (t-1),

n = number of products

$\ln \frac{q_{i,t}}{q_{i,t-1}}$ = the natural logarithm of the ratio of the quantity of product i in the current year to the quantity in the previous year, and

$w_{i,t}$ = the average value share weight for product i.

The average value share weight for product i will be computed as:

$$w_{i,t} = (S_{i,t} + S_{i,t-1}) \div 2$$

Where

$$S_{i,t} = p_{i,t}q_{i,t} \div \sum_{i=1}^n p_{i,t}q_{i,t}$$

& $p_{i,t}$ = price of product i at time t.

This provides us all-output-index.

The share weight of a product can be simple calculated using ration of its production quantity to the sum of all production quantities of products under consideration. This is because the price of products in most cases is not proportional to their labor hour inputs but other factors like fashion, design and materials and demand for the product.

- ii. The all-person-hour index for an industry with multiple products is calculated in the same manner as in the single-output case ($\frac{L_t}{L_0}$).
- iii. Labor productivity index for multi-product industry will be the ratio of all-output-index to all-person-hour-index. Following a multi-product industry productivity index, labor productivity improvement can be calculated.

2.4.3 Labor Productivity Improvement

The U.S. economic system transforms inputs to outputs at about an annual 2.5% increase in productivity per year. The productivity increase is the result of a mix of capital (38% of 2.5%), labor (10% of 2.5%), and management (52% of 2.5%). Only through productivity increase can a nation's standard of living improve. In case of Ethiopia footwear industry (1995-1999) the productivity in value added per unit of wage had an average of 1.97 with an average annual decline of 8.6% (Berhanu, 2002). On the other hand, in between 2000 and 2015, HDI value for Ethiopia increased from 0.283 to 0.448 which has a growth of 58.2% (Jahan and Jespersen, 2016b).

Key variables of labor productivity increment include basic education appropriate for the labor force, diet of the labor force, social overhead that makes labor available and maintaining and enhancing skills in the midst of rapidly changing technology and knowledge. Productivity improvement is calculated based on productivity index and the productivity of the specified unit of time for which the improvement is requested.

2.5 Labor Productivity Determinants

There are several factors affecting labor productivity. These factors are categorized under five prominent factors which are quality of workforce, human resource sophistication, labor turnover, other production inputs and management and scheduling.

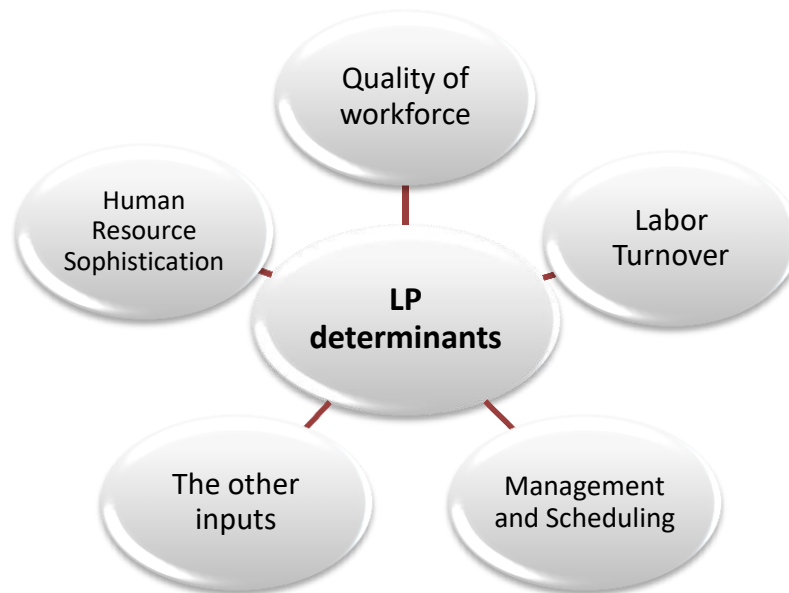


Figure 3: Determinants of Labor Productivity

(Source: organized by the researcher)

2.5.1 Quality of Workforce

It would be better assign the productivity gap to differences in the intrinsic quality of workers associated with differences in formal education of workers, in their professional training and in

their experience in the labor market, the company and the job being considered (Ellery, et al., 2013). Studies on European countries indicate that attribution by quality of workforce through their proper training reaches 16 per cent of the overall productivity growth (CEDEFOP, 2007).

- a) Formal education (schooling) affects productivity in at least three ways; worker with more schooling is capable of performing a wider range of activities, takes less time and tends to perform each activity more accurately; workers with more education are better able to learn new activities or production techniques; and more education also means more ability to process information. In all the cases strong correlation between education and productivity was observed by literatures (Ellery, et al., 2013).
- b) Professional training can also transform people into highly productive workers. Literatures on European countries show that there was an estimation of 3 per cent increase in productivity for every 1 per cent increase in training days (CEDEFOP, 2007). But this has a better impact if the training provided to the trainees has direct relation with the job they are allocated to (Ellery, et al., 2013). Training continually upgrades the skills of workers.
- a) Outputs of training courses such as knowledge of how to make it better and more quickly, accurately and with a higher quality, are insufficient to promote productivity by themselves but an additional parameter called experience is rigorous to do so. The greater the time that workers remain in the same company and in the same occupation, the greater the impact of the experience.

Quality of workforce is influenced by supervisor support, training and development, and working environment (Hwang and Tung, 2016). Although the terms training and development are usually seen together or used interchangeably (Hwang and Tung, 2016; Obisi, 1996), some scholars pointed out their differences in terms of time value, purpose and subject. Training is used for short-term, specific purpose and non-managerial individuals. Moreover, training is related with current performance and progress of an employee development (Miller, 2006; Hwang and Tung, 2016). On the other hand, development implies long-term general target, for managerial personnel (Steinmetz & Lawrenc, 1996) and related with the future performance and progress (Miller, 2006). Working environment, the other factor influencing quality of workforce, states that employees who have support, inspiration from and co-operation with coworkers are able to accomplish higher job performance than others who do not have (Grensler, 2013). Hence, the factor of colleague has contributed significantly to employee satisfaction and organization's sustainable development.

Moreover, the productivity of labor is directly determined by a number of factors, thus it is essential for any industry to study and identify those factors and take an appropriate action for improving its productivity (Attar, et.al, 2014). These have implications for calculating productivities. The size of physical labor by itself is not enough to describe the quality of human capital (Attar, et.al, 2014). Quality of labor may differ from one firm to the other and also within a firm. So to account for labor heterogeneity the measurement is taken in value terms, assuming that differences in skills will be captured by wage differentials (Berhanu, 2002). But the

researcher argues that skills of labor (like skilled, semiskilled and unskilled) could be considered for LP based on which a modified formula can be set for computations of productivity. If there is no data related to the skills of workers, workers’ wages can be used as a means to aiding labor segregations into their skill matrix.

Based on the study and survey of a construction firm productivity, the factors that affect the small and medium industry include lack of material, labor strikes, delay in arrival of materials, financial difficulties of the owner, unclear instruction to laborer and high absentees of labors, bad weather (e.g. rain, heat, etc.), non-discipline labor and use of alcohol and drugs, no supervision method, design changes, repairs and repetition of work, and bad resources management, bad supervisors absentees and far away from location of material storage, and poor leadership (Attar, et.al, 2014). However, the factors that affect productivity of the large industry include unclear instruction to laborer, delay in arrival of materials, lack of material and financial difficulties of the owner, there is no definite schedule, low supervisors capability/incompetence supervisors, no supervision method, lack of equipment, and high absenteeism of labors, supervisors absenteeism, frequent damage of equipment, and labor strikes, design changes, incomplete drawing and inspection delay, poor communication in site and inaccurate design. In case of footwear these factors in most cases are assumed to appear though slight differences occur due to the nature of the companies.

2.5.2 Human Resource Sophistication

Overall human resource sophistication one factor that contributes to a better labor productivity includes investments in human resource planning, investments in hiring and investments in employee development (Koch, 1996).

There is a strong connection between investments in human development and subsequent comparative productivity of a firm’s human capital. Any training that upgrades labor force skills should have a positive productivity effect. Workers with firm-specific skills are then retained by the firm that utilizes promotion-from-within as a primary mechanism for filling vacancies. However, some kinds of training, which are provided for the workers, are equally useful to a firm and to its competitors, in which case the firm offering the training pays a cost that can actually subsidize competitors in the event that employees are hired away (Becker, 1964; Koch, 1996).

Table 2: Effects of human resource sophistication on LP (revised from Koch, 1996)

	Category	Parameters	Impact on labor productivity
Overall human resource sophistications	Independent variables	Investment in human resource planning	+
		Investment in hiring	+
		Investment employee development	+
	Control	Industry type	+/-

Category	Parameters	Impact on labor productivity
variables	Capital intensity	+
	Firm size	+
	Unionization	+
	High technology	+

2.5.3 Management and Scheduling

Management system, specifically supervisory support, is vital for labor performance improvement. Supervisory supports build trust in employees, and improve the effectiveness of organization between memberships in a firm (Hwang and Tung, 2016). It facilitates employees, finds the cause and the solution for conflicts arising, and helps employees amend their faults. When an operation fails, the employee performing that job often feels bad, loses confidence and has no longer work commitment as before. The role of supervisor at this point will be to hearten and allow employees feel more comfortable so that they can overcome their failure and continue working more efficiently, and in order to head towards the true values of life.

On the other hand, the biggest obstacles in achieving production targets are lack of timely supplies of materials from vendors and absenteeism. Power cuts are also external variables, which can only be controlled through captive power generation facilities. Less than half of the responding companies in India had automated shop scheduling and loading systems. Such systems, whether in-house or purchased, can greatly increase productivity and effectiveness on the shop floor.

JIT manufacturing relies on all production tasks being completed on time and on schedule. The concept of synchronized manufacturing assumes strict adherence to schedules so that there is no queuing or unplanned waiting at any work center. A World-Class manufacturer stresses the continuous reduction of cycle times and inventories. This can be achieved by elimination of variation in the product and in the process.

There are three basic types of orders; purchase orders, production orders and customer orders. Each of these orders defines when to buy or make a product and how much of the product is needed. A customer order will result in production schedule or work-order on the shop floor. These final assembly orders spawn production orders for sub-assemblies and components, in turn creating a requirement for purchase orders of raw materials and components. If the production planning and control system requires a large number of changes to these orders, in addition to the wasted activity of processing the changes in the plant, there is quite likely to be a considerable waste in terms of inventory, production, queries and unfulfilled orders. The number of changes to

customer orders, purchase orders, and the production schedule is a leading indicator of LP and future delivery problems.

Cellular manufacturing enables the entire plant to function in assembly-line mode. It is an integral part of the movement towards single piece flow. Shingo's four principles for creating single piece flow are (Shingo 1989) levelling production quantities between processes, reducing transportation lot size, improving layout to compensate for the more frequent need for transportation and reducing lot size. According to world class manufacturers, through cellular manufacturing a production schedule can be simplified.

There is superior management in developed countries than in developing countries. In developing countries companies are often badly managed. Poor management practices have held back the productivity of firms in these countries. Owners tend to make almost all major management decisions because of fears of confiscation by their senior managers. Owners also think the business becomes unprofitable if they do not take or involve in decisions. They let their managers take some decisions because they are busy and unable to decide it all. Owners believe their relatives like their brothers and sisters than professional managers and hence if they have many brothers and sisters they are having many companies and if no relatives they usually have a single large production plant as they have no time to variate than enlargement of their existing companies. In all the case lac delegation in decision making affects their moves. On the other hand smaller firms also face financial constraints limiting their productivity (Bloom, et al., 2010). There is also no systematic planning of funds.

2.5.4 Lowering Labor Turnover

Labor turnover is the rotation of workers between firms, jobs and occupations; and between the states of employment and unemployment (Abassi and Hollman, 2000; Ongori, 2007). Turnover means that the later company may gain an employee having a new knowledge and skills who can become the company's competitive advantage. On the other hand, the former organization faces loss of knowledge and skills. This is why, labor turnover is considered to be one of the persisting problems in companies.

Turnover intentions are driven by many factors. According to a study performed on Air Force Institute of Technology in Columbia, Ohio; Age, tenure, pay, overall job satisfaction, and employment perceptions are stable and reliable correlates with turnover (Cotton, 1986). Moreover, internal and external factors that may cause turnover include ineffective communication about job expectations, facilities in the organization, salary and other benefit packages in external market, inability to listen well and ask the right questions respectfully, wage problems, underutilization of skills, adverse working conditions, and lack of opportunity for advancement through seniority, lack of well-organized training program (Pertrillose, 1998). In addition to this the factors contributing to turnover can be economy, the characteristics of the job, demographics, personal issues, unequal or substandard wage structures in the company, inadequate or monotonous supervision and training, bad match between the employee's skills and

the job, substandard equipment, tools or facilities, lack of chances for advancement or growth, and feelings of not being appreciated (Racho, 2015).

Labor turnover reduces the labor productivity and increases costs. The effects of high turnover include lost productivity, lost sales, management's time, less customer satisfaction and less profitability of organizations if not managed properly (Catherine, 2002; Hogan, 1992; Wasmuth and Davis, 1993; Barrows, 1990). Research estimates indicate that hiring and training a replacement worker for a lost employee costs approximately 50 percent of the worker's annual salary (Johnson, et. al., 2000) but the costs do not stop there. Each time an employee leaves the firm, we presume productivity drops due to the learning curve involved in understanding the job and the organization. Furthermore, the loss of intellectual capital adds to this cost, since not only do organizations lose the human capital and relational capital of the departing employee but also competitors are potentially gaining these assets (Meaghan, et. al., 2002).

Turnover can be computed as the ratio of the number of company workers who have left during the period under consideration divided by the average number of people in that company during the period. The average number of workers is calculated by taking a simple average of workers at the beginning and end of the period. There could be voluntary or involuntary turnover, internal or external turnover, and skilled or unskilled turnovers. Voluntary turnover, external turnover and skilled manpower turnover create a risk to a company because it incurs replacement costs and competitive disadvantage to the business (Racho, 2015). Turnover is natural and hence it is impossible to control all employee turnovers in a company but the rate of voluntary turnover can and should be a priority for managers. The rate of labor turnover depends on a number of factors like the nature of the industry, its size, location, nature of labor etc. A high labor turnover must be investigated and hence, it should be kept at a minimum level (ICSI, 2013). A low labor turnover also shows lack of flexibility or it may be due to inefficient workers not willing to leave the organization.

2.5.5 The Other Production Inputs

Occasionally capital and materials productivity measures are used although labor productivity is the most common measure of single factor productivity. Of course, single factor productivity levels are affected by the intensity of use of the excluded inputs. Two producers may have quite different labor productivity levels even though they have the same production technology if one happens to use capital much more intensively, say because they face different factor prices. To avoid the effect of the excluded inputs researchers measure total factor productivity or multifactor productivity (Syverson, 2011). But one of the biggest challenges to study the total factor productivity is to identify the correct measure of factor inputs used in the production of output (Fadejeva, 2009). So the researcher assumes that single factor productivity should be measured ahead of total factor productivity so that it will be an input in TFP measurement.

From a supply-side perspective, long-term economic growth is on the one hand determined by an increase in working population and/or rising labor productivity (e.g. through better education or improved technology). On the firm level, improvements in resource productivity have the

potential to reduce resource use. Most common excluded input resources are land, capital, facility, equipment, tool, energy, material and information. In manufacturing, both quantity and quality of labor and capital constitute the major factors for enhancing productivity (Berhanu, 2001). For this reason labor and capital are separately dealt but the others are set in one category as other resources. Each of the inputs and their relations to LP are briefed as follow.

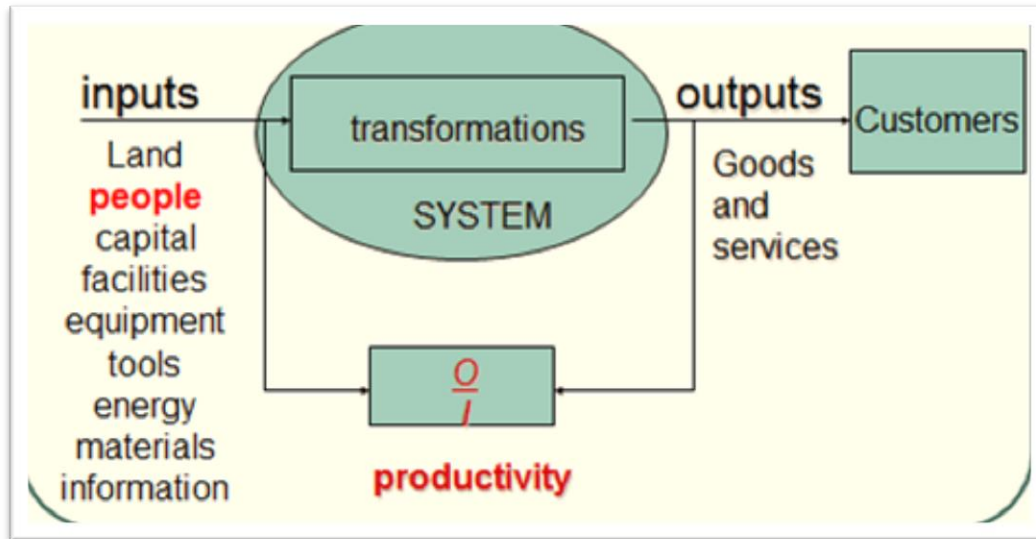


Figure 4: Productivity concept

Capital productivity measures the level of output (in €) obtained for each euro invested in manufactured capital. Capital productivity indicates how well this capital type is used in providing goods and services. An increase of capital productivity means that for a given level of production less capital is needed (Stocker, et al, 2015). It is also measured as the proportion between the quantity of output, and the quantity of capital involvement (OECD, 2015).

Productions function with labor and capital as the major factors of production (Berhanu, 2002).

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

Where, Y is output

L is labor measured in wages

K is capital (net fixed asset)

Elasticities sum up to unity, i.e., $\beta = 1 - \alpha$ - also called as factor shares of labor and capital respectively.

A indicates the current level of technology, or Total factor productivity (TFP)

Based on this, at a fixed capital level output Y increases as LP increases, and vice versa.

Other input resources (land, facility, equipment, tool, energy, material and information) affect LP, i.e., availability of those inputs foster LP because they create a better working aids and environment for increasing the productivity.

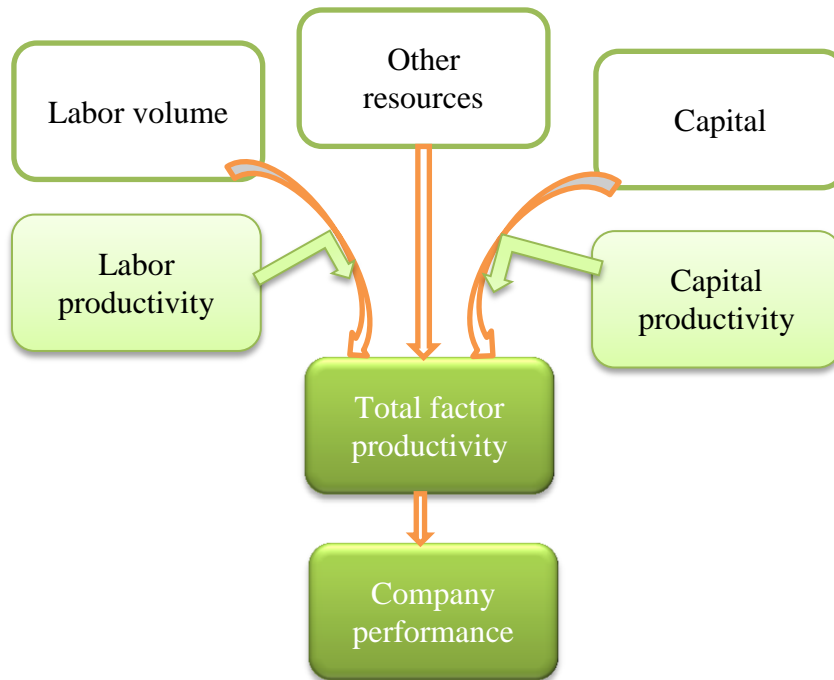


Figure 5: Impacts of resources productivity on company performance

The impact of technology on the economy is undeniable (Jahan and Jespersen, 2016a). Footwear manufacturing technology varies from traditional type of footwear production to semi-automated type. The degree of automation depends on the investment capability, quality target and the target volume of production. The more those target factors are required and the more there is capital to invest, the more the technology usage. A semi-automated footwear closing technology uses conveyors, basket and gravitational methods for transportation purposes which decide the quantity of production. In this regard in a single closing line a target of 400 pairs are usually considered. Similarly in footwear lasting technology 800pairs per shift are considered. On the other hand in traditional and manual way of manufacturing footwear there are generally smaller production quantities with no defined production volume target.

So, in any footwear technology there can be a division of the level of technology usage based on production quantities (as less or more than 400pairs per day). In each category of production volume, one can guess that there is similar production technologies used and hence the labor productivities can be compared in each category. In this study footwear companies with more than four hundred pairs are considered so that they could be investigated in similar fashion with less technological impacts

2.6 Some Previous Empirical Studies

2.6.1 Working Hours and Labor Productivity

Working hours can be known as the duration an employee is committed to his job. The reduction in weekly hours gives rise to productivity (Spurgeon, 2003), which has then brought up the change in attitude on employees' wellbeing in industrial sectors. Reasonable working hours and necessary breaks are critical to achieve above outcome (Jerome, 2013). That is why most of developed countries have adopted the national laws that prescribed working hours.

Based on the researchers, inverse association between working hours and labor productivity was found (Kelliher & Anderson, 2009; Pencavel, 2014; Griffith & Miller, 2010; Chris, 2016; Inagaki & Azetsu, 2013). It is believed that decrease in working hours will result in increase in labor productivity, and vice versa. Workers were seen more productive in shorter working weeks. Employees were seen to have more motivation and willingness to work efficiently where there were less working times, usually below 40 hours per week (Chris, 2016). This was because workers would get time to spend with their family as well as enough leisure time which motivates and refreshes them (Ahmad, et. al. 2013).

However declining the working time did not indicate a less workload. But this only means that they have used their extensive and intensive energies while working (Kelliher & Anderson, 2009). In the same fashion this could be extended that part time workers are seen to be more enthusiastic than full time workers and have extensive energy while performing their day-to-day tasks which result in higher productivity. On the other hand, shift work is also more preferable than overtime as it eliminate the physical fatigue caused by working long hours (O'Neill & Panuwatwanich, 2013). Thus, less working hours decrease fatigue and absenteeism which in turn is critical for more labor productivity.

2.6.2 Wages and labor productivity

Based on the earlier researches, a positive and significant relationship between wage and LP was found (Yen, et. al, 2017; Goh & Wong, 2010; Tamasauskien & Stankaityte, 2013; Kumar, Webber, & Perry, 2009; Narayan & Smyth, 2009; Huizinga & Broer, 2004; Nayak & Patra, 2013; Trpeski, Eftimov, & Cvetanoska, 2016; Erenburg, 1998). Wages paid to Ethiopian footwear industry workers was very small when compared to other countries like Turkey (Berhanu, 2002). This indicates that one cause for the lesser productivity was fewer wages paid to those workers.

Well-planned monetary or non-monetary schemes can boost the motivation among the labors and lead to an increase of productivity (Nayak & Patra, 2013). On the other hand some researches also substantiated that initial wages push only increase labor productivity in a short time but not sustainably as it is based on excess capital (Hondroyiannis & Papapetrou, 1997; Gneezy & Rustichini, 2000). They emphasized that the relationship between wage and productivity is not monotonic where proposing greater wages does not always inspire productivity. However, in all the cases wages and labor productivity have a positive relationship and hence in order to have more productivity it is advisable to timely and rationally add extra wages for workers.

2.7 Literature Summary and Gap Analysis

Many literatures related to labor productivity have been reviewed in this chapter in order to investigate their strengths and weaknesses for further identification of existing gaps and analysis. Based on the prioritized studies and preliminary investigations, the summary of the existing literature gaps is indicated as in the following.

Table 3: Literature gap analysis

No.	Existing literature	Strengths	Shortcomings
1.	(Bureau of labor Statistics, 1993). Labor Productivity and Costs	Labor input measure - all workers are treated as if they were identical <ul style="list-style-type: none"> Man hours are used commonly than man heads which helps to minimize the error of individual working hour differences. 	<ul style="list-style-type: none"> Skilled, semiskilled and unskilled workers or/and the workers at higher levels of management are considered as if they were identical.
2.	(OECD, 2001) Measurement of aggregate and industry-level productivity growth.	<ul style="list-style-type: none"> The framework for calculation of LP provides clue towards LP calculations 	<ul style="list-style-type: none"> Differentiation of labors and their hours is not clearly stated on the framework
3.	(Koch, 1996) Improving Labor Productivity: Human Resource Management Policies do Matter.	Human resource sophistication <ul style="list-style-type: none"> It observed and analyzed human resource sophistication factors by indicating their positive contribution to LP 	<ul style="list-style-type: none"> It has given less focus to the production challenges and their impact on LP.
4.	(Syverson, 2011) What Determines Productivity?	<ul style="list-style-type: none"> TFP and/or MFP is measured to avoid the effect of excluded inputs 	<ul style="list-style-type: none"> There is a challenge of identifying measures of factor inputs (Fadejeva, 2009).
5.	(OECD, 2001) Measurement of aggregate and industry-level productivity growth.	LP improvement index: Calculation of <i>average value share weight</i> of products considers the price of each product into consideration <ul style="list-style-type: none"> It can be applied to production types where products of labor hour inputs are proportional to the price of the products 	<ul style="list-style-type: none"> In addition to the product type, there are other factors like product demand and fashion that affect price of products. Monetary or the influence of price factor is required in profitability and not in productivity (Tangen, 2005). Low labor hour input for a product doesn't necessarily

No.	Existing literature	Strengths	Shortcomings
			mean relatively a lesser price.
6.	(Preliminary study) Existing LP measurement methods of LIDI	<ul style="list-style-type: none"> • It tries to estimate labor productivity from the actual company data • It uses output to labor hour as a method of LP calculations • Obtained LP for each company is averaged to get the footwear industry LP value 	<ul style="list-style-type: none"> • LP is estimated for report consumption and the actual value is unknown. • Skill of workers, management hierarchy of workers, holiday, annual leave and any other aspects affecting LP value are not considered. • Obtained LP for each company is averaged to get LP for the industry without considering the production capacities of companies. • LP at factory level is not the interest of the analysis.
7.	(Berhanu, 2002). Declining Productivity and Competitiveness in the Ethiopian Leather Sector.	<ul style="list-style-type: none"> • It tries to manage labor heterogeneity in measurement • Focus on major inputs (labor and capital productivity) 	<ul style="list-style-type: none"> • Productivity measurement is based on wages • Only labor and capital productivity are considered
8.	LIDI's training and development plan for new workers (preliminary study)	<ul style="list-style-type: none"> • Availability of different trainings for investment and production phase of footwear industry • Trainings are short, sector specific and achievable • Assess and full-fledged model factory to deliver trainings 	<ul style="list-style-type: none"> • New footwear industry traditionally starts running its production without training its workers. It also hires workers of other companies with insignificant salary differences. • This causes threat of knowledge to the former companies and high turnover

To summarize the literature, this study tries to fill all the gaps observed in the related literature investigated above and those summarized in the above table (Literature gap analysis). The gaps will be addressed in the thesis analysis parts i.e. both in measurement analysis, improvement analysis and model development which are detailed in chapter four and chapter five of this study.

Chapter Three: Overview of Ethiopian Footwear Industry

3.1 Introduction

Footwear industry is one of the prioritized subsectors in Ethiopia (MOI, 2013) because it aligns with the government industrial development strategy. Although the manufacturing processes of the footwear pass through similar set of activities such as cutting, closing, lasting, finishing and packing, their level of automation differs highly from manual to semiautomatic. The more the industry is automated with technology and machines, the lesser its labor intensiveness sounds. As per preliminary study and data from LIDI there are about 18 medium and large mechanized footwear companies currently in operation. All shoe factories are found in Addis Ababa and its neighborhood except Sheba, which is located 783 kilometers far to north from Addis Ababa.

For any manufacturing firm, there are five basic resources which are usually called as the 5Ms (manpower, machine, money, management and materials). Among these Ethiopia is rich in manpower and raw materials. Ethiopia has plenteous potential skilled, comparatively cheap and easily trainable work force and since there exists a great opportunity in producing a proficient expert level on the leather shoes manufacturing technology. Ethiopia, with a population of over 100 million, has abundant, hard-working, inexpensive and easily trainable labor force. Despite this potential, Ethiopia has not yet exploited this resource to any appreciable extent. It also has immense leather material inputs for leather products processing. The leather industry bases itself on the country's livestock resources. Indeed Ethiopia possesses one of the world largest livestock populations of which is 52 million cattle population that makes the country ranking 1st in Africa and 6th in the world, 27 million Sheep population which makes 3rd in Africa and 10th in the world and 23 million Goat population which makes 3rd in Africa and 8th in the world. However, the resource is not fully utilized and only 2.7million hides, 8.1million sheep skins and 7.5million goat skins are sold on the market (MOIT, 2005). Therefore, the leather industry still has room to be developed further; optimizing the abundance of the resource and the country can consider the leather and footwear industry important sub-sector that leads the whole sector's modernization.

The production of leather shoes in Ethiopia dates back from the late 1930s when Armenian merchants founded two shoe factories in Addis Ababa namely Tikur Abay and Anbessa Shoe factories. These were nationalized by the military government in 1974 and remained the largest and second largest shoemakers in Ethiopia. These factories nurtured number of shoemakers, who opened their own factories in Addis Ababa and trained their workers.

The export of leather footwear started only in 2005 although since then its value has been growing steadily. Since then and is expected to make a big impact on the Ethiopian economy. Also the job opportunities the industry creates could make a significant impact on poverty reduction. At the end of 2014/15 budget year total of 11,138 jobs are created in the sub sector among which females' employee are 6,114 (about 55%) and the remaining 5,024 are male employees. On the other hand, more than 8,310 employees (4,973 female and 3,337 male) are working in large and

medium factories; 2,828 workers (1,141 female and 1,687 male) involve in different cluster and micro and small Enterprises.

In, General there are more than 18 medium and large scale footwear exporting manufacturing companies which have designed capacity of 10.34 million pairs per year in average, but the actual production is currently around 6.47 million pairs per year in average. Additionally micro and small enterprises with total manufacturing capacity of 3.53million per annum exist (Zijlstra, et al., 2015; LIDI annual report, 2014).

Table 4: Workers in medium and large footwear industry in 2007EC

No.	Company name	Production capacity ¹	Sex	Number of Management ² Workers	Number of Production Workers	Total	Temporary Workers
1	Anbessa Shoes S.C.	1,550	Male	6	120	126	169
			Female	1	266	267	263
			Total	7	386	825	
2	Bostex PLC	150	Male	4	49	53	
			Female	4	73	77	
			Total	8	122	130	
3	ELICO Fontenina Shoe Factory	600	Male	10	37	47	
			Female	20	91	111	
			Total	30	128	158	
4	George Shoes Ethiopia PLC	1,300	Male	2	384	386	
			Female	8	575	583	
			Total	10		969	
5	Huajian International Shoe City (Ethiopia) PLC	4,000	Male	61	1,258	1,319	
			Female	111	1,579	1,690	
			Total	172	2,837	3,009	
6	Kangaroo Shoes Factory	650	Male	20	39	59	
			Female	40	151	191	
			Total	60	190	250	
7	Modern Zege Leather Products PLC	400	Male	8	32	40	
			Female	13	43	56	
			Total	21	75	96	
8	Mohan PLC	800	Male	3	46	49	
			Female	3	68	71	
			Total	6	114	120	
9	New wing Addis Shoes Factory	1000	Male	28	143	171	
			Female	31	575	606	
			Total	59	718	777	
10	OK Jamaica	500	Male	11	18	29	

¹ Production capacity – actual production capacity in pairs per 8 hours day

² Management workers - non-production workers

No.	Company name	Production capacity ¹	Sex	Number of Management ² Workers	Number of Production Workers	Total	Temporary Workers
	Shoes Factory		Female	10	62	72	
			Total	21	80	101	
11	Oliberte Limited (Ethiopia Branch)	100	Male	8	42	50	
			Female	7	63	70	
			Total	15	105	120	
12	Peacock Shoes Factory	1,500	Male	11	63	74	
			Female	8	144	152	
			Total	19	207	226	
13	Ramsay Shoes Factory	1,200	Male	197	30	227	
			Female	293	86	379	
			Total	490	116	606	
14	Ras Dashen Shoes Factory	1,000	Male	8	27	35	
			Female	7	49	56	
			Total	15	76	91	
15	Tikur Abay Shoe S.C.	1,600	Male	34	158	192	156
			Female	21	126	147	176
			Total	55	284	671	
16	Walia Leather and Leather Products PLC	400	Male	3	31	34	
			Female	17	64	81	
			Total	20	95	115	

Source: LIDI, Footwear Technology Directorate data, 2007E.C.

3.2 Why the Footwear Sub Sector Not Competitive

The reasons for sub sector's in competitiveness in domestic and international markets include problems like raw material price instability, product quality, scale of operation, marketing strategy, promotion service, external trade taxes, infrastructure, communications, port transaction efficiency, government incentives, financial problems, hard currency and the like. Studies also showed that productivity of Ethiopian footwear sub sector declined during 1995-1999 (Berhanu, 2002). Problems related to logistics include late delivery of raw materials like leather, accessories and components to the factory site and the late delivery of the end products to the customers' site. In order for the factories to secure loans and obtain hard currency from government it also takes extremely long time, in fact sometimes not possible. Lack of competitiveness is also created due to unfair competition created by new and second hand shoes imported into the domestic market by contrabandists.

In a broader sense the recent study conducted by AACCSA and accompanied on Ethiopian manufacturing sectors, tried to investigate the possible problems with which the manufacturing sector is challenged. It identified the major challenges through industry level survey, key informant interview and desk review (AACCSA, 2015). According to AACCSA and (MOI, 2013), the major challenges can be summarized as follows:

- Poor competitiveness as a result of under capacity utilization, poor quality, low productivity
- Poor managerial skill, lack of research and development activities, limited capacity building activities both at firm and sector level.
- Inadequate institutional support such as limited access to finance to fund projects in the sector, shortage of foreign currency to import raw materials and capital goods, poor availability and supply of infrastructures such as road, electricity, water, telecommunication and internet communications
- Corruption and lengthy bureaucratic procedures from government institutional services such as custom clearance, land lease processing, etc.

Both internal and external problems are challenging the growth and competitiveness of the individual firms and accordingly sometimes their existence falls under question (Yitagesu, 2017).

3.3 Government Support for Footwear Industry

The Ethiopian leather industry is a relatively older industry with more than 80 years of involvement in processing leather and producing leather products. LIDI, a government institute, was established solely to facilitate the development and transfer of leather and leather product industries' technologies as well as enable the industries become competitive and beget rapid development. LIDI has powers and duties to support the industry. Footwear industry development directorate FIDD, one of the directorates in the institute, has five main roles in supporting and providing technical services to the footwear industry. These include Education and training, Technical service, Research & Development service and Industrial Consultancy Services.

In Education and training, for regular students training is given for Level I (Cutting and prefabrication), Level II (Stitching and hand lasting), Level III (advanced footwear production) and Level IV (footwear production Supervision). Moreover for regular Short Term Trainings students, training is given in areas such as cutting, stitching, Lasting and finishing, Design and pattern making, and Supervisory Management.

In Technical service, Production of Standard cutting Knife Engineering, and Shoe component cutting and other technical services in footwear making processes is given for footwear industry.

In R&D service, conducting a practical problem solving Research I on the sector such as Product Development, Production Process and Productivity Improvement, Quality Improvement, Logistic and Supply Chain and Marketing and System Development are provided. Moreover LIDI possesses a full-fledged Product development center which provides Support services such as conducting applied researches that can be adopted by the sector and improve its productivity and competitiveness, Digital and Manual Sketching, Pattern and Sample Development, Pattern Engineering, Fashion Forecast, Last Digitalization, Pattern Grading with Precision, Range Building, Technical Book Preparation, Design and Consultancy and Human Development in Designing.

In Industrial Consultancy Services, the following are some of the support services provided to footwear industry. These include the following services.

- Conduct Proficient Gap Assessment and Analysis.
- Implementing and Adopting Productivity Improvement Techniques and Systems
- Implementing and Adopting Quality Management System
- Design and Develop Production Plan and Control Systems.
- Applying and Adopting Work-Study and Standard Time
- Develop and Implement Inventory Management Systems
- Provide Support for Establishing a Product Development Centers
- Standard Bill of Material and Shoe Costing Computation
- Develop and Implement Incentive Systems
- Any other consultancy as per Demand of Footwear Industries

On the other hand, feasibility study and project profiles are also the other technical services that are provided for the footwear industry as per the institute's website. These also include the following work.

- Project Profile Preparation
- Prepare a feasibility study for new project ideas
- Prepare a full and up-to-date information about the sector
- Follow up and full-fledged services for projects on investment phase
- Providing all the necessary information for new investors

In supporting newly entrant investments training and development in particular are provided. By doing this the institute produces a trained workforce for immediate sectarian demand created in the country. This is because the training and development of skills of new and senior employees is a key to improve productivity, team spirit, organization climate & culture, quality of product, healthy work environment & safety.

On the basis of these, preliminary study of the sector shows that short term theoretical and practical footwear production training is planned in footwear business plans to be provided for new entries; and it will have maximum duration of 25days. It is given for all direct workers and management directly incorporated to guiding the manufacturing process. Some of the courses planned to be given for new entrants to the footwear industry include footwear production operations and management, basic footwear production and supervision, basic footwear production and quality control, cutting technology, stitching technology, component technology, and mechanized footwear lasting and finishing technology.

Different programs have been set in the past few years with other national and international institutes. For instance benchmarking program has been held with Indian two institutes namely FDDI and CLRI in order to upgrade the leather and leather products industry capacity utilization. Moreover, by following the benchmarking program a twinning program was held with the same

institutes to mainly upgrade the supporting capacity of LIDI staff. Twinning program helped LIDI in getting short term and long term trainings including MSc and PHD studies. The institute is also currently undertaking an implementation of Kaizen principles for the industry in collaboration with Ethiopian Kaizen Institute.

3.4 Physical Labor Structure for Labor Productivity Measurement

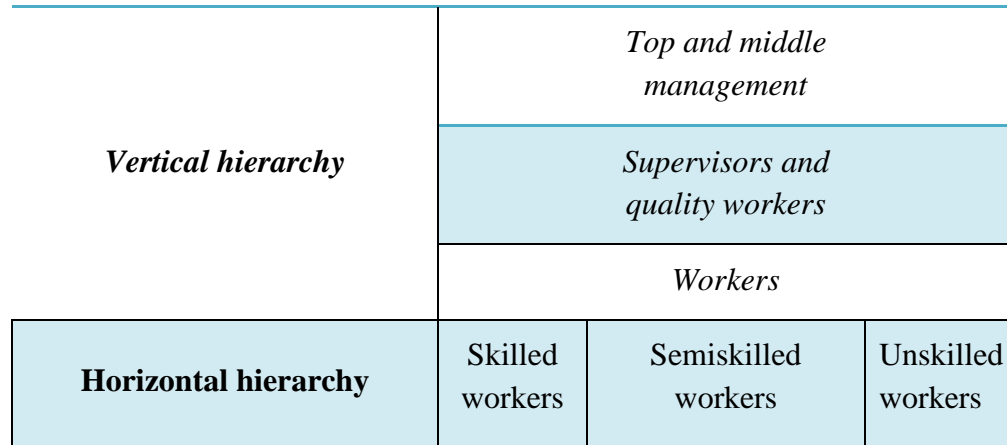


Figure 6: Footwear industry worker structure

Vertical hierarchy from management to worker

The top and middle management include general manager, production and technical managers, planning head, line supervisors and quality workers. Core processor departments are directly involved in production management whereas the critical support functions assist the core processes for their normal functioning which include design, procurement, testing and merchandizing functions.

Horizontal hierarchy in lower level workers

Operations are performed by combination of operator, material and stitching machine. In most cases, the workers perform the given job by their own hands and skill. Accordingly, they are rated as high skilled, skilled, semi-skilled or unskilled as per their performance and level of commitments (FDDI, 2012).

- An operator is called *High Skilled*, when one is able to perform any kind of relating job with good quality and productivity.
- An operator is called *Skilled*, when one is able to perform only one kind of relating job with good quality and productivity.
- An operator is called *Semi Skilled*, when one is able to perform one kind of relating job with average quality and productivity.
- An operator is called *Un-Skilled*, when one is required basic training to perform any kind of relating job to meet average quality and productivity.

Different studies like business plan that are carried out in LIDI use factor cost - a prepared document showing the wages and salaries of workers and many other tariffs for major regions in the country. According to factor cost (factor cost, 2010) the ratio of salary for skilled, semiskilled and unskilled workers is 1.2:1.0:0.9 which is assumed to be directly proportional to the productivity level of the workers. Vertical hierarchy of workers have also three categories as indicated in the above figure which was assumed to have the same ration as lower workers. Labor productivity hours of critical support function workers are considered by summing them up with top and supervisory level line workers.

3.5 Existing Labor Productivity Measurement System

Labor productivity of footwear industry in Ethiopia is roughly measured by LIDI. Data from the company is sourced either from the business or secondary data of the institute. It is required to generate reports and to evaluate against the GTP plan. The GTP plan has incorporated the labor productivity which indicates an increasing trend annually.

Table 5: GTP II (2008 - 2012E.C.) Goals and LP plan for footwear industry

Goal type		2008	2009	2010	2011	2012
Footwear production volume (in million pairs)		17.9	24.7	35.8	52.3	75.2
Footwear industry capacity utilization (out of 100)	Plan	68	75	79	84	90
	Actual	49	56.5	-	-	-
Labor Productivity (in pairs/day/person)	Plan	3.64	4.20	5.01	5.84	6.96
	Actual	2.405	2.74	-	-	-
Production share (from manufacturing and out of 100)		0.15	0.19	0.31	0.33	0.47
Footwear export (in million USD)		73	126	196	329	486

Source: LIDI GTP II plan and performance

As per preliminary study, the existing LP measurement procedures behave the following.

- a. Collection of actual production volume per annum from each company
- b. Calculation of production volume per day assuming that there are 280 working days per annum.
- c. Finding the average number of workers in each company
- d. Calculation of LP in pairs/day/person as the ratio of production volume per day for a company to its average number of employees
- e. Finding the average LP for the footwear industry. This is obtained based on LP for each company. Average LP for footwear industry is the average of LP of all companies under consideration. LP for the industry in the last few years was computed by LIDI and respective companies secondary.

Chapter Four: Research Methodology

This section explains about the overall design of the research and the methods used to collect relevant data, present data, analyze data and develop new model and approaches for the accomplishment of the research. Its first part discusses the methodology (the general framework of the research), the second part introduces the design of the research and the third part deals about how to collect and analyze data (qualitative and quantitative methods). The study follows some specified ways for data collection, presentation and analysis which were indicated as below.

4.1 Methods of Data Collection

Quantitative and qualitative data collection methods/techniques were used. The quantitative ways of data collection methods included observation, questionnaire and secondary data whereas the qualitative methods were observation, interview and secondary data. Data sources and data collection technique/tool was briefed as follow:

4.1.1 Data sources

Sources of data include footwear companies, MOI, and LIDI intranet, website, reports and leaflets.

4.1.2 Observation

This is used when the information required is sought after by way of investigator's own direct observation without asking from the respondent. Data related to the production and productivity such as of labor productivity and production process as a whole will be collected by this method. Observation is selected as a tool because if it is done accurately, it avoids subjective bias. Moreover, the information obtained under this method relates to what is currently happening and it is not complicated by either the past behavior or future intentions or attitudes.

4.1.3 Questionnaire

This technique was used for primary and quantitative data collection that includes assessing the LP determining factor data and assessing the level of impacts of those factors on labor performance. The questionnaire had three parts (Likert scale, prioritizing and fill in the blanks). That is both closed-ended types of questions (five-point Likert scale and prioritizing) and open-ended (fill in the blank) were included. Open ended questions were prepared to collect opinions, views and suggestions of respondents. The items in the Likert scale were measured using 5-point scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). The questions parts under prioritizing category were 10 in size and their results were transformed when analyzed. Finally, fill in the blank items were used for drawing cause-and-effect diagrams.

After conducting a pre-questionnaire test for the prepared questionnaires by six lead footwear researchers at LIDI, amendment was taken as per constructive comments and critics by the researchers after which the questionnaire was distributed to eight footwear companies. All the parts of questionnaires (Likert scale, prioritizing and fill in the blanks) were filled by the general

managers, production managers, division heads and supervisors but only two parts of the questionnaire (Likert scale and fill in the blank) were filled by lower level workers. The filled and returned questionnaire had a respondent rate of 83.4%. The quantitative data was purified and analyzed using SPSS version 20 (reliability test, Pearson Correlation and Multiple regression analysis).

4.1.4 Interviews

Semi structured interview was conducted for collecting in depth information wherever the information could not be obtained by other means of data collection techniques.

4.1.5 Secondary data

In this regard some data were collected from LIDI and footwear companies. Data of annual production volume and actual annual labor hours were collected from respective companies for five years (2006EC-2010EC).

Moreover data collected by other researchers and studies were used as one of the secondary data source. Among the mostly used journals and articles that are applicable for this thesis are data sources from Google scholar or AAU electronic thesis, international journals, Science Direct, Springer link and Emerald. Moreover different books related to the title sourced from Addis Ababa University library electronic information source, <http://gen.lib.rus.ec>, <http://sci-hub.cc/...>, other libraries and internet were used. On the other hand, companies' website, leaflets and quarterly, semi-annual and annual reports were referred. Useful information from those journals, articles, dissertations, theses, studies and e-books were filtered and used.

4.2 Conceptual Framework of the Study

The following methodology was employed to design and achieve the objective of the study.

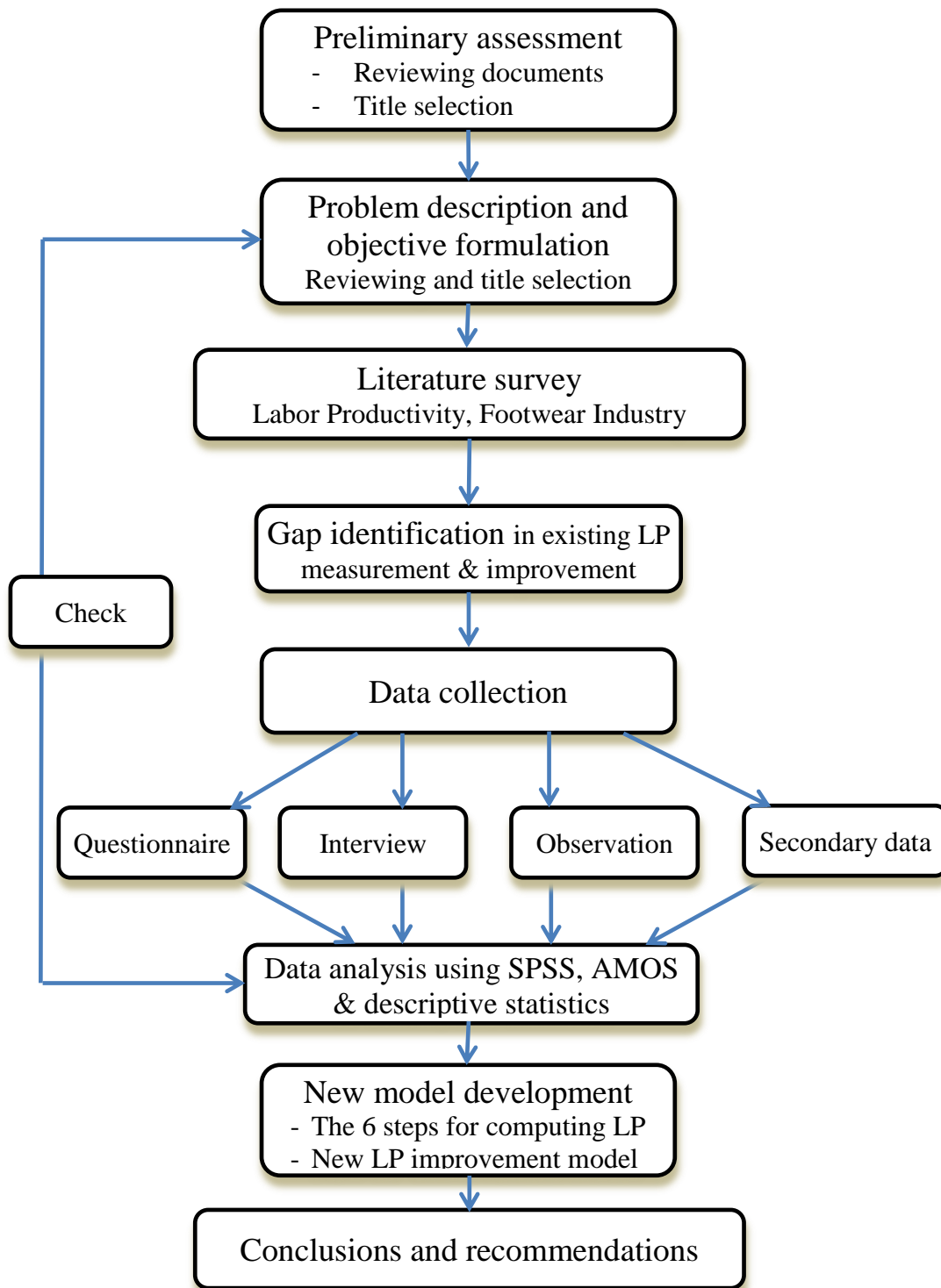


Figure 4: Conceptual framework of the study

4.3 Research Design

Research design is important to facilitate the smooth- sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money (Kothari, 2004). The design helps to organize ideas and to look for faults and insufficiencies. In the absence of research design, it would be difficult to provide a comprehensive evaluation of the study. Moreover, research design acts as a blue print or a plan in advance of data collection and analysis for the research project (Kothari, 2004). In this thesis, surveying of medium and large Ethiopian footwear companies was carried out in order to find data for LP calculation and its determinants. Sampling techniques were deployed to help collect representative data.

4.3.1 Areas of the study

The study was conducted on local Ethiopian medium and large footwear companies, 99% of which are located in and around Addis Ababa. Among these, export oriented companies were prioritized for investigation. This includes Anbessa Shoes SC, Tikur Abay Shoe SC, Kangaroo Shoes Factory, OK Jamaica Shoes Factory, Peacock Shoes Factory, Modern Zege Leather Products PLC, Mohan PLC and ELICO Fontenina Shoe Factory.

4.3.2 Sampling decision

Sampling decision was carried out in three parts of data collection. These were *determining the number of footwear companies, determining the number of working days in each year, and determining the number of respondents in each footwear company.*

Determination of the number of footwear companies:

Data were collected from all the selected footwear companies (census type) because the number of footwear companies under consideration was very small. Export oriented medium and large Ethiopian footwear companies were not more than 20 in number.

Determination of the number of working days:

In order to collect the production quantity and number of workers in each company, data from all footwear companies under consideration were collected on daily basis. Out of the assumed 280 working days per annum for each company, sample size was calculated and determined based on formula for finite population (280days). Moreover, for the ease of the work it was decided to randomly select the sample days from the population. According to Kothari (2004, p. 179) the desired sample size from finite population is given by the formula

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2 \cdot (N - 1) + z^2 \cdot p \cdot q}$$

Where,

n = the desired sample size

N = population size

z = the value of the standard variation at a given confidence level (to be read from the table giving the areas under normal curve)

p = the proportion of target population estimated

q = 1-p

e = acceptable error (the precision)

Population size N = 280

The researcher determined the desired sample size to be at 90% confidence or risk level. Hence at specified confidence level, z = 1.6395 (read from table of normal curve)

The degree of variability in the attributes (or in this case production capacity in pairs per day) is assumed as 15% which indicates that p = 0.15 and q = 1 – p = 0.85.

The level of precision or sampling error, which is the range in which the true value of the population is estimated to be, is 5%. So, e = 0.05

By using all these data

$$n = \frac{(1.6395)^2 * 0.15 * 0.85 * 280}{(0.05)^2 * (280 - 1) + (1.6395)^2 * 0.15 * 0.85} = 92.25034 \cong 92$$

Based on this, data for 92days were collected for each company per annum. However in some companies, data was not available on daily basis, and hence it was collected on monthly or annual basis. Data collection was done on daily basis because day is the smallest possible unit to measure both production volume and labor force on jobs.

Moreover, five year data (2006EC – 2010EC) was collected. This is because if lesser number of years was considered it would be insufficient to define the trend of LP (positive or negative). On the other hand considering more than five years was difficult because data before 2006EC is not available in some companies.

Determination of the number of respondents:

Primary data were collected from companies via developed questionnaire. These questionnaires were distributed to workers at top and medium management level (called as management level in general) and production floor workers or operators. Hence from the total number of workers in all the companies, only some company management and production workers were selected to distribute the questionnaires and get representative data responses based on finite population sampling approach. Data collected were used to identify LP determinants and for new model development.

Based on formula of sampling size determination for definite population size as set in Kothari (2004, p. 179), the sample sizes of management and production workers in each company was determined as follow.

Management workers

N = 212

z = 1.6395 at 90% confidence level

p = 0.15, the degree of variability in the attributes assumed to be 15%.

q = 1 – p = 0.85

e = 0.05, level of precision is assumed as 5%

So, using the formula

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2 \cdot (N - 1) + z^2 \cdot p \cdot q}$$

n

$$= \frac{(1.6395)^2 \cdot 0.15 \cdot 0.85 \cdot 212}{(0.05)^2 \cdot (212 - 1) + (1.6395)^2 \cdot 0.15 \cdot 0.85}$$

n = 83.5 = **84**

Production workers

N = 1,512

z = 1.6395 at 90% confidence level

p = 0.15, the degree of variability in the attributes assumed to be 15%.

q = 1 – p = 0.85

e = 0.05, level of precision is assumed as 5%

So, using the formula

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2 \cdot (N - 1) + z^2 \cdot p \cdot q}$$

n

$$= \frac{(1.6395)^2 \cdot 0.15 \cdot 0.85 \cdot 1512}{(0.05)^2 \cdot (1512 - 1) + (1.6395)^2 \cdot 0.15 \cdot 0.85}$$

n = 125.8 = **126**

The value of p indicates the degree of variability in the attributes. In this case it indicates that the number of workers on job (both management level and production workers) varies by a maximum of 15%. For instance, if a company had a total of 100 workers, this mean that at least 85 of the workers were present on their job, while the rest being not on job due to absentees or other personal factors.

Table 6: Number of workers in footwear companies

No.	Company name	Actual number of workers		Sample size	
		Management	Production	Management	Production
1	Anbessa Shoes SC	51	434	20	36
2	ELICO Fontenina Shoe Factory	30	128	12	11
3	Kangaroo Shoes Factory	60	190	24	16
4	Modern Zege Leather Products PLC	10	75	4	6
5	Mohan PLC	6	114	2	9
6	OK Jamaica Shoes Factory	21	80	8	7
7	Peacock Shoes Factory	19	207	7	17

No.	Company name	Actual number of workers		Sample size	
		Management	Production	Management	Production
8	Tikur Abay Shoe SC	15	284	6	24
Total		212	1512	84	126

Source: LIDI 2007EC footwear companies data

Based on this, 210 copies of the prepared questionnaire were distributed.

4.3.3 Conventional LP and index formula

Conventional labor productivity and its index were computed using following formula.

i. LP formula

$$\text{Labor Productivity} = \frac{\text{Units produced}}{\text{Labor head used}}$$

ii. LP index formula

As the footwear industry produces more than one type of products, the approach uses Tornqvist formula as follows.

- a. All-output-index was calculated as

$$\frac{Q_t}{Q_{t-1}} = \exp\left[\sum_{i=1}^n w_{i,t} \left(\ln \frac{q_{i,t}}{q_{i,t-1}}\right)\right]$$

Where:

$\frac{Q_t}{Q_{t-1}}$ = The ratio of output in the current year (t) to the previous year (t-1),

n = number of products

$\ln \frac{q_{i,t}}{q_{i,t-1}}$ = the natural logarithm of the ratio of the quantity of product i in the current year to the quantity in the previous year, and

$w_{i,t}$ = the average value share weight for product i.

The average value share weight for product i will be computed as:

$$w_{i,t} = (S_{i,t} + S_{i,t-1}) \div 2$$

Where

$$S_{i,t} = q_{i,t} \div \sum_{i=1}^n q_{i,t}$$

- b. The all-person-hour index for an industry with multiple products was calculated in the same manner as in the single-output case ($\frac{L_t}{L_0}$).
- c. Labor productivity index for multi-product industry will be the ratio of all-output-index to all-person-hour-index. Therefore, LP index is equal to:

$$\frac{Q_t}{Q_{t-1}} \div \frac{L_t}{L_0}$$

The data source for production volume and labor hours worked was surveying of the footwear industry.

4.4 Data Analysis Procedure

While data analysis was performed, the detail of the procedures indicated below was applied.

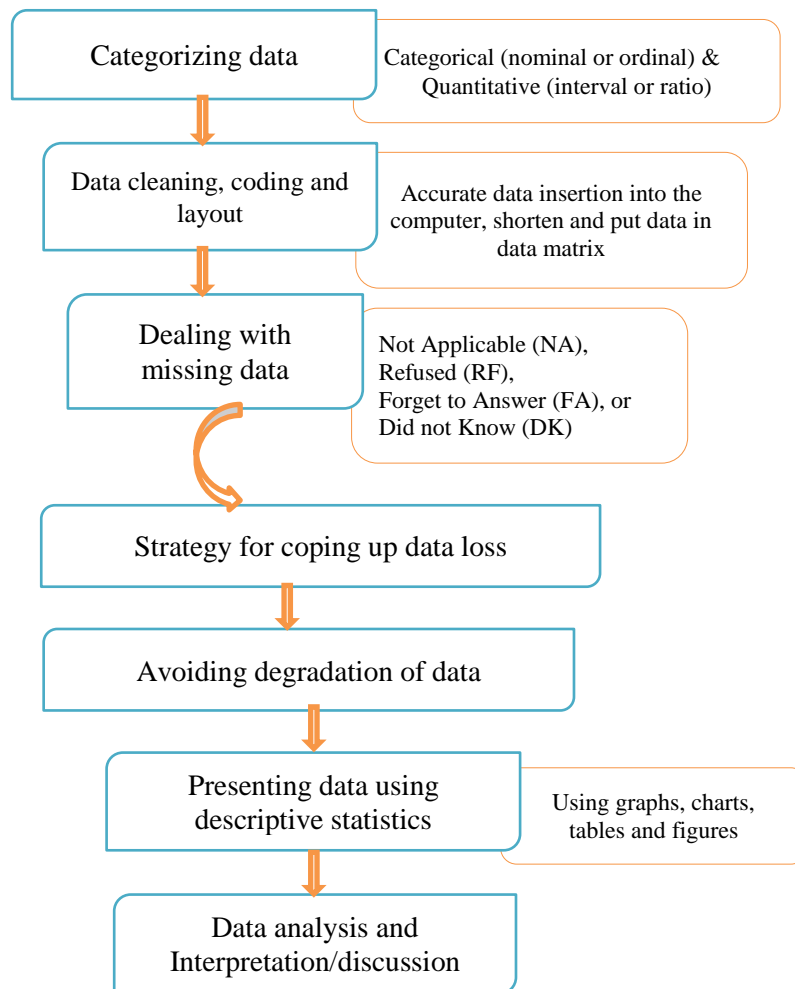


Figure 5: Procedure for Analyzing and presenting quantitative data

4.5 Data Analysis Tools and Techniques

Both qualitative and quantitative methods of data analysis were deployed to find labor productivity and its index, and analyze LP determinants and develop new model for the study. Instruments/tools used were SPSS, MS excel and AMOS software, QI Macros 2018 whereas the techniques used for the study include descriptive statistics, and correlation and regression analysis with the help of SPSS for Window Version 20 and statistical quality control.

SPSS tool was used for reliability testing, pear correlating and regression analysis of LP determinants that were collected by distributed questionnaires. AMOS software was used for new model development.

MS excel was used to compute LP, create graphs and charts, and construct cause and effect diagram. QI Macros 2018 was technique on MS excel instrument that was used to construct the cause and effect diagram.

Table 7: Summary of data collection and analysis

Data collection tools/techniques	Data sources	Data analysis tools/techniques
Questionnaire	Footwear companies	SPSS (reliability test, Pearson correlation and regression analysis), AMOS software and QI Macros 2018
Records and secondary data	<ul style="list-style-type: none"> - Computer databases in LIDI, MOI and footwear companies, - LIDI reports and leaflets, and - Footwear companies 	MS Excel and Descriptive statistics
Observation	Conditions of production activities in footwear companies	Inputs for other analysis
Informal interview	<ul style="list-style-type: none"> - LIDI staff and - Footwear companies 	MS Excel

Detail observations and preliminary study of footwear companies was carried out after which human resource and production managers have been interviewed. Finally, secondary data check sheet and questionnaire were prepared and disseminated to the organizations to gather data.

4.5.2 Data quality assurance

Data collected was triangulated to check for its validity before data was used in analysis. Data from production level workers got priority over the top level management data. Moreover reliability testing was carried out to validate data sourced from questionnaire.

Data gathered from management members and the lower level employees have been combined together in some cases and have been triangulated one against the other in other cases. For instance data collected by questionnaire have been summed for analysis because the same questions have been asked in different contexts and languages so that the respondents would be comfortable to reply. On the other hand, data from interviews and observations were used to strengthen the secondary data and questionnaire data analysis so that the data was checked for its practicality.

Chapter Five: Data Presentation, Analysis and Results

5.1 Introduction

Based on the data collection methods described under research design and methodology, primary and secondary data which were essential for achieving the objectives set were collected. The data collected from different sources as indicated in research methodology section were presented, analyzed and interpreted using different tools including soft wares.

The survey was divided as preliminary and secondary surveys.

- a) Preliminary data collection and survey: data was collected from LIDI for development of literature reviews and in order to use data as basis for analysis and also for triangulation purposes. Secondary data has been collected. Primary data regarding the existing methods of LP computations has also been collected.
- b) Secondary data collection: data were collected from footwear companies.
- c) Primary data collection: was conducted to assess the labor performance gap and factors affecting LP. Questionnaires were developed to assess this case (See Annex II).

Based on this approach, LP measurement system, LP improvement index and LP improvement factors analysis were dealt.

5.2 Labor Productivity Measurement

Under this subsection production volume and labor size were presented in tables and charts. LP was calculated based on production volume and labor size. This LP values were analyzed through five years for each company separately, and as average of all companies. On the other hand, labor productivity improvement index and cause and effect diagram for labor problems were illustrated.

5.2.1 Conventional vs new labor productivity measurement

A case of Tikur Abay Shoes SC was considered in order to investigate conventional LP measurement procedure or existing LP calculation practice approaches that were in use by the literature, LIDI and in footwear companies. Tikur Abay Shoes SC was selected as a case company here because it had many decision requiring factors which would later become part of new LP measurement approaches (indicated under the new model development section of this study).

Table: LP measurement – sample example for conventional vs the new approach

No.	Category	Average production (pairs/month) & labor size (case of Tikur Abay Shoes SC)				
		2006	2007	2008	2009	2010
A	Production quantity (pairs/year)	219,729	630,668	516,591	473,036	354,799
B	Effective working days in a year	239	353	276	280	237

No.	Category	Average production (pairs/month) & labor size (case of Tikur Abay Shoes SC)				
		2006	2007	2008	2009	2010
C	Average Production (pairs/day)	919.4	1,786.6	1,871.7	1,688.9	1,472.1
D	Number of workers (Conventional)	647	711	774	785	703
E	Absentees (in %)	9% on average				
F	Side business (shoe upper manufacturing) (pairs of upper/year)	17,743	3,890	-	-	-
G	Workers involved in side business (number/day) ¹	5	0.73	-	-	-
H	Workers structured (number) ²	582	637	698	708	634
I	Conventional LP (pairs/day) ³	1.42	2.51	2.42	2.15	2.09
J	LP (pairs/day) ⁴	1.58	2.80	2.68	2.39	2.32

¹ one worker produces 15pairs/day
² Workers structured = D-E-G
³ Conventional LP = C/D
⁴ LP = C/H

Production quantity in pairs per year: This quantity of shoes (in pairs/year) was collected directly from Tikur Abay shoes SC secondary or documented data. It is the total quantity of shoes produced during the entire depicted year. In some companies this data was collected on daily basis or on monthly basis based on the availability of data.

Effective working days in a year: This data was the actual number of worked days during the entire year. So, it excluded all non-working days like weekends, holidays and special company's day offs. In some companies this data was not obtained directly from their documented data but it was derived by collecting other related data like whether company works overtime, weekends and etc.

Average Production (pairs/day): This is a calculated value by dividing the Production in pairs per year into Effective working days in a year.

Number of workers (Conventional): This data indicates the total number of workers involved in the work of the company. It was obtained directly from the company's secondary data. It includes all companies workers who are paid or not paid, who are working on the specified product type or not, and who are on job or absentees. It indicates just the gross number of workers but not specifically the actual workers who are actually on job. This value (number of workers) is directly used in calculating the conventional LP but further means of resizing the value was done to calculate LP in the new approach.

The Absentees (in %): This is the ratio of the number of workers absent from their work to the number of workers (conventional). Although it has got the same value in this case this value in other companies have been calculated and recorded annually. This parameter is one of the values that should be deducted from the conventional number of workers in order to find the workers structured.

Side business (shoe upper manufacturing (pairs of upper/year): Side business indicates the manufacturing, services or any other activities that were carried out by the company workers but that were not part of the shoe product for which labor productivity was under process. After estimating the number workers involved in this side business, it will be one of the values deducted from the conventional number of workers in order to find the workers structured.

Workers involved in side business (number/day): This was an estimate value of workers involved in side business. This was obtained after collecting other related data like the production capacity of a worker participated in the side business.

Workers structured (number): It was obtained by deducting absentees and number of workers involved in side business from conventional number of workers in the company.

Conventional LP (pairs/day): It is the ratio of average production (pairs/day) to the conventional number of workers.

LP (pairs/day): This is the ratio of average production (pairs/day) to the workers structured.

In conventional (existing) measurement system, absentees and side business workers time were considered part of the conventional number of workers. On the other hand, in order to calculate the LP in the new approach, absentees and side business workers time were deducted from the conventional number of workers. There were also other factors differentiating the two approaches. For instance, in conventional measurement system, all types of workers have the same weight but in the new approach the different workers were given different weights based on their skills.

When both LP measurement approaches i.e. conventional and new approaches were compared, the new approach had greater LP values than the conventional approach in all the years. This was because in new approaches the job-time related to absentees and side business labors were reduced.

5.2.2 Production volume and labor size in footwear companies

Average monthly production volume of footwear companies and the total average labor numbers is indicated below.

Table 8: Footwear companies average monthly production volume and labor numbers

Name of the company	Item	Average monthly production in pairs & labor quantity				
		2006	2007	2008	2009	2010
Anbessa shoes SC	Production (pairs/month)	38,562	40,462	41,232	41,962	52,612
	Labor (number)	458	540	621	519	658
Kangaroo Shoes Factory	Production	9,518.6	7,205.5	10,317.1	11,553	9,624.6
	Labor	237	298	385	381	358
OK Jamaica Shoes Factory	Production	2,654	2,591	3,652	4,751	10,629
	Labor	97	112	130	151	106
Peacock Shoes Factory	Production	17,106	21,113	17,786	17,271	18,270
	Labor	307	333	275	290	358
Tikur Abay Shoe SC	Production	18,311	52,556	43,049	39,420	39,422
	Labor	647	712	774	785	703

The labor quantities indicated in the above table were the actual average number of all workers (permanent, temporary and contractual workers). These numbers were not structured into skilled, semiskilled and unskilled workers. Structuring (also called as structured workers as indicated in annexed tables) would be done in the later subsection for labor productivity calculations.

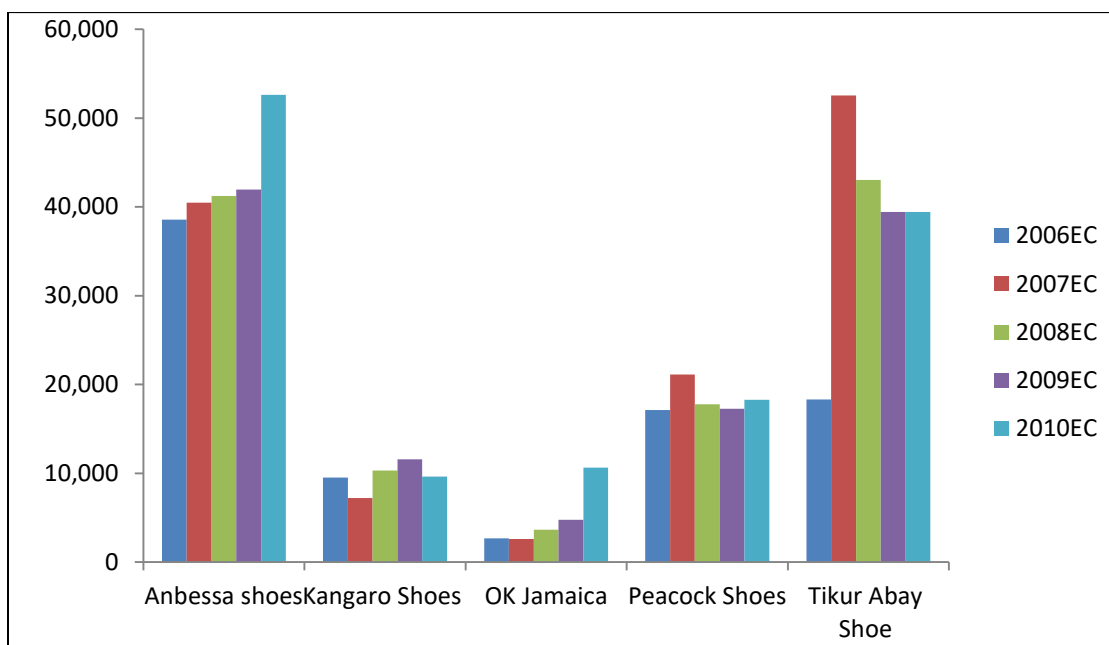


Figure 6: Average monthly production volume of companies in five years (2006-2010EC)

As clearly seen in the above diagram, production volume was increased during the successive years in Anbessa shoes and Ok Jamaica factories. However, in Kangaroo, Peacock and Tikur

Abay shoes companies, production volumes were not annually increased although the above graph shows increment from 2006 to 2010. This showed that footwear companies have no strategic growth plan which they strive for in order to annually increase their production volume.

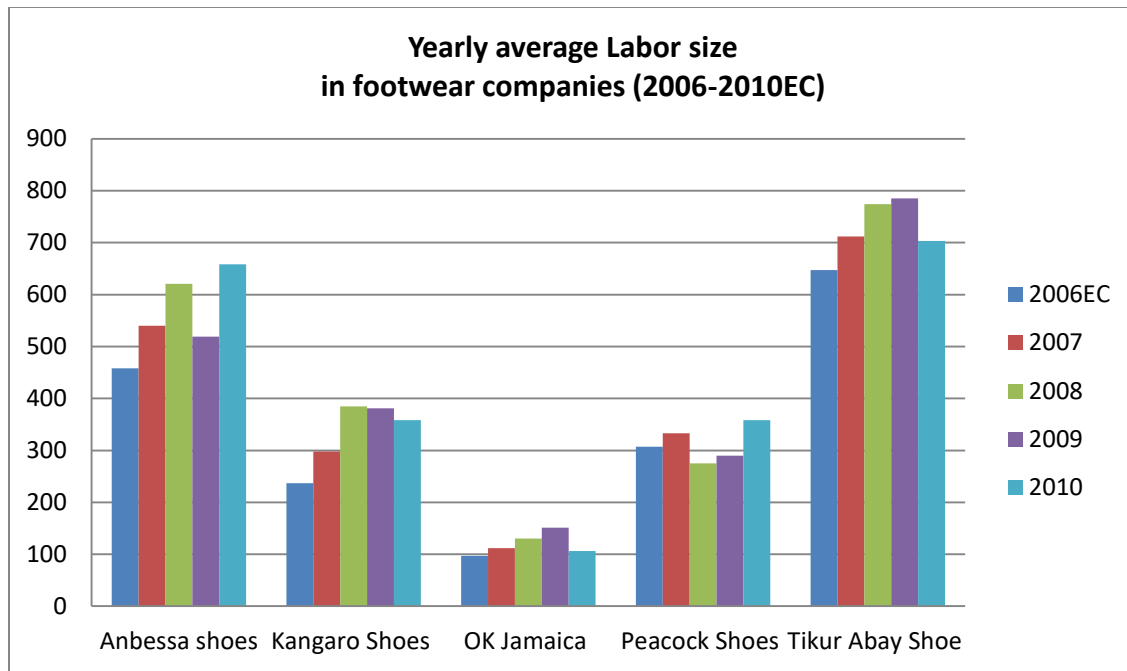


Figure 7: Yearly average sizer of labor in footwear companies

As clearly observed from the above bar graph the number of workers for all the companies were not uniformly increased annually. But when the labor size was compared using the initial and final years i.e. 2006 and 2010, all the companies’ labors increased except in case of Mohan PLC. This also indicates that labors are not uniformly added to the companies rather fluctuating ups and downs. This also showed that the companies are not expanding and using opportunity of increasing their labor force resources on annual basis.

Using the production volume and labor size of 5 years data (2006 – 2010EC) collected from the footwear companies and that were presented in the above tables and bar graphs, the following labor productivity values were found.

Table 9: Labor productivity in pairs/day/person in footwear companies (2006-2010EC)

SN	Company name	2006	2007	2008	2009	2010
1.	Anbessa shoes SC	1.97	1.80	2.05	2.57	2.86
2.	Kangaroo shoes factory	1.83	1.10	1.22	1.38	1.22
3.	Ok Jamaica shoes factory	1.25	1.06	1.28	1.43	2.22

SN	Company name	2006	2007	2008	2009	2010
4.	Peacock shoes factory	2.53	3.12	3.24	2.97	2.34
5.	Tikur Abay shoes SC	1.58	2.80	2.68	2.39	2.32
Average		1.83	1.98	2.09	2.15	2.19

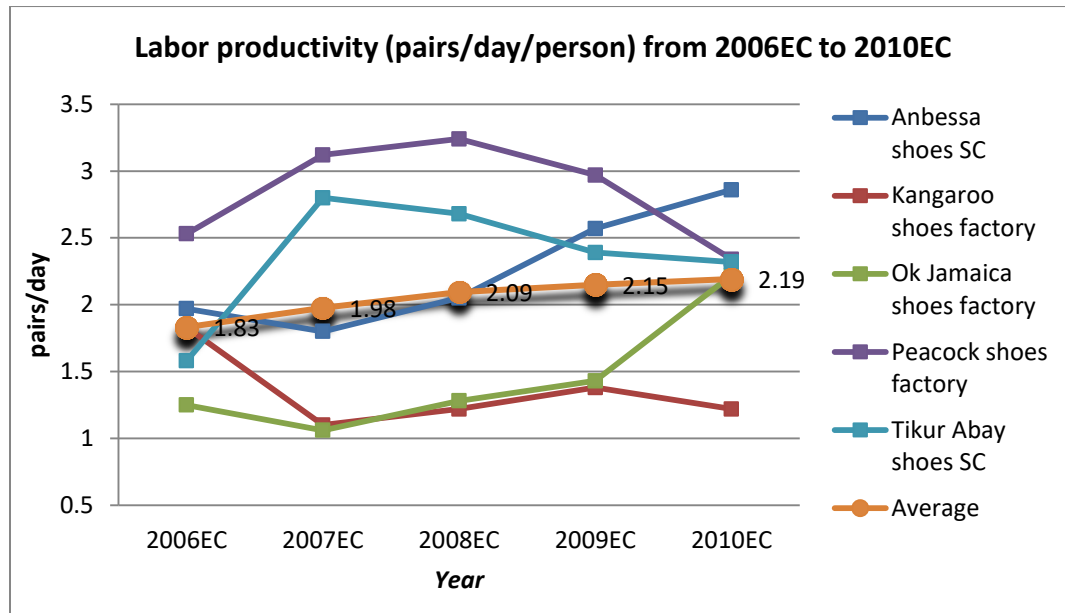


Figure 8: Labor productivity for each company (2006EC - 2010EC)

By examining the figure and table indicated above, it was observed that labor productivity varies among the companies, and comparatively higher labor productivity was registered in Peacock, Anbessa and Tikur Abay shoe factories which have got more than average labor productivity. On the other hand, Ok Jamaica and Kangaroo shoe factories have comparatively lesser level of productivity. Except Ok Jamaica shoes factory which has annually increasing productivity throughout the five years, all the other four factories have fluctuating productivities from year to year.

Average labor productivity from 2006EC to 2010EC had magnitude of 1.83, 1.98, 2.09, 2.15 and 2.19pairs/day/person which show a very slow or stagnant improvement situation i.e. a steady case or very slow increment from year to year. Moreover, the average labor productivity in China which was 6pairs/day/person is by far exceeding these values. From these one could interpret that there were some factors hindering the performance of human resource efficiency and effectiveness. Although cheap, trainable and abundant manpower were found in Ethiopia, the LP values that the companies obtained from man heads was not encouraging which further points to detail investigations.

5.2.3 Labor productivity index

This shows a trend of productivity that is the increment or decrement during the successive years. When the value of labor productivity index is greater than one it implies labor productivity is increasing, and vice versa.

Table 10: Labor productivity index of footwear companies (2006-2010EC)

No	Company name	2007	2008	2009	2010
1.	Anbessa shoes SC	0.914	1.139	1.254	1.113
2.	Kangaroo shoes factory	0.601	1.109	1.131	0.884
3.	Ok Jamaica shoes factory	0.848	1.208	1.117	1.552
4.	Peacock shoes factory	1.233	1.038	0.917	0.788
5.	Tikur Abay shoes SC	1.772	0.957	0.892	0.971
	Average	1.074	1.090	1.062	1.061

As seen from the above table, Anbessa shoes SC has labor productivity index of <1.000 in the first year (2007) and has values of >1.000 in the latter three years. OK Jamaica had the same trend with Anbessa shoes SC. This showed that labor productivity was decreasing in the first year but it was increasing the latter three years. Although productivity increased in the latter three years, the magnitude of increase was very small. The values of productivity index in both companies have also shown fluctuation during the years (2008-2010) which demonstrated that there was no guarantee for productivity increase in the upcoming years.

Kangaroo shoes factory also had LP index value of <1.000 in 2007EC and 2010 but had >1.000 in 2008 and 2009. This means productivity was decreasing in 2007 and 2010 while it was increasing in 2008 and 2009. Moreover, the magnitude of productivity decrease or increase was not significant and the trend was not unidirectional i.e. index value was not uniformly decreasing or uniformly increasing. This showed that there was no assignable cause to changes in productivity and hence could be induced that there was no guarantee for productivity increase in the next years.

Peacock shoes factory had LP index values running above one in 2007 and 2008, but running below one in 2009 and 2010. The magnitudes of the index value change also indicated small deviations from year to year. From this data increasing productivities were not observed. This showed that this company might not be focusing on the labor productivity increase as one pillar of its company performance improvement target.

The last factory namely, Tikur Abay shoes SC, was having an increase in LP index in 2007EC and a decrease in the other remaining years. This clearly showed a symptom of existence of labor productivity problem.

The average annual LP index values for the five factories from 2007 to 2010 were 1.074, 1.090, 1.062 and 1.061 respectively. These indices in general showed productivity increment throughout the years but the magnitude of increment was small. In 2007EC and 2008EC, there was yearly increasing labor productivity rate whereas from 2008EC to 2010EC the index value has shown a gradual decrease. From this it could be interpreted that the companies had some labor productivity related problems. So, a better approach that would be hunted to adverse companies' existing ups and downs movements to incremental, and to change the small magnitude move, towards a positive and higher magnitude increase in LP would be demanded. There would be some labor related problems that need to be identified and rectified.

5.2.4 Cause and effect diagram of labor problems

Respondents reflected the causes of poor labor performances in their respective companies and at their production shop floor based on their actual working area, their proper materials supply conditions, availability of facility problems, communication with other workers and supervisors, management system, workers work environment and problems related to market order. These factors were elaborated as in the cause and effect diagram indicated below.

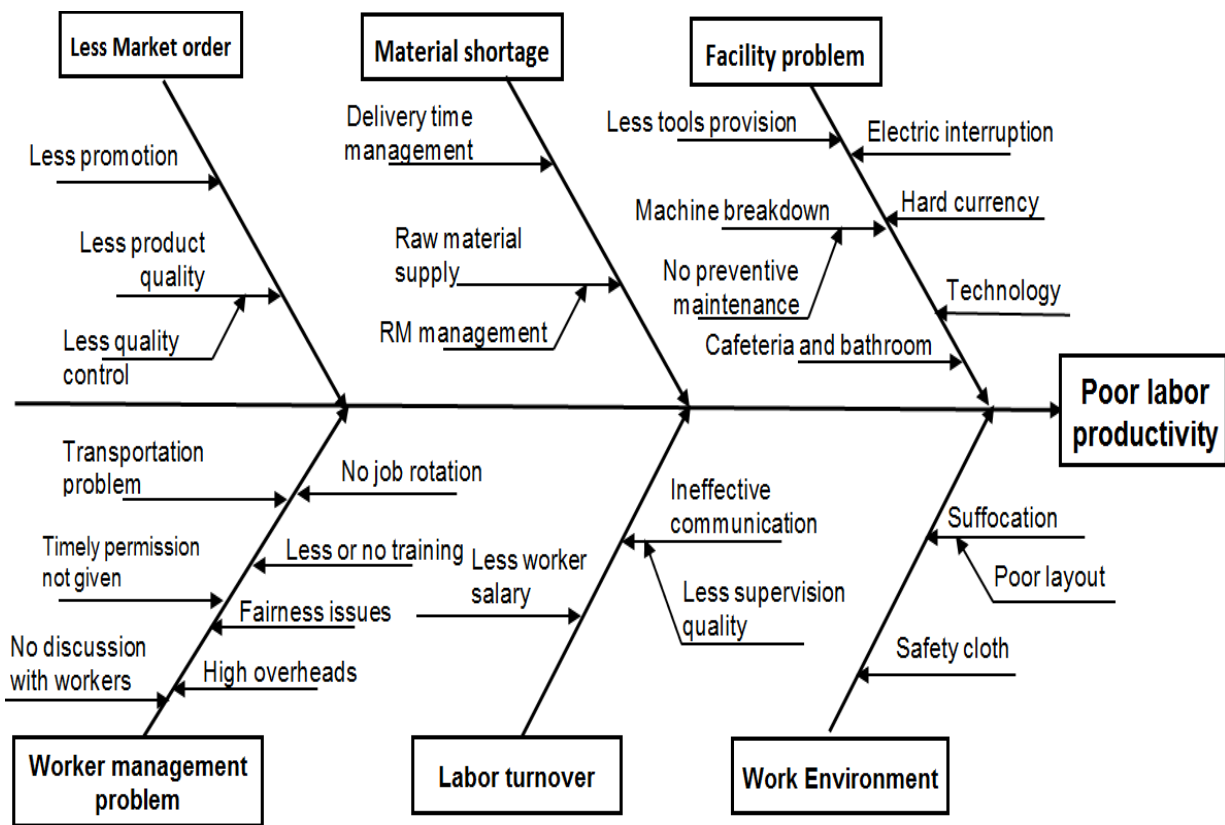


Figure 9: Cause and effect diagram of labor problems

Moreover the most common problems related to the labors that were indicated in literatures have been collected, summarized and given to respondents to prioritize them. Accordingly the management level workers of the footwear companies have put their opinions. The sum average of all the respondents have been presented as in the following ways.

Table 11: Respondents percentage on factors affecting labor productivity

No.	Parameter	Percentage
1.	Electric interruption	71.3%
2.	Poor production planning	53.5%
3.	Poor human resource selection, hiring, training and development problem	51.7%
4.	Customer order problems	48.3%
5.	Poor skills and experiences of operators and supervision	57.8%
6.	Working capital problem	60.4%
7.	Impacts of inputs like material availability, facilities, information, tools and equipment	79.6%
8.	Ineffective communication system among workers	57.4%
9.	Lack of salary carrier structure and motivation schemes	57.0%
10.	Others (like coordination among different departments)	10.4%

In the above table it was easily observed that according to the management workers level workers, impacts of other production inputs like material availability, facilities, information, tools and equipment was the top challenge to the labor productivity with support of 79.6% respondents. The second challenge was electric interruption with 71.3%, the third challenge was working capital problem, and etc.

The problems leading to poor worker performance can be classified into 2 broad categories. These are external and internal factors. The external factors are those factors that cannot be easily managed at factory level or those that take more time to handle which include electric interruption, hard currency, working capital and customer order problems. For instance, to get working capital from bank or any other funding institutions it takes several time and many related issues like collateral issues arise which should be handled in order to solve the problem. On the other hand electric interruption problem and hard currency are basic problems to all companies which can only be solved at country level in long time. So, although the company management has some roles to play in order to solve those external factors, a due attention from government is required to solve them.

Moreover, the internal factors that affect the labor performances are those which the company can manage by itself in shorter time. Here the internal factors are dealt in detail in order to devise productivity improvement system.

5.3 Labor Productivity Improvement

To get insight to collected data, summary of questions from respondents were put in percentages in tables and chart forms. For data collected reliability test was carried out, correlation analysis and regression analysis were generated which were further presented, analyzed and interpreted. For more investigation data presentation was assisted by tables, graphs and charts as shown as follow.

5.3.1 Questionnaire survey responses

This part of the study shows the number of respondents result in each section of the questionnaire in percentages. The items in the questionnaire were measured using a Likert scale /5-point scale/ ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5).

Table 12: Human resource sophistication proportion of respondents in percentage

No	Question	strongly disagree	disagree	neutral	agree	strongly agree
1	Many candidates are interviewed to hire few employees.	12.0%	21.4%	16.2%	26.5%	23.9%
2	Practical tests were given for you when you were recruited for this position.	4.3%	9.4%	21.4%	35.9%	29.1%
3	Theoretical tests were given for you when you were recruited for this position.	7.7%	22.2%	22.2%	23.9%	23.9%
4	The time given for hiring process is enough.	8.5%	28.2%	22.2%	18.8%	22.2%
5	Company provides you formal short term training after you started this job.	11.1%	18.8%	18.8%	27.4%	23.9%
6	You had sector related experience when you were hired in this company.	15.4%	16.2%	21.4%	24.8%	22.2%

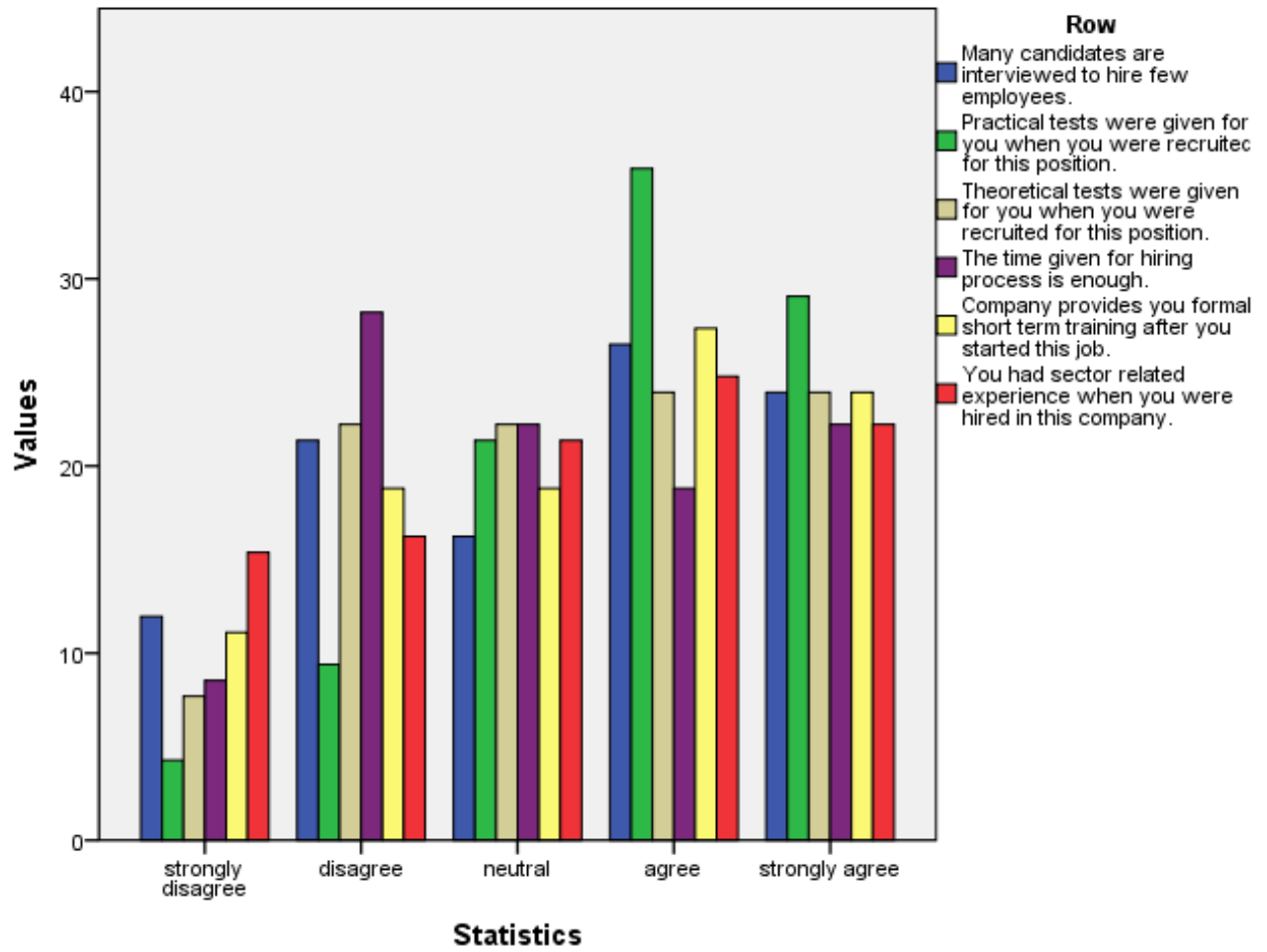


Figure 10: Human resource sophistication proportion of respondents in percentages

Table 13: Quality workforce proportion of respondents in percentages

No	Question	strongly disagree	disagree	neutral	agree	strongly agree
1	Your education or schooling helps you to be productive.	24.8%	20.5%	12.8%	21.4%	20.5%
2	The company gives you long term training opportunity.	6.0%	15.4%	26.5%	24.8%	27.4%
3	You are interested to continue in this job as your career.	14.5%	27.4%	23.1%	14.5%	20.5%
4	Workers selection and staffing policies is regularly evaluated for improvement.	3.4%	6.8%	48.7%	26.5%	14.5%
5	The company gives you short term training opportunity.	12.8%	16.2%	16.2%	23.1%	31.6%

For more elaboration, the data presented in the above table could be shown as in the following table.

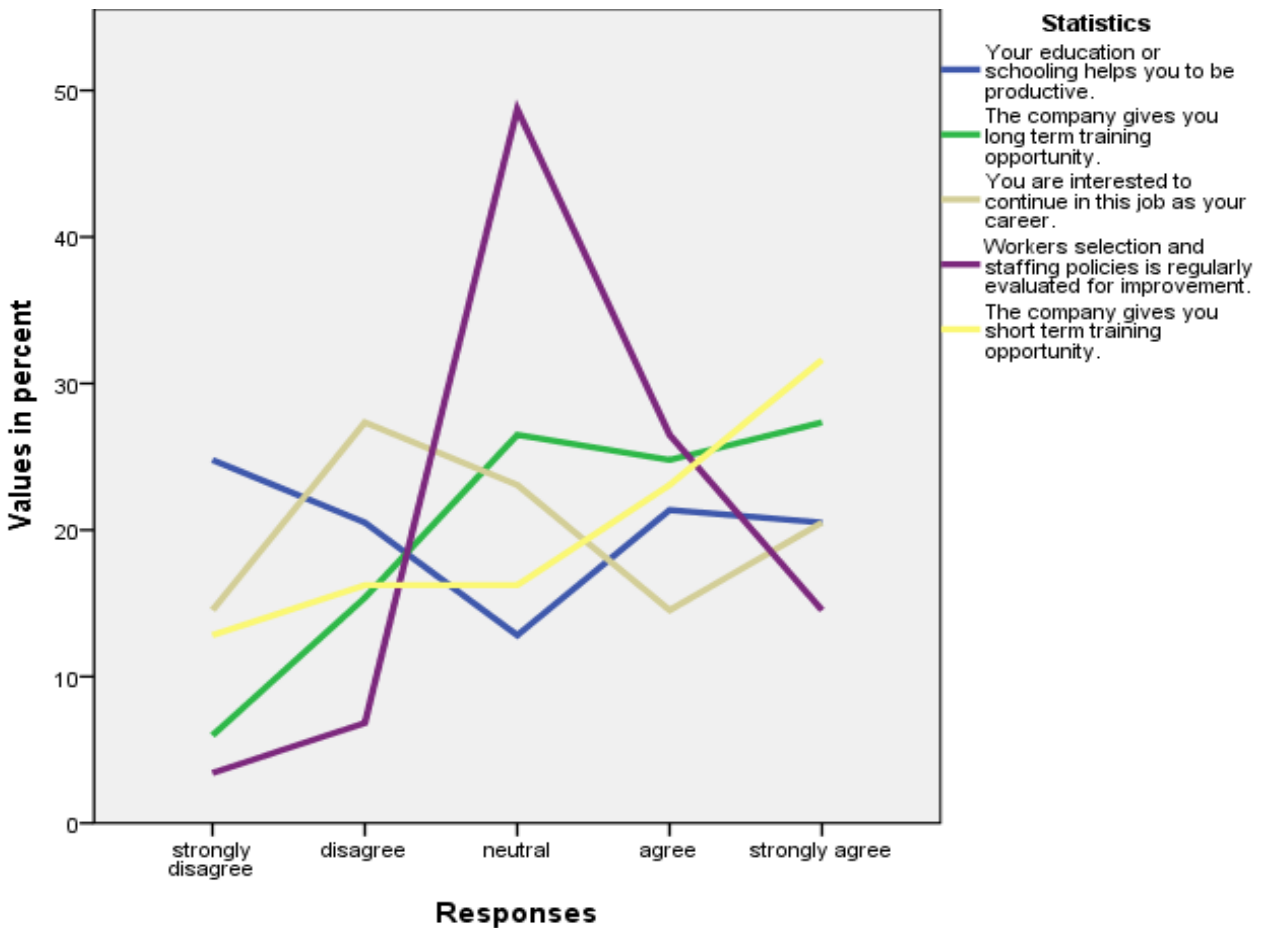


Figure 11: Quality workforce proportion of respondents in percentages

Table 14: Management and scheduling number of respondents in percentages

No	Question	strongly disagree	disagree	neutral	agree	strongly agree
1	You sometimes wait for materials in process until it reaches you.	13.7%	25.6%	12.0%	30.8%	17.9%
2	Other than your supervisor you sometimes get direct job order from others.	5.1%	17.1%	12.8%	41.9%	23.1%
3	You get timely information from your supervisor.	17.9%	31.6%	15.4%	18.8%	16.2%
4	When you make fault of operating, your supervisor heartens and allows you to feel comfortable.	9.4%	19.7%	19.7%	23.9%	27.4%
5	Your work usually stops because of maintenance work.	11.1%	22.2%	20.5%	25.6%	20.5%
6	When you get difficulty in your work you ask your colleagues.	12.0%	35.9%	16.2%	17.1%	18.8%
7	Raw materials are always timely supplied to the factory's shop floor.	5.1%	18.8%	22.2%	29.9%	23.9%
8	Operators sometimes get direct job order from top management.	17.9%	31.6%	15.4%	19.7%	15.4%

Table 15: Labor turnover proportion of respondents in percentages

No	Question	strongly disagree	disagree	neutral	agree	strongly agree
1	There is effective communication among operators on facilities in the organization and job expectations.	11.1%	27.4%	20.5%	29.1%	12.0%
2	There is effective communication between operators and their supervisors on facilities in the organization.	16.2%	33.3%	16.2%	19.7%	14.5%
3	Workers leave your company on their own interest.	7.7%	21.4%	31.6%	19.7%	19.7%
4	Your company amends itself regularly in order to minimize workers layoff.	5.1%	9.4%	22.2%	18.8%	44.4%
5	The company corrects/amends itself regularly in order to minimize workers layoff.	0.0%	4.3%	77.8%	10.3%	7.7%

Table 16: Other production inputs proportion of respondents in percentages

No	Question	strongly disagree	disagree	neutral	agree	strongly agree
1	Electric interruption has frequently caused significant impact on your work.	9.4%	16.2%	14.5%	29.9%	29.9%
2	You have not faced materials shortage on work.	10.3%	23.9%	12.0%	21.4%	32.5%
3	The company production per day depends on availability of market order.	0.9%	7.7%	59.8%	13.7%	17.9%
4	Lack of working capital has affected your company production.	0.0%	5.1%	63.2%	12.8%	18.8%
5	Lack of hard currency has affected your company production.	0.9%	6.0%	68.4%	11.1%	13.7%

5.3.2 Empirical Data: Reliability Testing

Prior to testing the research questions, the survey measures used examined for the reliability and validity. In view of the characteristics of the instrument used in this study, the inter-item reliability consistency (alpha) and mean were used to measure its reliability. Construct validity is determined by how well certain constructs explain the variance of responses to a set of survey items (Page & Meyer, 2000). Ideally, the Cronbach alpha coefficient of a scale should be above 0.7.

Cronbach alpha values are, however, quite sensitive to the number of items in the scale. With short scales (e.g. scales with fewer than ten items) it is common to find quite low Cronbach values (e.g. 0.5). In this case, it may be more appropriate to report the mean inter-item correlation for the items. Briggs and Cheek (1986) recommend an optimal range for the inter-item correlation of 0.2 to 0.4.

Table 17: Reliability statistics of overall and components of the survey

Performance measures	Code	Reliability Statistics		
		Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Reliability of the overall survey		.926	.931	29
Human resource sophistications	HR	.826	.830	6
Quality of workforce	QWF	.738	.741	5

Performance measures	Code	Reliability Statistics		
		Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Management and scheduling	MS	.777	.774	8
Lowering Labor turnover	LT	.751	.778	5
Other production inputs	OI	.653	.728	5

Some studies stated that 0.70 Cronbach's Alpha value is a “commonly used threshold for acceptable reliability” (Syum, 2010 and Changiz & Azadeh, 2011), and thus, it was considered acceptable as indicated in the above table except the last component (other production inputs).

The last performance measure namely other production inputs has a Cronbach's Alpha value of 0.653 which is less than 0.7. This is due to the Cronbach's Alpha nature being sensitive to the fewer number of items in the component. In this case the mean Inter-Item Correlations for the items is observed which should lies between 0.3 and 0.4. Here the value is 0.348 which is between 0.3 and 0.4 showing reliability of the case.

5.3.3 Correlation Analysis

Bivariate correlation

Correlations measure how the variables are related to each other using SPSS software tool has three types of menus for the correlation analysis, namely bivariate, partial Correlations, and distances correlations.

Bivariate Correlations measure how variables in each perspective are related before calculating correlation coefficient. The bivariate Correlations procedure computes the pair wise associations for a set of variables and displays the results in a matrix. It is useful for determining the strength and direction of the association between two scale or ordinal variables. The Partial Correlations procedure computes partial correlation coefficients that describe the linear relationship between two variables while controlling for the effects of one or more additional variables. On the other hand, distances procedure calculates any of a wide variety of statistics measuring either similarities or dissimilarities (distances), either between pairs of variables or between pairs of cases. These similarity or distance measures can then be used with other procedures, such as factor analysis, cluster analysis, or multidimensional scaling, to help analyze complex datasets.

For this analysis the study uses bivariate correlations procedure because the available information is expressed by weight (Likert scale) so that all the scores which have been collected from the respondents have been fed in to SPSS data entry module.

In the SPSS data entry module the analysis is shown as Pearson Correlation (r) and significance (p) value of the two variables. The correlation coefficient r is calculated as:

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}}$$

Therefore, it is vital to remind the properties and interpretation of r value (or Pearson Correlation), based on (Devore & Farnum, 1999).

- The variables of Pearson Correlation (r) does not depend on the unit of measurement for either variables, which the correlation coefficient measures the inherent strength of relationships between two variables.
- The value of Pearson Correlation (r) is between -1 and +1. A value near the upper limit, +1, is indicative of a substantial positive relationship, whereas an r close to the lower limit -1, suggests a prominent negative relationship.
- r=1 only when all the points is in a scatter plot of the data lie exactly on a straight line that slopes upward, and -1 the reverse.

The effect size measure varies between 0 (no relationship) and 1 (perfect positive relationship). Therefore, the closer to 1 it is the stronger the relationship is. As a general rule of thumb, the following cut-off points are sometimes proposed: ($r < 0.1 = weak$, $r < 0.3 = modest$, $r < 0.5 = moderate$, $r < 0.8 = strong$, $r \geq 0.8 = very strong$). Based on these cut off points, all the matrix variables groups that were listed in the study were analyzed and interpreted as in the following cases. The variable groups were obtained from the respondents in the form of Likert scale.

Correlation does not mean causation (Heron, 2009). If we observe high correlation between two variables, this does not necessarily imply that one variable has a high value because of the other variable. But rather there may be a third variable causing a simultaneous change in both variables.

5.3.3.1 Analysis of human resource sophistication metrics

Human resource sophistication (HR) is one of the groups of the labor productivity improvement factors which assess the initial stage of the labor applicants though which they have passed when they joined the company (Koch, 1996). This indicates the track of human resources of the company in searching, selecting, recruiting and orienting the right employee for its vacant positions. This metrics indicates how well the company has investigated for appropriate candidates in finding best employees. Pearson Correlation SPSS output for this group was indicated as in the table below.

Table 18: Bivariate Correlation among Human resource sophistication variables

		HR1	HR2	HR3	HR4	HR5	HR6
HR1	Pearson Correlation	1	.587**	.624**	.459**	.322**	.548**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
HR2	Pearson Correlation	.587**	1	.653**	.518**	.462**	.320**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
HR3	Pearson Correlation	.624**	.653**	1	.427**	.379**	.400**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
HR4	Pearson Correlation	.459**	.518**	.427**	1	.400**	.399**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
HR5	Pearson Correlation	.322**	.462**	.379**	.400**	1	.237**
	Sig. (2-tailed)	.000	.000	.000	.000		.010
HR6	Pearson Correlation	.548**	.320**	.400**	.399**	.237**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.010	

** . Correlation is significant at the 0.01 level (2-tailed).

As it was observed from the above table, all the variables have positive relationship and the magnitudes of these relationships vary from 0.237 to 0.653. These Pearson correlation coefficient values shown on SPSS output table indicate modest to strong relationship (Devore & Farnum, 1999). On the other hand, the significance level (P-value), the probability of obtaining results as extreme as the one observed, is very small ($P < 0.05$) which is significant and the two variables are linearly related. The researcher can be 95% confident that the relationship between the variables was not by chance.

The data also infers that the relationship between variable HR5 (= Company provides for the worker a formal short term training after he/she started the job) and variable HR6 (= Experience is considered when the worker was hired in the company) was 0.237 which is modest and positive. This indicates the variables have unforceful impact on each other. This was meant that a company, while providing any training to the worker, seldom considers the background of the worker including its past work experiences. If companies provide on job or off job trainings for workers in spite of their past experience, it may lead to redundant training that clues to indifferent production capacity per unit of time.

Moreover the variables HR2 (= Practical tests were given for you when you were recruited for this position) and HR3 (= Theoretical tests were given for you when you were recruited for this position) have strong and positive relationship with Pearson correlation value of 0.653. This shows that footwear companies mostly consider both theoretical and practical tests in the same manner during candidates screening time. This means the companies either consider both theoretical and practical tests or ignore both cases as criteria for candidates screening.

In the other variables of human resource sophistications the relationship falls in between the two apexes described above. Moreover in cases where the significance levels were large ($P > 0.05$), the

correlation was insignificant i.e. the two variables were not linearly related (Devore & Farnum, 1999).

5.3.3.2 Analysis of quality workforce metrics

Quality workforce, one of labor productivity determinant factor, evaluates the way workers are treated in companies from the point of upgradation of their skills and knowledge during their work. This factor strongly believes that the continual assessment of workers and upgrading of their skills and knowledge though short term and long term trainings is substantial for LP improvement. In order to assess this metrics, five questions or variables were set based on literatures.

Table 19: Description of QWF variables

Metrics	Code	Statement	Indication
Quality of work force	WF1	Your education or schooling helps you to be productive	Education helps to be productive because the worker <ul style="list-style-type: none"> • Performs a wider range of activities • Takes less time and • Tends to perform each activity more accurately (Ellery, et al., 2013).
	WF2	The company gives you long term training opportunity	Company thinks for workers long term endeavor
	WF3	You are interested to continue in this job as your career	Workers work because they favor the company over others
	WF4	Workers selection and staffing policies is regularly evaluated for improvement	There is a timely policy improvement
	WF5	The company gives you short term training opportunity	Workers get short term training

All the above questions were distributed to the designated respondents. The respondents filled the questionnaire which were collected and analyzed as in the following.

Table 20: Bivariate Correlation among quality workforce variables

		WF1	WF2	WF3	WF4	WF5
WF1	Pearson Correlation	1	.231*	.416**	.335**	.343**
	Sig. (2-tailed)		.012	.000	.000	.000
WF2	Pearson Correlation	.231*	1	.448**	.313**	.432**
	Sig. (2-tailed)	.012		.000	.001	.000
WF3	Pearson Correlation	.416**	.448**	1	.395**	.521**
	Sig. (2-tailed)	.000	.000		.000	.000
WF4	Pearson Correlation	.335**	.313**	.395**	1	.209*
	Sig. (2-tailed)	.000	.001	.000		.023
WF5	Pearson Correlation	.343**	.432**	.521**	.209*	1

	Sig. (2-tailed)	.000	.000	.000	.023	
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

The above table has clearly shown that the relationships among all the variables are positive with the Pearson correlation of values varying from 0.209 (smallest) to 0.448 (largest). The value 0.209 in the above table indicates the modest but positive relationship between the variables WF4 and WF5 whereas the larger positive value of .448 indicates moderate and positive relationship between the variables WF2 and WF3.

There were modest relationship between WF4 (=Workers selection and staffing policies is regularly evaluated for improvement) and WF5 (=you got relevant training before starting your current task). As part of their policies, the companies gave less attention to the issue of providing relevant training for their workers.

On the other hand, there were moderate relationship between WF2 (=the company gives you long term training opportunity) and WF3 (=you are interested to continue in this job as your career). This shows that the degree of the companies' level to provide long term training for their employees has a moderate relation with the workers interest to continue in their current profession.

The Pearson correlation was significant at 0.01 and 0.05 level. This indicated that each of any two variables in the above table was linearly related at a significant level. Therefore, it could be said that investigator can be 95% confident that the relationship between any two variables was not by chance.

5.3.3.3 Analysis of management and scheduling metrics

The third measurement element namely management and scheduling covers the role of management and the way of its scheduling for production activities input materials for labor productivity enhancement. Eight variables were identified as pillars for this factor whereas their relationships were indicated as in the following table.

Table 21: Bivariate Correlation among management and scheduling variables

		MS1	MS2	MS3	MS4	MS5	MS6	MS7	MS8
MS1	Pearson Correlation	1	.220*	.283**	.060	.383**	.368**	.471**	.272**
	Sig. (2-tailed)		.017	.002	.517	.000	.000	.000	.003
MS2	Pearson Correlation	.220*	1	.209*	.092	.386**	.181	.145	.197*
	Sig. (2-tailed)	.017		.024	.325	.000	.051	.119	.033
MS3	Pearson Correlation	.283**	.209*	1	.484**	.320**	.318**	.277**	.988**
	Sig. (2-tailed)	.002	.024		.000	.000	.000	.003	.000
MS4	Pearson Correlation	.060	.092	.484**	1	.112	.246**	.224*	.475**
	Sig. (2-tailed)	.517	.325	.000		.229	.008	.015	.000

MS5	Pearson Correlation	.383**	.386**	.320**	.112	1	.314**	.295**	.309**
	Sig. (2-tailed)	.000	.000	.000	.229		.001	.001	.001
MS6	Pearson Correlation	.368**	.181	.318**	.246**	.314**	1	.184*	.306**
	Sig. (2-tailed)	.000	.051	.000	.008	.001		.047	.001
MS7	Pearson Correlation	.471**	.145	.277**	.224*	.295**	.184*	1	.265**
	Sig. (2-tailed)	.000	.119	.003	.015	.001	.047		.004
MS8	Pearson Correlation	.272**	.197*	.988**	.475**	.309**	.306**	.265**	1
	Sig. (2-tailed)	.003	.033	.000	.000	.001	.001	.004	
*. Correlation is significant at the 0.05 level (2-tailed).									
**. Correlation is significant at the 0.01 level (2-tailed).									

As clearly shown in the above table all variables have positive relation with each other and have a significance level of 0.01 and 0.05. The codes represent the following statements.

Code Statement

- MS1 - You sometimes wait for materials in process until it reaches you.
- MS2 - Other than your supervisor you sometimes get direct job order from others.
- MS3 - You get timely information from your supervisor.
- MS4 - When you make fault of operating, your supervisor heartens and allows you to feel comfortable
- MS5 - Your work usually stops because of maintenance work.
- MS6 - When you get difficulty in your work you ask your colleagues.
- MS7 - Raw materials are always timely supplied to the factory's shop floor.
- MS8 - Operators sometimes get direct job order from top management.

The highest Pearson correlation value 0.988 was observed between MS3 and MS8. These two variables were correlated very strongly. This showed that either one of the variables might be the causal for the other or both variables were caused by the some other variable. In other words, for a worker, getting timely information from supervisor and getting direct job order from top management might not be a consequence, but both variables might be caused by the some other unknown variable. While a new model development (in later section) would be required, deploying each of these variables separately or using the average of the two variables would lead to the same analysis. For instance, MS3 and MS8 were merged to give MS38 in the MS model development (see the annex)

On the other hand, the lowest Pearson correlation value 0.060 was found between MS1 and MS4. Accordingly, those two variables had poor relationship with each other. As a result both variables have indispensable and in substitutable contribution to this group. Each should remain in the set for the wholeness of work.

The Pearson correlation was significant at 0.01 and 0.05 level. This indicated that each of any two variables in the above table was linearly related at a significant level. Therefore, it could be said that researcher can be 95% confident that the relationship between any two variables was not by chance.

5.3.3.4 Analysis of lowering labor turnover metrics

The effects of high turnover include lost productivity, lost sales, management’s time, less customer satisfaction and less profitability of organizations if not managed properly. High number of labor turnover leaks not only high skill and knowledge from the former company but also it exposes this company to high hiring costs. The loss of skill and knowledge leads to lesser LP. This was why labor turnover was used as a factor for LP improvement. Labor turnover variables and their relationships were indicated as in the following table.

Table 22: Bivariate Correlation among labor turnover variables

		LT1	LT2	LT3	LT4	LT5
LT1	Pearson Correlation	1	.510**	.413**	.365**	.551**
	Sig. (2-tailed)		.000	.000	.000	.000
LT2	Pearson Correlation	.510**	1	.282**	.275**	.501**
	Sig. (2-tailed)	.000		.002	.003	.000
LT3	Pearson Correlation	.413**	.282**	1	.419**	.482**
	Sig. (2-tailed)	.000	.002		.000	.000
LT4	Pearson Correlation	.365**	.275**	.419**	1	.329**
	Sig. (2-tailed)	.000	.003	.000		.000
LT5	Pearson Correlation	.551**	.501**	.482**	.329**	1
	Sig. (2-tailed)	.000	.000	.000	.000	

** . Correlation is significant at the 0.01 level (2-tailed).

As clearly shown in the above table the relationship among the variables is significant at the level of 0.01. Moreover all the variables have positive values of relationship that indicates positive relationships.

Table 23: Components of lowering labor turnover and their indication

Metrics	Code	Statement	Indication
Lowering labor turnover	LT1	Your company evaluates itself regularly in order to minimize workers layoff.	Level of company assessment on its workers situations such as on <ul style="list-style-type: none"> • Job satisfaction • Inter role conflict (Greenhaus & Beutell, 1985) • Salary and motivation • Job embeddedness: links, fit, and sacrifice (Mitchell et al., 2001).
	LT2	There is effective communication between operators and their supervisors on facilities in the organization.	Goodness of worker-to-leader interaction <ul style="list-style-type: none"> • Availability of free communication • Whether the worker gets help from leader without any criticism

Metrics	Code	Statement	Indication
	LT3	Workers leave your company on their own interest.	Voluntary turnover is area of interest for the company
	LT4	There is effective communication among operators on facilities in the organization and job expectations.	Goodness of worker-to-worker interaction
	LT5	The company corrects/amends itself regularly in order to minimize workers layoff.	Extent of action taken by company after getting necessary information, and shows <ul style="list-style-type: none">• Organizational commitment (Mitchell et al., 2001)

LT1 (company evaluates itself regularly) above indicates Level of company assessment on its workers situations such as job satisfaction, personal issues like inter role conflict (Greenhaus & Beutell, 1985), salary and motivation, and job embeddedness: links, fit, and sacrifice (Mitchell et al., 2001). A company that tries to look itself by regular self-evaluation would also likely amend itself (LT5) using evaluation reports. Extent of self-correction by a company after getting necessary information via self-evaluation (LT5) shows an organizational commitment (Mitchell et al., 2001). This is why, based on multiple research studies, it has been suggested that organizational commitment is a strong predictor of turnover intentions (Gabrielson, 2012; Elangovan, 2001; Griffeth, et al., 2000; Mathieu & Zajac, 1990). The Pearson correlation value of 0.551 (strong and highest relationship value) was observed between these variables (LT1 and LT5).

Moreover as seen from the above table the lowest Pearson correlation value of 0.275 (modest) also exists between the variables LT2 and LT4. LT2 (Goodness of worker-to-leader interaction) indicates the availability of free communication and whether the worker gets help from leader without any criticism. On the other hand LT4 (Goodness of worker-to-worker interaction) indicates a communication regarding the cooperativeness on their work, and discussion on their day to day personal activities. Goodness of worker-to-worker interaction helps workers to deal on their personal and work related issues which solves problems, gives relief, create good working environment and help motivate the workers. The weak relationship between variables LT2 and LT4 indicates that the vertical communication (between worker and leader) and horizontal communication (among workers) have less impact on one another.

From the tables one can interpret those companies with regular self-evaluation schemes use this as inputs to amend their problems. Self-evaluation helps organizations to observe and focus on their problems, initiates them for amending their problems related to labor, and as a result labor turnover can be managed at minimal level. On the other hand vertical communication and horizontal communication do not have a strong relation that indicates that the effectiveness of one type of communication does not guarantee the effectiveness of the other. So, both types of communication should be worked on for labor turnover optimization.

5.3.3.5 Analysis of other production inputs metrics

In addition to labor resource, production inputs used include capital, materials, land, facility, tool and equipment, energy and information are all referred to as other production inputs. The availability and proper supply of these inputs to the production area as and when required affects labor performance directly or indirectly. The same skill and knowledge of labor that are available in two different companies have different productivity level due to the level of provision and management of other production inputs. Accordingly, five most important variables were set under this factor for respondents' and their response analysis have been put as in the following way.

Table 24: Bivariate Correlation among other production inputs variables

		OI1	OI2	OI3	OI4	OI5
OI1	Pearson Correlation	1	-.031	.393**	.312**	.411**
	Sig. (2-tailed)		.737	.000	.001	.000
OI2	Pearson Correlation	-.031	1	.164	.176	.284**
	Sig. (2-tailed)	.737		.077	.057	.002
OI3	Pearson Correlation	.393**	.164	1	.690**	.594**
	Sig. (2-tailed)	.000	.077		.000	.000
OI4	Pearson Correlation	.312**	.176	.690**	1	.491**
	Sig. (2-tailed)	.001	.057	.000		.000
OI5	Pearson Correlation	.411**	.284**	.594**	.491**	1
	Sig. (2-tailed)	.000	.002	.000	.000	
**. Correlation is significant at the 0.01 level (2-tailed).						

As clearly shown in the above table, there were negative and positive Pearson correlation values indicating that the variables had either negative or positive relationships. OI3 and OI4 have strong positive relationships (0.690). OI3 (The company production per day depends on availability of market order) and OI4 (Lack of working capital has affected your company production) had strong relations. Market order could be maximized when the company owns more working capital. On the other hand, OI1 and OI2 were the two variables having weak and negative relationships (-0.031). This indicates that electric interruption and material shortage on production floor had weak relationship i.e. the absence of one variable did have less influence on the other. Correlations between the variables were significant at 0.01.

5.3.4 Regression Equation Analysis

Regression equation is important to associate the independent variables one in terms of the others. Using these regression equations the new model for LP improvement would be easily developed, which was shown in the later section.

Multiple regression analysis

Correlation is assessing the association between quantitative variables whereas simple linear regression is description and prediction of one quantitative variable from another. In $Y = f(X)$,

- Y = predicted variable = dependent variable = response variable = outcome variable
- X = predictor variable = independent variable = carrier variable = input variable

Simple linear regression is used when there is only one predictor variable whereas multiple or multivariate regression is used when there is more than one predictor variable.

In standard multiple regression, all the independent (or predictor) variables are entered into the model simultaneously. Each independent variable is evaluated in terms of its predictive power, over and above that offered by all the other independent variables. This is the most commonly used multiple regression analysis (Pallant, 2016). This approach is used when a set of variables are available and the researcher wanted to know how much variance in a dependent variable were able to be explained as a group or block. This approach would also tell you how much unique variance in the dependent variable each of the independent variables explained (Pallant, 2016).

Since bivariate correlation demonstrations only strength of relations whether strong or weak, in order to show quantitatively how much is the effect of one variable over other variable, regression analysis is required. Therefore, by using a regression analysis additional analysis has been conducted to show better inferences.

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + e$$

Where y = dependent variable or the variable to be predicted

x_i = the independent or predictor variables

a = raw score equation that includes a constant or Y intercept or Y axis representing the value of Y when $X = 0$.

b_i = b weights; or partial regression coefficients. Any b shows the relative contribution of the independent variable on the dependent variable when controlling for the effects of the other predictors.

e = error term

Accordingly, the variables in each of the subgroups of the labor productivity improvement were equated and shown their relationships as detailed under.

5.3.4.1 Human resource sophistication perspective

The questionnaire distributed to respondents that were aimed to indicate level of the human resource sophistication competence in the company were equated together where each one acts as a predicted variable and the others being the predictor variables. The result of each matrix was shown in the following table.

Table 25: Results of the regression analysis among human resource sophistication measures

Eqn.	Regression Equation	R ²
Eqn. 1	HR1= -0.185 + 0.313HR2+ 0.325HR3+ 0.081HR4-0.018HR5+ 0.315HR6	0.544
Eqn. 2	HR2= 1.183 + 0.202HR1+ 0.328HR3+ 0.177HR4+ 0.148HR5-0.075HR6	0.554
Eqn. 3	HR3= 0.123 + 0.298HR1+ 0.467HR2+ 0.015HR4+ 0.063HR5+ 0.070HR6	0.524
Eqn. 4	HR4= 0.291 + 0.104HR1+0.351HR2+ 0.021HR3+ 0.169HR5+ 0.184HR6	0.360
Eqn. 5	HR5= 0.968-0.028HR1+0.356HR2+ 0.107HR3+0.205HR4+ 0.036HR6	0.256
Eqn. 6	HR6= 1.171+ 0.465HR1-0.171HR2+ 0.112HR3+ 0.213HR4+ 0.034HR5	0.338

As it was clearly shown in the above table, the maximum R squared value was investigated in equation 2 with value of R squared equals 0.554 or 55.4%. This maximum R squared was selected because it indicates how much of the variance in the dependent variable could be expressed by the model. The greater the value of R squared the better the degree of expression of the dependent variable by the independent variables. The variables in this case were HR1, HR2, HR3, HR4, HR5 and HR6 from which HR2 is dependent variable where the others are independent variables. The equation was described as

$$HR2 = 1.183 + 0.202HR1 + 0.328HR3 + 0.177HR4 + 0.148HR5 - 0.075HR6.$$

The b values (correlation coefficients) are 0.202, 0.328, 0.177, 0.148 and -0.075 which indicate the degree of the variables contribution to HR2 (the dependent variable). The positive and negative signs indicate positive and negative relationships with HR2 respectively. The larger the value of b, in spite of its sign, the more it contributes to the dependent variable.

Moreover when each of the independent variable increase by one unit and assuming the rest of independent variables fixed, the dependent variable increases/decreases by the following amount:

- When HR1 (Many candidates are interviewed to hire few employees) gets increased by one unit, HR2 increases by 0.202units.
- When HR3 (Theoretical tests were given for you when you were recruited for this position) gets increased by one unit, HR2 increases by 0.328.
- When HR4 (The time given for hiring process is enough) gets increased by one unit, HR2 increases by 0.177.
- When HR5 (You got relevant training before starting your current task) gets increased by one unit, HR2 increases by 0.148.
- When HR6 (You had sector related experience when you were hired in this company) gets increased by one unit, HR2 increases by 0.075.

From this analysis it could be observed that the providing theoretical tests for candidates had positive and higher contribution to providing practical tests for the candidates. On the other hand, the experience of the candidate had negative and least contribution to the practical tests provided for the candidates indicating that consideration of candidate experience could be left out theoretically.

5.3.4.2 Quality of workforce perspective

Regression analysis results for quality workforce were as indicated for all the variables.

Table 26: Results of the regression analysis among quality of workforce measures

Eqn.	Regression Equation	R ²
Eqn. 1	$QWF1 = 0.419 - 0.029QWF2 + 0.279QWF3 + 0.328QWF4 + 0.190QWF5$	0.230
Eqn. 2	$QWF2 = 1.363 - 0.018QWF1 + 0.223QWF3 + 0.212QWF4 + 0.238QWF5$	0.277
Eqn. 3	$QWF3 = -0.367 + 0.172QWF1 + 0.223QWF2 + 0.289QWF4 + 0.314QWF5$	0.418
Eqn. 4	$QWF4 = 2.172 + 0.131QWF1 + 0.138QWF2 + 0.187QWF3 - 0.053QWF5$	0.216
Eqn. 5	$QWF5 = 1.184 + 0.144QWF1 + 0.292QWF2 + 0.386QWF3 - 0.101QWF4$	0.340

As it was easily observed in the above table, equation 3 has the highest R squared value. Equation 3 was $QWF3 = -0.367 + 0.172QWF1 + 0.223QWF2 + 0.289QWF4 + 0.314QWF5$.

From this equation it could be observed that the following relationships exist between the dependent and the independent variables. When each of the independent variable increase by one unit and assuming the rest of independent variables fixed, the dependent variable increases/decreases by the following amount:

- When QWF1 (Your education or schooling helps you to be productive) gets increased by one unit, QWF3 increases by 0.172.
- When QWF2 (to get long term training opportunity) gets increased by one unit, QWF3 increases by 0.223.
- When QWF4 (Workers selection and staffing policies is regularly evaluated for improvement) gets increased by one unit, QWF3 increases by 0.289.
- When QWF5 (getting short term training opportunity) gets increased by one unit, QWF3 increases by 0.314.

From the above analysis it could be interpreted that getting short term opportunity (QWF5) had highest positive contribution with the increase in the worker’s continual of the current job as his career (QWF3). It was also observed from table labelled ANOVA in SPSS regression analysis that this independent variable (QWF5) made a significant unique contribution to the dependent variable (QWF3) at sig. =0.000 (that really implies at $p < 0.0005$, and >99% confidence level).

On the other hand it could also be observed that there was a weak relation between QWF1 and QWF3 i.e. whether the worker’s schooling helped him to be productive or not, this might not guarantee him to stay in the job as his career. Therefore at confidence level of 99% as indicated in table labelled ANOVA, QWF1 could be omitted theoretically.

5.3.4.3 Management and scheduling perspective

In this perspective there were eight variables and using each variable as dependent variable eight regression equations were formulated. The variables were MS1, MS2 ... and MS8.

Table 27: Results of the regression analysis among management and scheduling measures

Eqn.	Regression Equation	R ²
Eqn. 1	MS1=0.428+ 0.059MS2+ 0.198MS3-0.168MS4+ 0.161MS5+ 0.246MS6+ 0.426MS7- 0.079MS8	0.362
Eqn. 2	MS2=2.254+ 0.058MS1+ 0.280MS3+ 0.009MS4+ 0.293MS5+ 0.024MS6- 0.013MS7- 0.221MS8	0.163
Eqn. 3	MS3= -0.127+ 0.007MS1+ 0.010MS2+ 0.018MS4+ 0.008MS5+ 0.010MS6+ 0.008MS7+ 0.977MS8	0.978
Eqn. 4	MS4= 1.767- 0.182MS1+ 0.010MS2+0.541MS3-0.069MS5+ 0.155MS6+ 0.193MS7-0.096MS8	0.282
Eqn. 5	MS5= 0.503 + 0.166MS1+ 0.309MS2+ 0.226MS3- 0.065MS4+ 0.139MS6+ 0.127MS7- 0.065MS8	0.297
Eqn. 6	MS6= 0.831+ 0.289MS1+ 0.029MS2+0.318MS3+ 0.167MS4+ 0.158MS5- 0.085MS7- 0.205MS8	0.228
Eqn. 7	MS7= 1.515 + 0.376MS1- 0.012MS2+ 0.198MS3+ 0.157MS4+ 0.108MS5- 0.064MS6- 0.150MS8	0.278
Eqn. 8	MS8= 0.120- 0.003MS1- 0.008MS2+ 0.989MS3- 0.003MS4- 0.002MS5- 0.006MS6- 0.006MS7	0.977

As clearly shown in the above table in order to get an optimal equation the greatest R squared value of 0.978 or 97.8% was selected. The equation was

MS3= -0.127+ 0.007MS1+ 0.010MS2+ 0.018MS4+ 0.008MS5+ 0.010MS6+ 0.008MS7+ 0.977MS8. This equation shows that when each of the independent variable increases by one unit and assuming the rest of independent variables fixed, the dependent variable MS3 increases/decreases by the following amount:

- When MS1 (You do not wait for materials in process) gets increased by one unit, MS3 increases by 0.007units
- When MS2 (You get job order only from your supervisor) gets increased by one unit, MS3 increases by 0.010units
- When MS4 (When you make fault of operating, your supervisor heartens and allows you to feel comfortable) gets increased by one unit, MS3 increases by 0.018units
- When MS5 (Your work does not stop because of maintenance work) gets increased by one unit, MS3 increases by 0.008units
- When MS6 (When you get difficulty in your work you ask your colleagues) gets increased by one unit, MS3 increases by 0.010units
- When MS7 (Raw materials are always timely supplied to the factory’s shop floor) gets increased by one unit, MS3 increases by 0.008units
- When MS8 (Operators do not get direct job order from top management) gets increased by one unit, MS3 increases by 0.977units

The largest contributing independent variable was MS8 with the coefficient of 0.977 whereas the smallest contributing variable was MS1 with coefficient value of 0.007. This clearly indicated that getting timely information from immediate boss has strong and positive correlation with workers job order from top management. This shows that if supervisors keep informed about their workers, they will hinder the side job order from workers that otherwise come from top management people. On the other hand, getting timely information from immediate boss has weak relationship with smooth flow of materials on production floor. Therefore at sig. =0.000 which really implies $p < 0.0005$ as indicated in table labelled ANOVA, MS1 could be omitted theoretically.

5.3.4.4 Lowering labor turnover perspective

In labor turnover perspective five variables LT1, LT2 ...and LT5 were formulated together to get an optimal equation. All the equations obtained from regression analysis were as in the table below.

Table 28: Results of the regression analysis among labor turnover measures

Eqn.	Regression Equation	R ²
Eqn. 1	$LT1 = -0.501 + 0.265LT2 + 0.134LT3 + 0.132LT4 + 0.574LT5$	0.414
Eqn. 2	$LT2 = -0.493 + 0.351LT1 - 0.035LT3 + 0.070LT4 + 0.652LT5$	0.333
Eqn. 3	$LT3 = -0.154 + 0.152LT1 - 0.030LT2 + 0.261LT4 + 0.618LT5$	0.323
Eqn. 4	$LT4 = 1.864 + 0.174LT1 + 0.070LT2 + 0.305LT3 + 0.095LT5$	0.227
Eqn. 5	$LT5 = 1.850 + 0.151LT1 + 0.130LT2 + 0.144LT3 + 0.019LT4$	0.436

As clearly indicated the optimal equation is equation 5 with highest R squared value of 0.436 or 43.6%. This equation had the strength to express the dependent variable by 43.6% while the left being expressed by opinions or assumptions by the researcher. The equation 5 is

$$LT5 = 1.850 + 0.151LT1 + 0.130LT2 + 0.144LT3 + 0.019LT4$$

The formulated equation indicates that when each of the independent variable increases by one unit and assuming the rest of independent variables fixed, the dependent variable LT5 (regular self-amendment of the company in order to minimize workers layoff) increases/decreases by the following amount:

- When LT1 (Your Company evaluates itself regularly in order to minimize workers layoff) gets increased by one unit, LT5 increases by 0.151units.
- When LT2 (There is effective communication between operators and their supervisors on facilities in the organization) gets increased by one unit, LT5 increases by 0.130units.
- When LT3 (Workers leave your company on their own interest) gets increased by one unit, LT5 increases by 0.144units.
- When LT4 (There is effective communication among operators on facilities in the organization and job expectations) gets increased by one unit, LT5 increases by 0.019units.

From this it was observed that the coefficients of all the independent variables had almost the same contributions with the dependent variable. LT1 had relatively high degree of contribution towards LT5 than other variables. This showed that there was good relationship between the two variables namely regular self-amendment of the company in order to minimize workers layoff and self-evaluation. This showed that company evaluates itself in order to amend itself. Moreover the coefficient of LT4 which was 0.019 showed that it had weak relationship with the dependent variable LT5. This showed that there was weak relationship between effective communication among the operators and the regular self-amendment of the company to minimize workers layoff. Moreover it would be interpreted that LT1 could be omitted theoretically from the equation as table labelled ANOVA at values of sig. = 0.000, $p < 0.0005$ and confidence level of 99%.

5.3.4.5 Other production inputs perspective

Table 29: Results of the regression analysis among other production inputs measures

Eqn.	Regression Equation	R ²
Eqn. 1	OI1 = 1.119 - 0.151OI2 + 0.292OI3 + 0.076OI4 + 0.510OI5	0.228
Eqn. 2	OI2 = 1.842 - 0.199OI1 - 0.024OI3 + 0.139OI4 + 0.570OI5	0.333
Eqn. 3	OI3 = 0.201 + 0.075OI1 - 0.005OI2 + 0.536OI4 + 0.333OI5	0.572

Eqn.	Regression Equation	R ²
Eqn. 4	OI4= 0.955+ 0.021OI1+ 0.029OI2+ 0.578OI3+ 0.108OI5	0.489
Eqn. 5	OI5= 0.827+ 0.140OI1+ 0.119OI2+ 0.356OI3+ 0.107OI4	0.441

As clearly seen from the above table, equation with higher R squared value of 0.572 was OI3= 0.201+ 0.075OI1- 0.005OI2+ 0.536OI4+ 0.333OI5 from the above equations. The coefficients of the independent variables indicate that when the independent variable gets increased by one unit the dependent variable gets exactly increased by their respective coefficients, assuming that all the other independent variables remain fixed. This showed that the independent variable OI4 has high degree of contribution to the dependent variable OI3. From this it could be interpreted that lack of working capital in a company highly affects the availability of market order because the capital helps better achieve customer delivery time and handle customers properly. The statements indicated by the above codes were as under.

- OI1 - *Electric interruption has frequently caused significant impact on your work.*
- OI2 - *You have not faced materials shortage on work.*
- OI3 - *The company production per day depends on availability of market order.*
- OI4 - *Lack of working capital has affected your company production.*
- OI5 - *Lack of hard currency has affected your company production.*

5.3.5 Correlation of representative variables

Table 30: Correlation of representative variables

		HR2	QWF3	MS3	LT5	OI3
HR2	Pearson Correlation	1	.368**	.340**	.378**	.340**
	Sig. (2-tailed)		.000	.000	.000	.000
QWF3	Pearson Correlation	.368**	1	.484**	.479**	.384**
	Sig. (2-tailed)	.000		.000	.000	.000
MS3	Pearson Correlation	.340**	.484**	1	.493**	.439**
	Sig. (2-tailed)	.000	.000		.000	.000
LT5	Pearson Correlation	.378**	.479**	.493**	1	.641**
	Sig. (2-tailed)	.000	.000	.000		.000
OI3	Pearson Correlation	.340**	.384**	.439**	.641**	1
	Sig. (2-tailed)	.000	.000	.000	.000	

** . Correlation is significant at the 0.01 level (2-tailed).

The relationship among the representative variables was from .340 (moderate) to .641 (strong). The variables LT5 (=the company corrects/amends itself regularly in order to minimize workers layoff) and OI3 (The company production per day depends on availability of market order) had strong relationship (.641). There was also moderates relationship between HR2 (Practical tests

were given for you when you were recruited for this position) and other two variables namely MS3 (you get timely information from your supervisor) and OI3 (the company production per day depends on availability of market order). The correlation was significant in all the variable relationships with sig. = .000 which really means $p < 0.0005$. From this it could be interpreted that the variables were worthy enough in order to develop new model for labor productivity improvement.

Table 31: Mean and variance of representative variables

	HR2	QWF3	MS3	LT5	OI3
Mean	3.76	2.99	2.84	3.21	3.40
Variance	1.218	1.836	1.861	.411	.811

5.3.6 Variables

For summary of regression statistics values R, R square, and adjusted R square were obtained from model summary table whereas the sig. and F values were used from table labeled as ANOVA (Pallant, 2016). All data below were presented from the regression analysis of all the respective variables.

Table 32: Summary of regression statistics

Variable	R	R square	Adjusted R square	β	t	VIF	F	Sig.
HR1	.737	.544	.523	-.185	-.544	2.1	26.450	.000
HR2	.744	.554	.534	1.183	4.732	2.053	27.559	.000
HR3	.724	.524	.503	.123	.376	1.980	24.435	.000
HR4	.600	.360	.331	.291	.757	2.173	12.485	.000
HR5	.506	.256	.222	.968	2.329	2.15	7.627	.000
HR6	.581	.338	.308	1.171	2.931	2.213	11.340	.000
QWF1	.479	.230	.202	.419	.775	1.636	8.342	.000
QWF2	.526	.277	.251	1.363	3.363	1.634	10.715	.000
QWF3	.647	.418	.397	-.367	-.866	1.332	20.130	.000
QWF4	.465	.216	.188	2.172	7.914	1.626	7.716	.000
QWF5	.583	.340	.317	1.184	2.582	1.511	14.430	.000
MS1	.602	.362	.321	.428	.893	44.820	8.848	.000
MS2	.402	.162	.116	2.232	5.315	1.562	3.537	.000
MS3	.989	.978	.976	-.127	-1.414	1.566	683.320	.000
MS4	.531	.282	.235	1.767	3.742	44.453	6.103	.000
MS5	.545	.297	.252	.503	1.035	44.804	6.593	.000
MS6	.478	.228	.179	.831	1.611	44.745	4.604	.000

Variable	R	R square	Adjusted R square	β	t	VIF	F	Sig.
MS7	.527	.278	.231	1.515	3.535	44.812	5.989	.000
MS8	.988	.977	.976	.120	1.324	1.568	664.521	.000
LT1	.643	.414	.393	-.501	-1.046	1.621	19.777	.000
LT2	.577	.333	.309	-.943	-.893	1.624	13.994	.000
LT3	.568	.323	.298	-.154	-.301	1.672	13.333	.000
LT4	.476	.227	.199	1.864	3.566	1.771	8.212	.000
LT5	.661	.436	.416	1.850	10.618	1.558	21.684	.000
OI1	.477	.228	.200	1.119	2.051	2.286	8.248	.000
OI2	.333	.111	.079	1.842	2.999	2.336	3.501	.000
OI3	.756	.572	.557	.201	.714	1.576	37.428	.000
OI4	.699	.489	.470	.955	3.431	1.767	26.768	.000
OI5	.664	.441	.421	.827	2.949	2.060	22.052	.000

The model in the above shows statistical significance Sig. = .000 indicated under the table labelled as ANOVA on SPSS statistics really means $p < .0005$. Sig. value tells you whether this variable is making a statistically significant unique contribution to the equation. If the Sig. value is less than .05 (.01, .0001, etc.), the variable is making a significant unique contribution to the prediction of the dependent variable. If Sig. > .05, the variable is not making a significant unique contribution to the prediction of your dependent variable. As there are small sample sizes Adjusted R square value is considered rather than the normal R Squared value.

5.3.7 Covariance of representative variables

The correlation value r between the representative variables was indicated as in the following diagram. The r values were laid between 0.34 and 0.64.

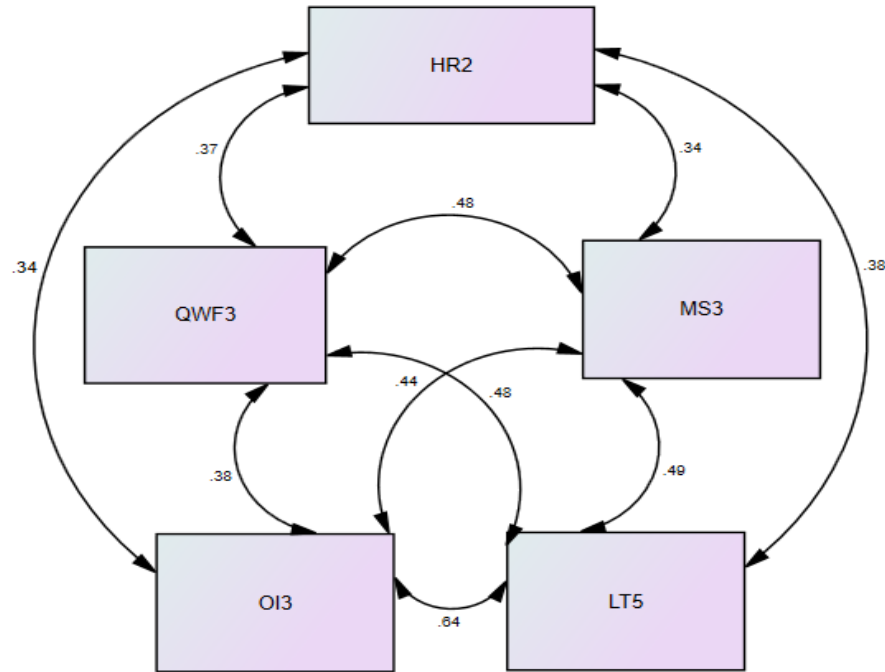


Figure: correlation of representative variables

5.3.8 Regression analysis of representative variables

In representative variables regression analysis perspective five variables from each labor determinants category have been analyzed. The variables among the others that were selected based on their representativeness were HR2, QWF3, MS3, LT5 and OI3. All the equations obtained from regression analysis were presented as in the table below.

Table 33: Results of the regression analysis of representative variables

Eqn.	Regression Equation	R ²
Eqn. 1	HR2= 1.693+ 0.156QWF3+ 0.099MS3+ 0.260LT5+ 0.142OI3	0.209
Eqn. 2	QWF3= -.470+ 0.198HR2+ 0.286MS3+ 0.523LT5+ 0.067OI3	0.334
Eqn. 3	MS3= 0.791+ 0.124HR2+ 0.284QWF3+ 0.471LT5+ 0.235OI3	0.348
Eqn. 4	LT5= 1.398+ 0.055HR2+ 0.087QWF3+ 0.079MS3+ 0.331OI3	0.505
Eqn. 5	OI3= 0.446+ 0.067HR2+ 0.025QWF3+ 0.088MS3+ 0.740LT5	0.439

As clearly indicated the optimal equation is equation 4 with highest R squared value of 0.505 or 50.5%. This equation had the strength to express the dependent variable by 50.5% while the left being expressed by opinions or assumptions by the researcher. Representative variables and their narrated names were as indicated.

Table 34: Narration of representative variables

Perspective	Representative variable	
	Code	Narrated Name
Human resource sophistications	HR2	Practical tests are provided for new candidates
Quality of workforce	QWF3	Workers work because they favor the company over others
Management & scheduling	MS3	Operator gets timely information from supervisor
Lowering labor turnover	LT5	Company amends itself regularly to optimize turnover
Other production inputs	OI3	A company's production volume depends on market availability

The equation 4 is $LT5 = 1.398 + 0.055HR2 + 0.087QWF3 + 0.079MS3 + 0.331OI3$. The formulated equation indicates that when each of the independent variable increases by one unit and assuming the rest of independent variables fixed, the dependent variable LT5 increases/decreases by the following amount:

- When HR2 gets increased by one unit, LT5 increases by 0.055units.
- When QWF3 gets increased by one unit, LT5 increases by 0.087units.
- When MS3 gets increased by one unit, LT5 increases by 0.079units.
- When OI3 gets increased by one unit, LT5 increases by 0.331units.

From this, it could be observed that the independent variables with higher coefficients have more impacts on the dependent variable when compared with the others.

Chapter Six: New Model Development

Under this chapter two core topics were addressed namely, New Labor Productivity Measurement Approach and Labor Productivity Improvement Model.

6.1 New Labor Productivity Measurement Approach

The 6 Steps of computing LP

1. Identify total number of jobs performed in the company

Number of persons employed or number of jobs can generate biased measures of productivity if hours per person change or if there are multiple job holdings (Schreyer, 2005).

- a. List the jobs carried out by the company
- b. Identify interrelations of the jobs and how workers are engaged in the jobs.
- c. Segregate jobs in the company which are not part of the footwear manufacturing
- d. Investigate whether there are sister companies for the company

2. Collect the total pairs produced per unit of time and convert into daily production

- a. If obtained data is in pairs per annum unit
 - a. Change into monthly production by dividing into 12, and then
 - b. Change into daily production after finding effective number of days in each month. (Daily production = monthly production /effective days in month)
- b. If obtained data is in pairs per month unit, change into daily production after finding effective number of days in each month.
- c. If obtained data is in pairs per day unit, use directly in LP computing
- d. Effective number of days in each month is obtained after deducting non-working days such as weekends and holidays from 30.

3. Identify total number of labors engaged in footwear production

- a. Sort out labors involved only in footwear production and for those involved in different jobs proportionate labors hours.
- b. Collect the labors keeping the hierarchy (non-production, production and technical, and contract and temporary workers)

This equals sums of

- Employed workers
- Self employed
- Unpaid workers (family members of the company owner) (OECD, 2015)

And minus the proportion of labors hours who work in sister companies and other jobs within the company.

- c. The total sum gives total number of workers engaged (= actual workers)
- d. Production and technical workers are categorized into three as skilled (s), semiskilled (ss) and unskilled (us) on basis of 0.2:0.35:0.45 or as per the data obtained from the company.

4. Restructure the workers

In order to omit equal consideration of for instance managers and cleaners, restructure to give better values to some workers is vital. Accordingly workers are categorized into 3 as skilled (S), semiskilled (SS) and unskilled (US).

- a. Skilled (S) = non production (management members)+ production (skilled workers)
- b. Semiskilled (SS) = non production (not management members) + production (semiskilled workers) + all contract and temporary workers
- c. Unskilled (US) = production (all unskilled)

5. Minimize the absentees from structured workers to get net structured workers

Absentees are minimized because only the actual number of workers participated on the job should be considered (OECD, 2001).

For instance, if the absentee obtained from the company is 8.5%, this value is reduced from each category of workers (S, SS and US).

Now, net structured workers are known.

6. Calculate LP

$$LP = \frac{\text{Units produced per day}}{0.8S + SS + 1.1US}$$

Where,

S = skilled workers, and top management workers

SS = semiskilled workers, and all other critical support function workers (indirect workers)

US = unskilled workers, and unpaid family members

6.2 Labor Productivity Improvement Model

6.2.1 Introduction to the approach

LP improvement model was developed based on the subgroup variables. These were

- ✓ Human resource sophistications HR
- ✓ Quality of workforce QWF
- ✓ Management & scheduling MS
- ✓ Lowering labor turnover LT
- ✓ Other production inputs OI

The models were developed all the cases of subgroup variables (HR, QWF, MS, LT and OI) using AMOS software and the outputs were checked for the model fitness. When model fitness was checked out three parameters were considered. These were Absolute model fit, Incremental model fit and Parsimonious model fit.

Absolute model fit – under this parameter, three values were checked: Chi-Square value and probability value $p < 0.05$, Root Mean Square Error of Approximation (RMSEA) < 0.08 , Goodness of Fit Index (GFI) < 1.00 .

Incremental model fit - this includes checking the values of four functions. These are Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Normal Fit Index (NFI) and Tucker Lewis Index (TLI). According to SEM AMOS tutorials, the values of all the functions should be > 0.9 for validity of the model although nearby values of < 0.9 could be tolerated. However, according to AMOS software notes, $AGFI < 1$ indicates a perfect fit and it is not, however, bounded below by zero unlike GFI; CFI is truncated to fall in the range from 0 to 1; CFI values close to 1 indicate a very good fit, and for NFI the models with overall fit indices of < 0.9 can be improved substantially. Finally, $0 < TLI < 1$, but TLI is not limited to this range. In either case, TLI values nearer to 1 show a very good fit.

Parsimonious model fit - includes checking of Chi-Square/ (degree of freedom) (CMIN/DF) which is called as Minimum discrepancy. $CMIN/DF < 5.0$

6.2.2 Brief of models of subgroup variables

The summary of the model fit criteria for the developed models were put as in the following table.

Table 35: Summary of model fit values for subgroup variables

Model	Y(x)	Absolute model fit			Incremental model fit				Parsimonious model fit
		p	RMSEA	GFI	AGFI	CFI	NFI	TLI	CMIN/DF
<i>Expected Limits</i>		<0.05	<0.08	<1.00	>0.9	>0.9	>0.9	>0.9	<5.0
HR	6(4)	.078	.079	.960	.908	.973	.940	.955	1.723
QWF	5(4)	.039	.115	.970	.888	.947	.919	.867	2.523
MS	8(6)	0.014	.110	.958	.853	.915	.874	.777	2.403
LT	5(4)	.050	.103	.963	.889	.958	.928	.915	2.219
OI	5(5)	.087	.101	.990	.890	.977	.961	.925	2.190
LPI	5(5)	.090	.127	.988	.854	.994	.991	.937	2.877

Human resource sophistications (HR)

HR has 6 observed variables from which its model was built as indicated in the annex. During the model development, in order to improve the model fitness the numbers of variables were reduced to 4 variables. The modification of model was carried out by investigating the observed/representative variables one by one. Finally the following values were observed in the output of the model.

Absolute model fit – Probability level of the model was 0.078 which was >0.05. This indicates that the model was not valid. On the other hand Chi-Square value (15.507) should not be very high when compared to the degree of freedom (9). Generally the degree of freedom is better when it exceeds Chi-Square value; when Chi-Square value exceeds the degree of freedom, it is acceptable but should not be very high when compared to the degree of freedom. This indicated a good model.

RMSEA = 0.079 which is <0.08. RMSEA value, when >0.08 and not very far from it, could be used or considered by bearing in mind the other parameters. So, this showed that the model was fit on this regard.

In this model, GFI = 0.960 which is <1.00. So, this showed that the model was fit on this regard.

From the three values under Absolute model fit, RMSEA and GFI showed the model was valid but the probability level ($0.078 > 0.05$) showed that this value was near to the limit. Considering all the values under this, the model was considered as valid.

Incremental model fit – here, the actual values of each of these functions were AGFI = 0.908, CFI = 0.973, NFI = 0.940 and TLI = 0.955. These all values were > 0.9 and around 1.0, and hence showed that the model on this regard was fit or valid.

Parsimonious model fit - In this regard, the output of the model analysis showed that CMIN/DF = 1.723 which is < 5.0 indicating good model.

From the above three parameters Incremental model fit and Parsimonious model fit indicated that the model was valid. However, in Absolute model fit, although the probability level ($0.078 > 0.05$) showed that the value goes beyond the limit to some extent, in general by considering all the model fit values into consideration, the model could be used as valid.

Quality workforce (QWF)

QWF has 5 observed variables from which its model was built as indicated in the annex. During the model development, in order to improve the model fitness the numbers of variables were reduced to 4 variables. The modification of model was carried out by investigating the observed/representative variables one by one. Finally the following values were observed in the output of the model.

Absolute model fit – Probability level of the model was 0.039 which was < 0.05 . On the other hand Chi-Square value (10.091) should not be very high when compared to the degree of freedom (4). Generally the degree of freedom is better when it exceeds Chi-Square value; when Chi-Square value exceeds the degree of freedom, it is acceptable but should not be very high when compared to the degree of freedom. This indicated a good model.

RMSEA = 0.115 which is > 0.08 . RMSEA value, when > 0.08 and not very far from it, could be considered by bearing in mind the other parameters. So, this showed that the model was fit on this regard.

In this model, GFI = 0.960 which is < 1.00 . So, this showed that the model was fit on this regard.

From this Absolute model fit parameters, the values of p, RMSEA and GFI showed that the model was valid. Considering all the values under this, the model was considered as valid.

Incremental model fit – here, the actual values of each of these functions were AGFI = 0.888, CFI = 0.947, NFI = 0.919 and TLI = 0.867. CFI and NFI values were > 0.9 and around 1.0, whereas AGFI and TLI have < 0.9 but near to it: and hence showed that the model on this regard was fit.

Parsimonious model fit - In this regard, the output of the model analysis showed that CMIN/DF = 2.523 which is < 5.0 indicating good model.

From the above three parameters it showed that the model was valid. However, in Absolute model fit, although the probability level ($0.078 > 0.05$) showed that the value goes beyond the limit to some extent, in general by considering all the model fit values into consideration, the model was regarded as valid.

Management and Scheduling (MS)

MS has 8 observed variables from which its model was built (see annex). While developing the model, in order to improve the model fitness the numbers of variables which have direct link with the MS were reduced to 6. The modification of model was carried out by investigating the observed/representative variables one by one. The following values were observed in the output of the model.

Absolute model fit – Probability level of the model was 0.014 which was < 0.05 . Chi-Square value (19.222) should not be very high when compared to the degree of freedom (8). Generally the degree of freedom is better when it exceeds Chi-Square value; and this was acceptable as it fulfills this requirement. On this regard the model was good.

RMSEA = 0.110 which is > 0.08 . RMSEA value, when > 0.08 and not very far from it, could be used or considered by bearing in mind the other parameters. Moreover, in this model, GFI = 0.958 < 1.00 . So, these three Absolute model fit parameters showed that the model was fit on this regard.

Incremental model fit – here, the actual values of each of these functions were AGFI = 0.958, CFI = 0.915, NFI = 0.874 and TLI = 0.777. The values AGFI and CFI were > 0.9 and around 1.0. However, NFI and TLI were < 0.9 although they were not very far from the limit (0.9). So, the model on this regard was fit.

Parsimonious model fit - In this regard, the output of the model analysis showed that CMIN/DF = 2.523 which is < 5.0 indicating good model.

From the above three parameters, Absolute model fit, Incremental model fit and Parsimonious model fit indicated that the model was valid.

Labor Turnover (LT)

LT has 5 observed variables from which its model was built (see annex). During the model development, in order to improve the model fitness the numbers of variables were reduced to 4 variables. The modification of model was carried out by investigating the observed variables one by one. Finally the following values were witnessed in the output of the model.

Absolute model fit – Probability level of the model was 0.050 which was < 0.05 . On the other hand Chi-Square value (11.096) should not be very high when compared to the degree of freedom (5). Generally the degree of freedom is better when it exceeds Chi-Square value; when Chi-Square value exceeds the degree of freedom, it is acceptable but should not be very high when compared to the degree of freedom. This indicated a good model.

RMSEA = 0.103 which is >0.08 . RMSEA value, when >0.08 and not very far from it, could be considered by bearing in mind the other parameters. Moreover, in this model, GFI = 0.963 which is <1.00 . So, the model was fit with regards to these criteria.

Incremental model fit – here, the actual values of each of these functions were AGFI = 0.889, CFI = 0.958, NFI = 0.928 and TLI = 0.915. Here, the values of CFI, NFI and TLI were >0.9 which satisfies the basic requirement. AGFI = 0.889 which is less than 0.9 that indicates invalidity. However, AGFI=0.889 was near to the limit value (0.9) that showed that the model on this regard was fit.

Parsimonious model fit - In this regard, the output of the model analysis showed that CMIN/DF = 2.403 which is <5.0 indicating good model.

The above three parameters (Absolute model fit, Incremental model fit and Parsimonious model fit) showed that the model was valid.

Other Production Inputs (OI)

OI has 5 observed variables from which its model was built (see annex) all of which have direct link with it. The modification of model was carried out by investigating the observed/representative variables one by one. The following values were observed in the output of the model.

Absolute model fit – Probability level of the model was 0.101 which was >0.05 . Chi-Square value (6.571) should not be very high when compared to the degree of freedom (3). Generally the degree of freedom is better when it exceeds Chi-Square value; and this was acceptable as it fulfills this requirement. P value seems invalid as it has a value that exceeds 0.05 but other parameters would be taken into consideration to decide its invalidity because p value was nearer to the limit.

RMSEA = 0.101 which is >0.08 . RMSEA value, when >0.08 and not very far from it, could be used or considered by bearing in mind the other parameters. Moreover, in this model, GFI = 0.978 <1.00 . So, these three parameters showed that the model was fit on this regard.

Incremental model fit – here, the actual values of each of these functions were AGFI = 0.890, CFI = 0.977, NFI = 0.961 and TLI = 0.925. All these values satisfy the limit required (>0.9) except AGFI which did not satisfy the limit but nearer to the value. So, the model on this regard was fit.

Parsimonious model fit - In this regard, the output of the model analysis showed that CMIN/DF = 2.190 which is <5.0 indicating good model.

From the above three views of measurement, Absolute model fit, Incremental model fit and Parsimonious model fit indicated that the model was valid.

6.2.3 The new model

Based on the validated models of subgroup variables like HR and QWF, which were detailed under the above subsection, the new model for LP improvement was developed. This new model was improved repeatedly in order to make it better fit. Finally model fit diagram, Model validity explanation and interpretation of the new model has been detailed as under.

6.2.3.1 Model fit diagram

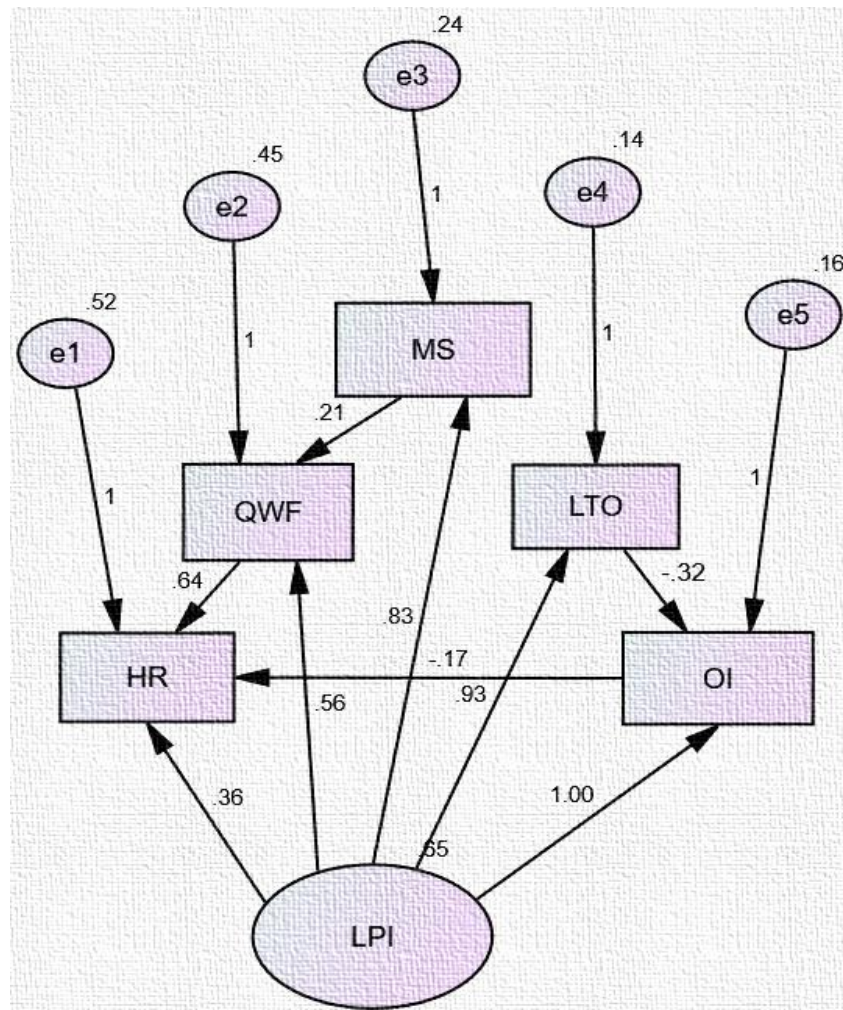


Figure 12: New model for LP improvement

6.2.3.2 Model validity explanation

Labor Productivity Improvement LPI model has 5 observed variables which had been derived from data questionnaires. While developing LPI model, those 5 variables were not reduced further because these variables enabled get good model. The following values were observed in the final output of the model.

Absolute model fit – Probability level of the model was 0.055 which was >0.05 . On the other hand Chi-Square value (2.877) should not be very high when compared to the degree of freedom

(1). Generally the degree of freedom is better when it exceeds Chi-Square value; when Chi-Square value exceeds the degree of freedom, it is acceptable but should not be very high when compared to the degree of freedom. Generally a good model was shown on this regard.

RMSEA = 0.127 which is >0.08 . RMSEA value, when >0.08 and not very far from it, could be considered by bearing in mind the other parameters. Other parameters like GFI is equal to 0.988 which is <1.00 . So, this showed that the model was fit on this regard.

Incremental model fit – Here, the actual values of each of these functions were AGFI = 0.854, CFI = 0.994, NFI = 0.991 and TLI = 0.937. All the values of these should be >0.9 ; and in this case three of the variables have fulfilled the criteria except one variable (AGFI = 0.854). However, the value of AGFI was also near to 0.9 and therefore by considering the other three variables, the value of AGFI could be well considered. In general, the model was fit on Incremental model fit criteria aspects.

Parsimonious model fit - In this regard, the output of the model analysis showed that CMIN/DF = 2.877 which is <5.0 indicates good model.

Therefore, the model was fit when observed using all the parameters limits (Absolute model fit, Incremental model fit and Parsimonious model fit).

6.2.3.3 Interpretation of the new model

The model indicated on figure 13 above proved that all the five subgroup variables HR, QWF, MS, LTO and OI had direct impact on the LPI (labor productivity improvement). Moreover QWF, MS, LTO and OI also had an indirect influence on LPI via determining the role of other subgroup variables. For instance QWF was determined by HR i.e. the more the human resource sophistication work carried out by the companies, the more the quality of workforce the company would possess. If a company strongly deploys its efforts on attracting, selection and recruiting new candidates, it will own more productive workers.

Moreover, QWF had an impact on MS. A company that has created a quality workforce would have better management and scheduling system. This boldly tells us that workforce that had experience, skill and higher educational background is enabling to run occupations related to the management and scheduling activities. Management and scheduling activities include proper material handling, smooth work-shop work flow and creating attractive working environment for its workers.

Labor turnover LTO was negatively affected by other production inputs OI. This means that when there are ease supplies of other production inputs like facilities, tools and equipment, materials on production floor, energy and information and others, workers will comfortably work their jobs. This creates a better working environment and lesser conflict with immediate supervisors, which otherwise happens due to less productivity, lead to less labor turnover.

OI was also negatively affected by HR. This indicates that when there is more human resource sophistication in a company the competitive workers hired would run production activities at less OI. Competitive workers can wisely manage and deploy the available resources; and they can run their activities without much complain for the input problems.

Finally, the respective order of degrees of the variables impacts on LPI was OI (1.00), LTO (0.93), MS (0.83), QWF (0.56) and HR (0.36). Hence, focus should be given according to these priorities.

Chapter Seven:

Conclusion, Recommendations and Future Research Directions

7.1 Conclusion

Leather and leather products industry is one of the major sectors given due attention by the Government of Ethiopia to increase its competitiveness. This research work attempts to assess the labor productivity (LP) of the EMLFI to identify existing LP measurement system and set new measurement approach, to measure and evaluate LP improvement index, to devise its improvement model based on the indices.

It is revealed that the existing LP measurement system in EMLFI was inadequate to represent and express the productivity level because it lacks consideration of conditions like absentees, degree of skills and productive time of labors involved in extra work or side business. This paper has deployed a survey on eight footwear companies and has shown the gap between the existing and the new methods of LP measurement and forwarded six steps towards computing the new methods of LP measurement. Accordingly, the productivity level computed using the new measurement approach has also provided greater magnitudes than the traditional methods of productivity estimation.

The average annual LP index values for the EMLFI from 2007 to 2010 were 1.07, 1.09, 1.06 and 1.06 respectively. These indices in general showed productivity increment throughout the years but the magnitude of increment was small. In 2007EC and 2008EC, there was yearly increasing labor productivity rate whereas from 2008EC to 2010EC the index value has shown a gradual decrease. This showed some LP related problems exist that would be identified and rectified to alleviate problems and to aid a continually productivity increase at higher magnitude.

Based on the data analysis made by using Human resource sophistications HR, Quality of workforce QWF, Management & scheduling MS, Lowering labor turnover LTO and Other production inputs OI:

- ✓ All the variables had direct impact on Labor productivity improvement (LPI). Determinant variables also affect each other.
- ✓ HR positively affected QWF i.e. the more the human resource sophistication work carried out by the companies, the more the quality of workforce the company would possess. If a company strongly deploys its efforts on attracting, selection and recruiting new candidates, it will own more productive workers.
- ✓ Moreover, QWF had an impact on MS. A company that has created a quality workforce would have better management and scheduling system. This boldly tells us that workforce that had experience, skill and higher educational background could easily run occupations related to the management and scheduling activities.

- ✓ Labor turnover LTO was negatively affected by other production inputs OI. This means that when there is ease supplies of OI, workers will comfortably work their jobs, which create a better working environment and lesser conflict with immediate supervisors, and hence lead to less labor turnover.
- ✓ OI was also negatively affected by HR. This means competitive workers (as a result of strong HR) can wisely manage and deploy the available resources; and they can run their activities without much complain for the input problems.

7.2 Recommendations

The footwear sector has got due attention in Ethiopia because it aligns with government industrial strategic principles, like being labor intensive and using agricultural products (leather) as input. Although there are abundant, cheap and trainable labors in Ethiopia, wise use of this dominant resource is still under question and hence the researcher has recommended some of the following study results for the subsector.

As per the data obtained from observation and informal interview, some companies have been using a simple output to input ratio in order to estimate their labor productivities while others have even no interest to estimate and did not have the purpose to estimate it at all. However, both measurement and appropriate way to measurement are mandatory to manage, control and improve the annual LP progress. Therefore the researcher recommends the footwear companies to use *The Six Steps of LP Measurement Approach* which was formulated in this thesis in order to know their level of LP and to work for improvement.

In general, the average annual LP index values for the EMLFI from 2007 to 2010 showed that there was little improvement. But increment from year-to-year showed ups-and-downs which indicated there would be no guarantee to achieve the Ethiopian government's GTP II plan expectations. Therefore, based on the LP index achievement computed in this study, companies should evaluate their year-to-year LP index values and own improvement plans for the upcoming years.

The EMLFIs average annual LP in 2010EC was found as 2.19pairs/day/person but a benchmark of China shows that LP reaches to 6pairs/day/person; this implied 36.5% efficiency. Therefore, these footwear companies should have systematic approach to improve their labor performances in order to achieve strategic plan set by the Ethiopian government as well as to reach the world class benchmark. To solve this problem, the researcher has developed *Labor Productivity Improvement Model* that directs the companies' efforts towards improving their labor capabilities; and hence companies should use this model as a tool in their endeavors to improving the utilization of their labor resources.

7.3 Future Research Directions

Measurement and improvement related researches are broad and there has been both evolution and revolution phenomena. This study has introduced some new findings to the body of knowledge in this field i.e. labor productivity measurement and improvement. However, this can be widened to company wise performance measurement, to other major production inputs measurements, to psychological impacts on labor productivity and etc. In order to continually improve utilization of different service and manufacturing sectors resources, some fields of study are recommended. Accordingly, the following research agendas are suggested.

- ✓ There are labor productivity determinants which companies cannot manage by themselves. These determinants are managed only by compassionate hands of many stockholders or by solely the government support and due attentions. These factors of labor productivity can be researched to see their impacts, improve their roles and provide directions.
- ✓ Upcoming technological advancements in the field can be timely researched for improvements in the current findings of this study. Moreover, other major production inputs and their effect on total factor productivity can be researched to better utilize the resources.
- ✓ Studies related to fields of social sciences like the psychological aspect of workers can be researched in order to explore and fulfill the human needs for better labor productivities.
- ✓ Similar studies can be expanded to the footwear sector for small enterprises; and other sectors including service enterprises.

References

- AACCSA. 2015. An Overview of Ethiopian Manufacturing Sector, Addis Ababa, Ethiopia: Addis Ababa Chamber of Commerce and Sectorial Association.
- Abassi, S. and Hollman, K. 2000. Turnover: the real bottom line. *Public Personnel Management*, 2 (3): 333-342.
- Ahmed, M. U., Muzib, M., & Roy, A. 2013. Price-wage spiral in Bangladesh: evidence from ARDL bound testing approach. *International Journal of Applied Economics*, 10(2), 77-103.
- Andersen, C. 1993. The Lean Enterprise Benchmarking Project, February, Andersen Consulting, London.
- Anita, S., Tan, D. B. & Mohammed, S. 2013. Develop a framework of performance measurement and improvement system for lean manufacturing activity. Malaysia, s.n.
- Arie, H. 2005. Performance measurement is only one way of managing performance. *International Journal of Productivity and Performance Management*, 54(7), pp. 502-516.
- Attar, A., Gupta, A., and D.B. Desai. 2014. A Study of Various Factors Affecting Labor Productivity and Methods to Improve It. *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)* ISSN: 2278-1684, PP: 11-14.
- Babaeinesami, A. and Babaeinesami, M. 2016. Factors affecting labor productivity in the government organization of Iran, unpublished thesis, Islamic Azad University (IAU), Iran.
- Banks, R.L. and Wheelwright, S.C. 1979. "Operations versus strategy – trading tomorrow for today", *Harvard Business Review*, May-June, pp. 112-20.
- Barnard, C.I. 1962. *The Functions of the Executive*, Harvard University Press, Cambridge, MA.
- Barrows, C. 1990. Employee turnover: implications for hotel managers. *FIU Hosp. Rev.* pp.24-31.
- Battese, G.E., Heshmati, A. and Hjalmarsson, L., 2000. Efficiency of Labor Use in the Swedish Banking Industry: A Stochastic Frontier Approach. *Empirical Economics* 25(4), 623-640.
- Becker, G. S. 1964. *Human Capital*. National Bureau of Economic Research, New York.
- Beer, M., Ruh, R., Dawson, J.A., McCaa, B.B. and Kavanagh, M.J. 1978. "A performance management system: research, design, introduction and evaluation", *Personnel Psychology*, Vol. 31, pp. 505-35.
- Berhanu, B. and Kibre, M. 2002. *Declining Productivity and Competitiveness in the Ethiopian Leather Sector.pdf*. EEA/Ethiopian Economic Policy Research Institute. Working Paper No. 1/2002.
- Bleischwitz. 2007. The relation between resource productivity and competitiveness. Retrieved from http://ec.europa.eu/environment/enveco/economics_policy/pdf/part2_report_comp.pdf on August 16, 2018.

- Bloom, N., Mahajan, A., McKenzie, D. and Roberts, J. 2010. Why Do Firms in Developing Countries Have Low Productivity? The American Economic Review, Vol. 100, No. 2, PAPERS AND PROCEEDINGS, pp. 619-623. Published by American Economic Association
- Bromwich, M. and Bhimani, A. 1989. Management accounting – evolution not revolution. Management Accounting, October, pp. 5-6.
- Bureau of Labor Statistics. 2018. Labor Productivity and Costs. US Department of labor, Retrieved from <http://www.bls.gov/> on date March 05, 2018.
- Butler, A., Letza, S. & Neale, B. 1997. Linking the Balanced Scorecard to Strategy. Volume 30.
- Camp, R.C. 1989. Benchmarking – the Search for Industry Best Practices that Lead to Superior Performance, ASQS Quality Press, Milwaukee, WI.
- Catherine M Gustafson. 2002. Staff turnover: Retention. International j. contemp. Hosp. manages. 14 (3): 106-110.
- CEDEFOP (European Centre for the Development of Vocational Training). 2007. Building a European VET area, Agora conference (Thessaloniki).
- Chakravarthy, B.S. 1988. Measuring strategic performance. Strategic Management Journal, Vol. 7, pp. 110-8.
- Changiz, V. and Azadeh, S. 2011. Performance measurement system implementation using Balanced Scorecard and statistical methods. Journal of Productivity and Performance Management, 60(5), pp. 493-511.
- Coelli T.J., Rao, D.S.P., O'Donnell, C.J. and G.E. Battese. 2005. An Introduction to Efficiency and Productivity Analysis // 2nd Edition, New York: Springer.
- Cooper, R. 1987a. The two-stage procedure in cost accounting: part 1. Journal of Cost Management, Summer, pp. 43-51.
- Cooper, R. 1987b. The two-stage procedure in cost accounting: part 2. Journal of Cost Management, Fall, pp. 39-45.
- Cotton, J. & Tuttle, J. M. 1986. Employee turnover: A meta-analysis and review with implications for research. Academy of Management Review, 11(1), 55-70.
- Cross, K. & Lynch, R. 1989. The SMART way to define and sustain success. *National Productivity Review*, 8(1), pp. 23-33.
- Definition of Productivity. 2018. Overview – productivity management ppt. Retrieved on March 4, 2018 from www.csus.edu/indiv/w/wangc
- Devore, J. and Farnum, N., 1999. Applied Statistics for Engineers and Scientists. London. Madrid. Tokyo: Duxbury Press.
- Dixon, J., Nanni, A. & Vollman, T. 1990. The new performance challenge: measuring operations for world class competition.

- Dixon, J.R., Nanni, A.J. and Vollmann, T.E. 1990. *The New Performance Challenge – Measuring Operations for World-Class Competition*, Dow Jones-Irwin, Homewood, IL.
- Elangovan, A. R. 2001. Causal ordering of stress, satisfaction and commitment, and intention to quit: A structural equations analysis. *Leadership & Organization Development Journal*, 22 (4), 159-165.
- Ellery, R., Barros, R., and Grosner, D. 2013. *Labor Productivity Determinants for the Strategy on Sustainability and Promotion of the Middle Class*. Federal Government Presidency of the Republic Secretariat for Strategic Affairs, Brazil.
- ENERCON. 2018. Concepts and Principles Behind Economic Issues. Labor Productivity vs. Total Factor Productivity. Retrieved from <https://cem.uplb.edu.ph/research-extension-training/economicissues> on date March 30, 2018.
- Ephrem, G. 2014. *Analysis of Quality and Productivity Relationship Based on Measurements in Ethiopian Plastic Industries*, Addis Ababa: PhD dissertation report.
- Erenburg, S. J. 1998. Productivity, private and public capital, and real wage in the US. *Applied Economics Letters*, 5(8), 491-495.
- Factor Cost. 2010. Ethiopian Investment Commission booklet on costs pertaining to different factors. www.investethiopia.gov.et
- Fadejeva, L. and Melihovs, A. 2009. *Measuring Total Factor Productivity and Variable Factor Utilization: Sector Approach, the Case of Latvia*. Working paper 3.2009. ISBN 9984-676-67-6.
- Fasika, B., Thoben, K. & Seifert M. 2013. “Assessing the Existing Performance Measures & Measurement Systems in Developing Countries: An Ethiopian Study”. *Global Journal of Researches in Engineering Industrial Engineering*, Volume 13.
- FDDI. 2012. *Closing Sewing Machine pdf*. Handout for footwear technology.
- Fentahun, M. K. & Alemu, M. 2013. The impact of multi-criteria performance measurement on business performance improvement. *Journal of Industrial Engineering and Management*, 6(2).
- Gabrielson, E. 2012. *Turnover Intentions: A Qualitative Analysis of Comments from Air Force Civil Engineering Company Grade Officers*. Air Force Institute of Technology unpublished thesis. Wright-Patterson Air Force Base, Ohio. Retrieved on September 10, 2018. from <http://www.dtic.mil/dtic/tr/fulltext/u2/a558216.pdf>.
- Galazzo, N. 2006. “Using SCOR model in a real Collaborative Sourcing scenario”. VIB-ABCAL_PICS, Supply Chain Award 2006.
- Ganapathy, B. & Goh, C. 1997. “A hierarchical system of performance measures for concurrent engineering”. 5(2), pp. 137-123.
- Gezahegn, T. 2009. *A Total Manufacturing Solutions Approach to Assess the Performance of Ethiopian Footwear Industry and Suggest Improvement Strategy*. Addis Ababa: Unpublished MSc thesis.

- Ghalayini, A. & Noble, J. 1996. "The changing basis of performance measurement". *Journal of Operations and Production Management*, Volume 16, pp. 63-80.
- Gneezy, U. & Rustichini, A. 2000. A fine is a price. *The Journal of Legal Studies*, 29(1), 1-18.
- Goldratt, E.M. and Cox, J. 1986. *The Goal: Beating the Competition*, Creative Output Books, Hounslow.
- Greenhaus, J. H., & Beutell, N. J. 1985. Sources of conflict between work and family roles. *Academy of Management Review*, 10(1), 76-88.
- Griffeth, R. W., Hom, P. W., and Gaertner, S. 2000. A meta-analysis of antecedents and correlates of employee turnover: Updated, moderator tests, and research implications for the next millennium. *Journal of Management*, 26(3), 463-488.
- Griffith, R., & Miller, H. 2010. UK productivity in the recession. *Institute for Fiscal Studies*.
- Gruenberg, T. 2004. Performance Improvement: Towards a method for finding and prioritizing potential performance improvement areas in manufacturing operations. *Journal of Productivity and Performance Management*, 53(1), pp. 52-71.
- Gunasekaran, A. and Kobu, B. 2007. Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995–2004) for research and applications, *Int. J. Prod. Res.* 45 (12) (2007) 2819–2840.
- Hailu, K. B., & Tanaka, M. 2015. A "true" random effects stochastic frontier analysis for technical efficiency and heterogeneity: Evidence from manufacturing firms in Ethiopia. *Economic Modelling*, 50, 179-192.
- Hakala, D. 2008. 16 Ways to Measure Employee Performance. HR world. pdf.
- Hall, R.W. 1983. *Zero Inventories*, Dow-Jones Irwin, Homewood, IL.
- Hayes, R.H. and Abernathy, W.J. 1980. "Managing our way to economic decline", *Harvard Business Review*, July-August, pp. 67-77.
- Hermela, S. 2016. Performance Measurement and Improvement System in Meat Processing Industries (With Special Reference to Addis Ababa Abattoirs Enterprise). Addis Ababa: Unpublished MSc Thesis.
- Heron, E. 2009. Correlation and Regression pdf retrieved on September 07, 2018.
- Heshmati, A., and Rashidghalam, M. 2016. Labor Productivity in Kenyan Manufacturing and Service Industries. Sogang University. Republic of Korea. Seoul.
- Hogan, J.J. 1992. Turnover and what to do about it. *The Cornell HRA Quarterly*. 33 (1):40-45.
- Hondroyannis, G., & Papapetrou, E. 1997. Are budget deficits inflationary? A cointegration approach. *Applied Economics Letters*, 4, 493-496.
- House, C.H. and Price, R.L. 1991. The return map: tracking product teams. *Harvard Business Review*, January-February, pp. 92-100.

- Huizinga, F., & Broer, P. 2004. Wage moderation and labour productivity. *CPB Netherlands Bureau for Economic Policy Analysis*, 1-36.
- Hwang, C.S. and Tung, H. T. 2016. Factors Affecting the Quality of Workforce at Hanoi Department of Information and Communication.pdf. Retrieved from <http://ir.meiho.edu.tw/ir/bitstream.pdf> on August 31, 2018.
- ICSI. 2013. Executive Programme - Cost and Management Accounting. Module 1 Paper 2 pdf. website www.icsi.edu.
- ILO, 2008. Measurement of working time, 18th ICLS.
- Jahan, S. and Jespersen, E. 2016a. Human Development Report 2016 Human Development for Everyone. Published for the United Nations Development Programme (UNDP). 1 UN Plaza, New York, NY 10017 USA.
- Jahan, S. and Jespersen, E. 2016b. Human Development Report 2016 Human Development for Everyone. Briefing note for countries on the 2016 Human Development Report, Ethiopia.pdf. UNDP. Retrieved from <http://hdr.undp.org/en/data> on August 16, 2018
- Johnson, J., Griffeth, R.W., Griffin M. 2000. Factors discrimination functional and dysfunctional sales force turnover. *J. Bus. Ind. Mark.* 15 (6): 399-415.
- Kanthi M., Muthiah and H. Samuel. 2006. A review of literature on manufacturing systems productivity measurement and improvement. *International Journal of Industrial and Systems Engineering*, Vol. 1, No. 4, 2006 pp. 461-484.
- Kaplan, R. & Norton, D. 1996. Using the balanced score card as a strategic management system. *Harvard Business Review*, Volume 74.
- Kaplan, R. S. and D. P. Norton. 1992. The balanced scorecard - Measures that drive performance. *Harvard Business Review* January-February: 71-79.
- Kaplan, R. S. and D. P. Norton. 1996. *The Balanced Scorecard: Translating strategy into action.* Boston, Ma, Harvard Business School Press.
- Kaplan, R.S. and D.P. Norton. 1992. The balanced scorecard – measures that drive performance. *Harvard Business Review*, January-February, pp. 71-9.
- Koch, J. M. and McGrath, G. R. 1996. Improving Labor Productivity: Human Resource Management Policies do Matter. *Strategic Management Journal*, Vol. 17, No. 5, pp. 335-354.
- Kothari, C. 2004. *Research Methodology: Methods and Techniques.*
- Kumar, S., Webber, D. J., & Perry, G. 2009. Real wages, inflation and labour productivity in Australia. *Department of Business Economics, Auckland University of Technology, New Zealand*, 1-15.
- Laitinen, E.K. 2002. A dynamic performance measurement system: evidence from small Finnish technology companies. *Scandinavian Journal of Management. Scand. J. Mgmt.* 18 (2002) 65-99.

- Lynch, R. L., & Cross, K. F. 1991. *Measure up! Yardsticks for continuous improvement*. USA: Blackwell.
- Lynch, R.L. and Cross, K.F. 1991. *Measure Up – the Essential Guide to Measuring Business Performance*, Mandarin, London.
- Magnusson, L. 2010. *Performance Management using SCOR*, Ericsson AB. Supply Chain Council.
- Masso, J. and A. Heshmati. 2004. *Optimality and Overuse of Labor in Estonian Manufacturing Enterprises*. *Economics of Transition*, 12(4), 683-720.
- Mathieu, J. E., & Zajac, D. M. 1990. A review and meta-analysis of the antecedents, correlates, and consequences of organizational commitment. *Psychological Bulletin*, 108, 171-194.
- Mitchell, T. R., Holtom, B. C., Lee, T. W., Sablinski, C. J., & Erez, M. 2001. Why people stay: Using job embeddedness to predict voluntary turnover. *Academy of Management Journal*, 44(6), 1102-1121.
- MOI. 2013. *Ethiopian Industrial Development Strategic Plan (2013-2025)*. Addis Ababa: FDRE MOI.
- Moullin, M., 2005a. Defining performance measurement: the debate continues. *Perspectives on Performance*, Vol. 4 No. 1, p. 13.
- Nanni, A. J., Dixon, R. and Vollmann, T. E. 1992. Integrated performance measurement: management accounting to support the new manufacturing realities. *Journal of Management Accounting Research* 4(Fall): 1-19.
- Narayan, P. K., & Smyth, R. 2009. The effect of inflation and real wages on productivity: New evidence from a panel of G7 countries. *Applied Economics*, 41(10), 1285-1291.
- Nayak, S. R., & Patra, S. 2013. Wage-labour productivity relationship in manufacturing sector of Odisha: An observed analysis. *International Journal of Engineering Science Invention*, 2(3), 8-11.
- Neely, A.D., Mills, J., Platts, K., Gregory, M. and Richards, H. 1994. Realising strategy through measurement. *International Journal of Operations & Production Management*, Vol. 14 No. 3, pp. 140-52.
- OECD. 2001. *Publications on Measuring productivity – OECD Manual: measurement of aggregate and industry-level productivity growth*.
- OECD. 2015. *OECD Compendium of Productivity Indicators 2015*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/pdtvy-2015-en>. ISBN 978-92-64-22957-0 (PDF).
- Ongori, H. 2007. A Review of the Literature on Employee Turnover. *African Journal of Business Management* pp. 049-054. Retrieved on March 22, 2018 from <http://www.academicjournals.org/ajbm>
- Ovidiu et al., 2011. Utilisation of benchmarking techniques for fundamenting development strategies in the manufacturing industry in Romania.

- Pallant, J. 2016. SPSS Survival manual - A Step by Step Guide to Data Analysis Using IBM SPSS. pdf, Open University Press, England and Two Penn Plaza, New York, NY 10121-2289, USA.
- Parasuraman, A., Zeithmal, V.A. and Berry, L.L. 1990. Delivering Service Quality: Balancing Customer Perceptions and Expectations, Free Press, New York, NY.
- Phelps, T. 2006. "SCOR and benefits of using process reference models". Proceedings of the 2006 Supply Chain International Conference, Taipei, Taiwan.
- Racho, A. 2015. The Causes and Effects of Employees' Turnover: the Case of Oromia Water Works Design and Supervision Enterprise. Addis Ababa: Unpublished MBA thesis.
- Raggl, A. K. 2015. Determinants of total factor productivity in the Middle East and North Africa. *Review of Middle East Economics and Finance*, 11(2).
- Roma, M. R. & Tesfahunegn, S. Z. 2015. Performance Measurement of Manufacturing Industries in Ethiopia. Volume 7.
- Roma, M. R. & Tesfahunegn, S. Z., 2015. Performance Measurement of Manufacturing industries in Ethiopia. Volume 7.
- RSA. 1994. Tomorrow's Company: The Role of Business in a Changing World, interim report, Royal Society of Arts, Manufacturers and Commerce, London, February.
- Sahay, B. S. 2005. Multi-factor productivity measurement model for service organization, *International Journal of Productivity and Performance Management*, 54 (1), 7-22.
- Sauermann, J. 2016. Performance measures and worker productivity. Stockholm University, Sweden, IZA, Germany, and Research Centre for Education and the Labor Market (ROA), the Netherlands.
- Schmenner, R.W. 1988. "Escaping the black holes of cost accounting", *Business Horizons*, January-February, pp. 66-72.
- Schreyer, P. 2005. Measuring Productivity. Conference on next steps for the Japanese SNA Tokyo, 25 March 2005.
- Skinner, W. 1974. "The decline, fall, and renewal of manufacturing", *Industrial Engineering*, October, pp. 32-8.
- Steinmetz and Lawrence. 1969. Unrecognized Enigma of Executive Development. *Management of Personnel*, New York Vol. (8) 5.
- Stocker, A. Gerold, S., Hinterberger, F., Berwald, A., Soleille, S., Morgan, V.A. and Zoupa-nidou, E., 2015. The Interaction of Resource and Labor Productivity. Sustainable Europe Research Institute (SERI) bio by Deloitte. www.seri.at
- Stovel, M. and N. Bontis. 2002. Voluntary turnover: knowledge management-friend or foe? *J. intellect. Cap.* 3 (3): 303-322.
- Sumanth, D.J. 1984. *Productivity Engineering and Management*, McGraw-Hill.
- Sumanth, D.J. 1985. *Productivity Engineering and Management*, McGraw-Hill, Singapore.

- Syum, A. 2010. Performance Evaluation of Selected Ethiopian Commercial Banks using Balanced Score Card, Mekelle: Unpublished MSc Thesis.
- Syverson, C. 2011. What Determines Productivity? *Journal of Economic Literature* 2011, 49:2, 326–365. <http://www.aeaweb.org/articles.php?doi=10.1257/jel.49.2.326>.
- Tamasauskiene, Z., & Stankaityte, A. 2013. Evaluating of the relationship between wages and labor productivity in Lithuania: Territorial and sectoral approaches. *Social Research*, 1(30), 24-35.
- Tangen, S. 2004. Evaluation and Revision of Performance Measurement Systems. A Doctoral Thesis ed. Stockholm, Sweden : Royal Institute of Technology.
- Tangen, S. 2004. Evaluation and Revision of Performance Measurement Systems. A Doctoral Thesis ed. Stockholm, Sweden : Royal Institute of Technology.
- Tangen, S. 2005. Demystifying Performance and Productivity. *International Journal of Productivity and Performance Management*, 54(1), pp. 34-36.
- Time magazine. 2015. World economy. Retrieved from <http://time.com/4621185/worker-productivity-countries> on date July 12, 2018
- Tomas, C. 2011. Performance Analysis and Improvement of Ethiopian Leather Footwear Factories, Addis Ababa: MSc Thesis.
- Trpeski, P., Eftimov, L. & Cvetanoska, M. 2016. Labor productivity and real wages in Macedonia: An overview before and after the global economic crisis. *European Scientific Journal*, 12(10), 1-14.
- Tunalv, C. 1992. Manufacturing strategy plans and business performance. *Jornal of Operations & Production Management*, 12(3), pp. 4-24.
- Turney, P.B.B. and Anderson, B. 1989. “Accounting for continuous improvement”, *Sloan Management Review*, Vol. 30 No. 2, pp. 37-48.
- UNIDO in Cooperation with MoIT. 2005. A Strategic Action Plan for the Development of the Ethiopian Leather and Leather Products Industry. Volume I, Ethiopia.
- Wasmuth WJ, Davis SW. 1983. "Managing employee turnover: why employees leave", *The Cornell HRA Quarterly*, pp. 11-18.
- Weber, S. and Thomas, R. 2005. Key Performance Indicators Measuring and Managing the Maintenance Function. IVARA CORPORATION, 935 Sheldon Court, Burlington Ontario, Canada.
- Yen, C. L., Leng, S. L., Wei, T. K., Ming, T. Y. and Yi, Y. X. 2017. The Determinants of Labor Productivity in United Kingdom. Unpublished thesis pdf retrieved from http://eprints.utar.edu.my/2699/1/fyp_BF_2017_TKW_1406894.pdf dated September 07, 2018.

- Yitagesu, Y. 2017. Performance Measurement System in Manufacturing Industry for Better Competitiveness Case of Ethiopian Prioritized Manufacturing Industries, Addis Ababa: PhD dissertation report.
- Zijlstra, J., Berhanu, T., Vernooij, A., Van Der Lee, J. & Boere, A. 2015. Investment Opportunities in Ethiopian Dairy Sector. Wageningen UR Livestock Research.

Appendix

Annex I: Bibliography

Abiy, Z., Alemayehu, W., Daniel, T. and Melese, G., 2009. Introduction to Research Methods, Preparatory module for Addis Ababa University graduate programs. Graduate Studies and Research Office, Addis Ababa University, Addis Ababa.

Gray, D.E., 2004. Doing Research in the Real World pdf. SAGE Publications, London /Thousand Oaks /New Delhi.

Annex II: Questionnaire

Addis Ababa
University
(Since 1950)



**Addis Ababa Institute of Technology
School of Mechanical Engineering and Industrial Engineering**

Labor Productivity Measurement and Improvement: In Case of Ethiopian Medium and Large Footwear Industry

This survey is aimed at collecting data from footwear industry for labor productivity measurement and improvement requirement. The questionnaire is conducted for academic purpose only. I am responsible for the confidentiality of any data that you provide me. So, I request your kind cooperation to fill this questionnaire. If you have any query related to this thesis, you can contact my advisors Dr. Ephrem G. (+251911002935, ephyalem@gmail.com) and Mr. Daniel A. (+251944139407, daniel.ashagrie@gmail.com).

Thanking you in advance for your kind cooperation.

With best regards,

Abdi Angerasa

Cell phone: +251931430551

Email: abdinago2@gmail.com

Section I – Questionnaire for top and middle management

Part 1: Profile of respondent *(not necessary to write your Name!)*

- a) Company name _____
- b) Your current position (GM, Production Head, etc.) _____
- c) Highest Qualification (Below diploma, College diploma, BA/BSc, MA/MSc & above)

- d) Your work experience (in years) _____ Sex _____ Age _____

Part 2: Please rate on the scale 1 to 5 with the following questions.

Please tick '✓' mark in the corresponding cell that you most agree with.						
1 = Strongly disagree, 2 = Disagree, 3 = Indifferent, 4 = Agree, 5 = strongly agree						
		1	2	3	4	5
<u>Human resource sophistication</u>						
1.	Many candidates are interviewed to hire few employees.					
2.	Practical tests were given for you when you were recruited for this position.					
3.	Theoretical tests were given for you when you were recruited for this position.					
4.	The time given for hiring process is enough.					
5.	Company provides you formal short term training after you started this job.					
6.	You had sector related experience when you were hired in this company.					
<u>Quality of workforce</u>						
1.	Your education or schooling helps you to be productive.					
2.	The company gives you long term training opportunity.					
3.	You are interested to continue in this job as your career.					
4.	Workers selection and staffing policies is regularly evaluated for improvement.					
5.	The company gives you short term training opportunity.					
<u>Management and scheduling</u>						
1.	You sometimes wait for materials in process until it reaches you.					
2.	Other than your supervisor you sometimes get direct job order from others.					
3.	You get timely information from your supervisor.					
4.	When you make fault of operating, your supervisor heartens and allows you to feel comfortable.					
5.	Your work usually stops because of maintenance work.					

Please tick '✓' mark in the corresponding cell that you most agree with. <u>1 = Strongly disagree, 2 = Disagree, 3 = Indifferent, 4 = Agree, 5 = strongly agree</u>						
		1	2	3	4	5
6.	When you get difficulty in your work you ask your colleagues.					
7.	Raw materials are always timely supplied to the factory's shop floor.					
8.	Operators sometimes get direct job order from top management.					
<u>Lowering labor turnover</u>						
1.	Your company evaluates itself regularly in order to minimize workers layoff.					
2.	There is effective communication between operators and their supervisors on facilities in the organization.					
3.	Workers leave your company on their own interest.					
4.	There is effective communication among operators on facilities in the organization and job expectations.					
5.	The company corrects/amends itself regularly in order to minimize workers layoff.					
<u>Lowering impacts of other inputs</u>						
1.	Electric interruption has frequently caused significant impact on your work.					
2.	You have not faced materials shortage on work.					
3.	The company production per day depends on availability of market order.					
4.	Lack of working capital has affected your company production.					
5.	Lack of hard currency has affected your company production.					

Part 3: Prioritize the following problems in their order of influences on labor productivity

<i>Factors affecting labor productivity</i>	<i>Priority order level</i>
1. Electric interruption	_____
2. Poor production planning	_____
3. Poor human resource selection, hiring, training and development problem	_____
4. Customer order problems	_____
5. Poor skills and experiences of operators and supervision	_____
6. Working capital problem	_____
7. Impacts of inputs like material availability, facilities, information, tools and equipment	_____
8. Ineffective communication system among workers	_____

- 9. Lack of salary carrier structure and motivation schemes _____
- 10. Other(s), please specify----- _____

Part 4: What are the major causes hindering labor productivity in your company? (*Please put your answer in order of importance*)

- a) _____
- b) _____
- c) _____
- d) _____

Section II – Questionnaire for workers

Part 1: Profile of respondent (*not necessary to write your Name!*)

- a) Company name _____
- b) Your section _____
- c) Highest Qualification (Below diploma, College diploma, BA/BSc & above) _____
- d) Your work experience (in years) _____ Sex _____ Age _____

Part 2: Please rate on the scale 1 to 5 with the following questions.

Please tick '✓' mark in the corresponding cell that you most agree with. 1 = Strongly disagree, 2 = Disagree, 3 = Indifferent, 4 = Agree, 5 = strongly agree በጣም ምክንያት ምርጫ ላይ '✓' ምልክት ያድርጉ: : (1= በጣም አልሰማም 2= አልሰማም 3= አላወቅም 4= እስማማለሁ 5= በጣም እስማማለሁ) Filannoo kee irratti '✓' godhi. (1- gonkuma itti walii hin galu, 2- itti walii hin galu, 3- hin beeku, 4- ittan walii gala, 5- baaye'een itti walii gala)						
		1	2	3	4	5
1	Quality of workforce					
	You got relevant training before starting your current task. ይህ ስራ ከመጀመሪያ በፊት አስፈላጊ ውን ስልጠና አግኝተሃል: : Hojii kana otoo hin eegaliin dursa leenjii gahaa argatteetta.					
	Company provides you formal short term training after you started this job. ይህ ስራ ከጀመረክ ወደህ ፋብሪካው ወይም አጭር ጊዜ ስልጠና ሰጥቶ ያወቃል:: Fabrikichi erga hojjaa eegaltee leenjii yeroo gabaabaa sii kennee beeka.					
	You had sector related experience when you were hired in this company. በዚህ ፋብሪካ ስራ ሳትቀጠር ተመሳሳይ የስራ ልምድ ነበረክ Fabrikaa kanatti qaxaramtee yeroo hojii eegaluuf jette muuxannoo hojii amma hojjettuu qabda turte.					
	Your education or schooling helps you to be productive.					

	ትምህርት ቤት ያገኘው ትምህርት ለምትሰራው ስራ እገዛ አድርጎ ልሃል፡፡ Barumsi ati mana barumsaa seentee baratte bakka hojii kanatti si fayyadeera.					
	There company gives you long term training opportunity. ፋብሪካው የረጅም ጊዜ ስልጠና ዕድል ይሰጥሃል፡፡ Fabrikichi leenjii yeroo dheeraa in sii kenna.					
2	Scheduling					
	You sometimes wait for materials in process until it reaches you. በምርት ሂደት ላይ እያለክ አንዳንድ ጊዜ ማቴሪያል ጨርሶክ እስከ ማጣልክ ትጠብቃለህ፡፡ Hojiirra otoo jirtuu takka takka kan kee xumurtee hamma inni itti aanu si bira gahuttii ni eegda.					
	Other than your supervisor you sometimes get direct job order from others. አንዳንድ ከሃላፊህ ወይም ሌላ ሰው ስራ ትዕዛዝ ይሰጥሃል፡፡ Supervaayizara keetiin alatti namni biroon takka takka ajaja hojii ni sii kenna.					
	You get timely information from your supervisor. ከሃላፊህ የሚጠቅምን ሚዲያ በጊዜ ታገኛለህ፡፡ Odeeffannoo yeroo yerootti supervaayizara kee irraa ni argatta.					
	When you make fault of operating, your supervisor heartens and allows you to feel comfortable. በስራ ላይ እያለክ ብትሰሳት ሃላፊህ እንዳትበሰጩ ተረጋግተህ ስራህን እንድትሰራ ያበረታታሃል Hojiikee irratti yeroo ati dogoggortu, supervaayizarri kee akka ati hin aarre gochuudhaan si jajjabeessa.					
	Your work usually stops because of maintenance work. በሰዓት ጥገና ምክንያት ብዙ ጊዜ ስራህ ይቋረጣል፡፡ Maashinii suphuuf hojiin yeroo baayyee ni dhaabbata.					
	<i>Work environment:</i> When you get difficulty in your work you ask your colleagues. ስራ ላይ እያለክ አዳጋችሁኝ ታዎች ስያጋጥሙክ አጠገብክ ያለውን የስራ ባልደረባህ ማጠየቅ ትችላለክ፡፡ Hojiikee irratti wanti ati hin beekne yoo si quunname hojjetaa si cina jiru gaafachuu dandeessa.					
3	Human resource sophistication					
	Many candidates are interviewed to hire few employees. ይህ ስራ ለማግኘት ስትቀጠር ብዙ ተወዳዳሪዎች ተወዳድረው ጥቂት ሰዎች ተመረጡት/አንተ አለፍክ/ Hojjettoota xiqqoo qaxaruuf dorgomtoota baay'eetu dorgoma.					
	Practical tests were given for you when you were recruited for this position. በቅጥር ጊዜ ለተወዳዳሪዎች የተግባር ፈተና ተሰተዉነ በር Yeroo qaxaramtan qormaatni kan hojii dirree (practical) ni kennama.					
	Theoretical tests were given for you when you were recruited for this position. በቅጥር ጊዜ ለተወዳዳሪዎች የወረቀት ላይ ፈተና ተሰተዉነ በር					

	Yeroo qaxaramtan qormaatni kan waraqaa (theory) ni kennama. The time given for hiring process is enough. ብቁ ሰራተኛ ለመሥሪ ጥያቄ ጥር ሂደቱ ይዘትና ጊዜ በቂ ነበር Qaxarrii ilaalchisee adeemsi faabrikichi taasisu gaarii dha.					
4	Labor turnover (Reasons and effects)					
	There is effective communication among operators on facilities in the organization and job expectations. በሰራተኞች መሀከል ጥሩ መግባባት አለ Hojjettoota gidduu hariiroo fi waliigaltee hojii gaarii jira.					
	There is effective communication between operators and their supervisors on facilities in the organization and job expectations. በሰራተኞችና በሱፐርቪዥን ይዘት/ሃላፊ መሀከል ጥሩ መግባባት አለ Hojjettoota fi supervaayizara gidduu harriiroo fi waliigaltee hojii gaarii jira.					
	Workers leave your company on their own interest. ሰራተኞች ስራ የሚቋቋምበት ስራ ሰራተኞች ላይ ነው Hojjettoonni hojii yeroo gad lakkisan fedhii isaaniitiin dha.					
	Your company amends itself regularly in order to minimize workers layoff. ፋብሪካው ሰራተኞች በብዛት እንዳይለቁ በየጊዜው ሰራተኞችን ችግር እየፈተሽ ለመቀረፍ ይሰራል Hojjettoota hojii gad lakkisan xiqqeessuuf fabrikichi haala jiru qorachuun hojjettootaaf yereoo yerootti fooyyee taasisa.					
5	Other inputs					
	Electric interruption has frequently caused significant impact on your work. የመብራት መቆራረጥ ብዙ ጊዜ ስራ ላይ አሉን ታዊ ጭነት አሳድሯል Badinsi humna ibsaa yeroo baay'ee hojii irratti rakkoo uumeera.					
	Each operator has all basic facilities like tools that are required to independently perform for his/her tasks. እያንዳንዱ ሰራተኛ ለስራው አጋዥ የሆኑ ቁሳቁሶች ለግል ስራ ይቀርብላታል Tokko tokkoo hojjetaaf meeshaalee xixiqqoon hojiif barbaachisan ni guutamaaf.					
	You have not faced materials shortage on work. ስራ ላይ እያለክ የሚሰራ ስራ በመጨረሻ ሰራተኞች ስራቸውን ያቆማሉ Rakkoo materiyaalaatiin kan ka'e hojiin dhaabatee hin beeku.					

What are the major problems you would like to be solved for you? (Please put in order of importance)

ብዙ ጊዜ ፋብሪካው እንዲፈታልክ የምትፈልጋቸው ነገሮች ምንድን ናቸው (እባክህ በአንገት ብቻ ስራዎችን ቅደም ተከተል አስቀምጥቸው)

Fabrikichi akka sii hiikuuf rakkoon ati qabdu maali? (tartiiba barbaachisummaa isaniitiin teechisi)

- a) _____
- b) _____
- c) _____

d) _____

Section III – Likert Scale Questionnaire merged for SPSS Analysis

Part 1: Profile of respondent (not necessary to write your Name!)

- a) Company name _____
- b) Your section _____
- c) Highest Qualification (Below diploma, College diploma, BA/BSc & above _____)
- d) Your work experience (in years) _____ Sex _____ Age _____

Part 2: Please rate on the scale 1 to 5 with the following questions.

Please tick '✓' mark in the corresponding cell that you most agree with. 1 = Strongly disagree, 2 = Disagree, 3 = Indifferent, 4 = Agree, 5 = strongly agree		1	2	3	4	5
<u>Human resource sophistication</u>						
1.	Many candidates are interviewed to hire few employees.					
2.	Practical tests were given for you when you were recruited for this position.					
3.	Theoretical tests were given for you when you were recruited for this position.					
4.	The time given for hiring process is enough.					
5.	Company provides you formal short term training after you started this job.					
6.	You had sector related experience when you were hired in this company.					
<u>Quality of workforce</u>						
1.	Your education or schooling helps you to be productive.					
2.	The company gives you long term training opportunity.					
3.	You are interested to continue in this job as your career.					
4.	<i>Workers selection and staffing policies is regularly evaluated for improvement.</i>					
5.	The company gives you short term training opportunity.					
<u>Management and scheduling</u>						
1.	You sometimes wait for materials in process until it reaches you. ***negate					
2.	Other than your supervisor you sometimes get direct job order from others. ***negate					
3.	You get timely information from your supervisor.					
4.	When you make fault of operating, your supervisor heartens and allows you to feel comfortable.					
5.	Your work usually stops because of maintenance work. ***negate					
6.	When you get difficulty in your work you ask your colleagues.					

Please tick '✓' mark in the corresponding cell that you most agree with. 1 = Strongly disagree, 2 = Disagree, 3 = Indifferent, 4 = Agree, 5 = strongly agree		1	2	3	4	5
7.	Raw materials are always timely supplied to the factory's shop floor.					
8.	Operators sometimes get direct job order from top management.					
Lowering Labor turnover						
1.	Your company evaluates itself regularly in order to minimize workers layoff.					
2.	There is effective communication between operators and their supervisors on facilities in the organization.					
3.	Workers leave your company on their own interest.					
4.	There is effective communication among operators on facilities in the organization and job expectations.					
5.	The company corrects/amends itself regularly in order to minimize workers layoff.					
Lowering impacts of other inputs						
1.	Electric interruption has frequently caused significant impact on your work. *negate					
2.	You have not faced materials shortage on work.					
3.	The company production per day depends on availability of market order.					
4.	Lack of working capital has affected your company production.					
5.	Lack of hard currency has affected your company production.					

Thank you for your cooperation!!

Annex III: Sample shoe SOP and skill requirement

SN	Major SOP for oxford shoe upper	 Skill required
1.	Sorting	Skilled
2.	Skiving components of upper	Skilled
3.	Attach interlining to toecap, quarters and vamp (Keep under scarf of skiving). If required	Semiskilled
4.	Foil stamping lining for size and fitting on quarter lining	Semiskilled
5.	Closed seam quarter by single needle flatbed machine	Semiskilled
6.	Back seam rubbing (flattening back seam) and tape back seam	Semiskilled
7.	Apply adhesives on upper vamp and toe cap	Unskilled
8.	Attach the upper vamp with toe cap	Unskilled
9.	Stitch toecap to vamp by double needle flatbed machine	Skilled
10.	Apply adhesives on upper vamps and quarters	Unskilled
11.	Attach the upper vamps to quarters	Unskilled
12.	Stitch vamp to quarter by double needle post bed machine	Skilled
13.	Stitch quarter lining with heel grip	Semiskilled
14.	Stitch quarter lining to vamp lining by single needle flatbed mc	Semiskilled
15.	Manual folding quarter top line, vamp and toecap.	Skilled
16.	Pre fit lining shell to upper by rubber solution adhesive	Semiskilled
17.	Topline stitching	Skilled
18.	Lining trimming	Semiskilled
19.	Edge inking top line lining and tongue by same color	Unskilled
20.	Attaching eyelets by eyeleting mc	Semiskilled
21.	Examine upper	Skilled

Annex IV: Details of LP measurement (factory wise computations)

Table 36: Kangaroo labor productivity computation

	2006EC		2007EC		2008EC		2009EC		2010EC	
mo	Total workers 237	actual production (pairs/annu m)	Total workers 298	actual production (pairs/month)	Total 385	actual production (pairs/month h)	Production workers 284 (s=57, ss=99, us=128)	actual production (pairs/month h)	Production workers 243 (s=49, ss=85, us=109)	actual production (pairs/month h)
nth	Production workers 204 (20/35/45)% (s=41, ss=71, us=92)		Production workers 246 (s=49, ss=86, us=111)		Production workers 291 (s=58, ss=102, us=131)		Non production workers 75 (mgt.=5, staff=70)		Non production workers 93 (mgt.=5, staff=88)	
1	Non production workers 33 (mgt.=5, staff=28)	114,223	Non production workers 52 (mgt.=5, staff=47)	7,436	Non production workers 72 (mgt.=5, staff=67)	8,389	Contract and temporary workers 22	7,901	Contract and temporary workers 22	7,968
2	Contract and temporary workers 0		Contract and temporary workers 0	9,634	Contract and temporary workers 22	12,241	Total 381	12,427	Total 358	9,331
3	$S=s+mgt=41+5,$			6,030	$S=Mgt.+s.=5+58=63$	10,495		9,846		8,887
4	$SS=ss+staff+contra=71+28+0. US=92. Workers structured= 248$			7,897	$SS=Staff+ss+contr act=102+67+22=191$	12,771		14,404		13,267
5	8working hours/day from Monday to Friday and 5 working hrs/day on Saturday (= 24.5 days /month).			10,661	$Us=146$	14,524		7,618		8,019
6	leave + absences time:21+ 9days 30 days =2.5days/month			7,227		15,979		9,964		12,919
7	Side work...0;Sister company work 0			8,424		9,946		8,980		10,010
8	Effective days/month 22.			6,143		7,303		10,778		10,339
9				7,680		8,342		13,394		5,881
10				5,291		3,506		10,180		-
11				5,572		11,338		16,899		-
12				4,471		8,971		16,241		-
	Average	9,518.58	Average	7,205.5	Average	10,317.1	Average	11,553	Average	9,624.6
	units produced $\frac{9,518.58prs/month}{22day/month}$		units produced $\frac{7,205.5prs/month}{22days/month}$		units produced $\frac{10,317.1prs/month}{22days/month}$		Units produced $\frac{11,553prs/month}{22days/month}$		Units produced $\frac{9,624.6prs/month}{22days/month}$	
	= 432.66pairs/day		= 327.52pairs/day		468.96pairs/day		= 525.14pairs/day		= 437.48pairs/day	
	LP = $\frac{Units\ produced}{0.8S + SS + 1.1US}$		LP = $\frac{Units\ produced}{0.8S + SS + 1.1US}$		LP = $\frac{Units\ produced}{0.8S + SS + 1.1US}$		LP = $\frac{Units\ produced}{0.8S + SS + 1.1US}$		LP = $\frac{Units\ produced}{0.8S + SS + 1.1US}$	
	= $\frac{432.66prs/day}{0.8(46) + 99 + 1.1(92)}$		= $\frac{327.52prs/day}{0.8(54) + 133 + 1.1(111)}$		= $\frac{468.96prs/day}{0.8(63) + 191 + 1.1(131)}$		= $\frac{525.14prs/day}{0.8(62) + 191 + 1.1(128)}$		= $\frac{437.48prs/day}{0.8(54) + 195 + 1.1(109)}$	
	= <u>1.83pairs/day</u>		= <u>1.10pairs/day</u>		= <u>1.22pairs/day</u>		= <u>1.38pairs/day</u>		= <u>1.22pairs/day</u>	

Table 37: Peacock labor productivity computation

	2006EC		2007EC		2008EC		2009EC		2010EC	
month	Total workers 307 Production workers 269 (20/35/45)% (s=54, ss=94, us=121)	actual production (pairs/annu m)	Total workers 333	actual production (pairs/month)	Total 275	actual production (pairs/mont h)	Total 290	actual production (pairs/mont h)	Total 358	actual production (pairs/mont h)
1		205,275	Production workers 294 (s=59, ss=103, us=132)	253,350	Production workers 235 (s=47, ss=82, us=106)	21,278	Production workers 249 (s=50, ss=87, us=112)	19837	Production workers 243 (s=49, ss=85, us=109)	
2	Non production workers 38 (mgt.=5, staff=33)		Non production workers 39 (mgt.=5, staff=34)	234,592 pairs of insole/annu m produced using 5 workers	Non production workers 40 (mgt.=5, staff=35)	27,676	Non production workers 41 (mgt.=5, staff=36)	15723	Non production workers 93 (mgt.=5, staff=88)	
3	Contract and temporary workers 0		Contract and temporary workers 0	20workers sole production	Contract and temporary workers 0	13,487	Contract and temporary workers 0	8939	Contract and temporary workers 22	
4	8working hours/day from Monday to Friday and 5 working hrs/day on Saturday (= 24.5 days /month).		<i>Side work :insole, sole;</i>		<i>Side work :insole and sole; for insole 5 workers, for sole 20workers</i>	13,974	<i>Side work :insole and sole; for insole 5 workers, for sole 20workers</i>	12723	<i>Side work :insole and sole; for insole 5 workers, for sole 20workers</i>	
5	leave + absences time:21+ 9days 30 days =2.5days/month		<i>Sister company work 0</i>			14,985		13698		
6	Effective days/month 22.					10,648		22055		
7						12,525		15391		
8						21,654		15743		
9						18,066		23753		
10						14,679		12302		-
11						22,261		22662		-
12						22,199		24425		-
	Average	17,106.25	Average	21,112.50	Average	17,786.00	Average	17,270.92	Average	18,270*
	units produced $= \frac{17,106.25\text{prs/month}}{22\text{day/month}}$ $= 777.56\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{777.56\text{prs/day}}{0.8(59) + 127 + 1.1(121)}$ $= \underline{2.53\text{pairs/day}}$		units produced $= \frac{21,112.50\text{prs/month}}{22\text{days/month}}$ $= 959.66\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{959.66\text{prs/day}}{0.8(62) + 125 + 1.1(121)}$ $= \underline{3.12\text{pairs/day}}$		units produced $= \frac{17,786\text{prs/month}}{22\text{days/month}}$ $= 808.45\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{808.45\text{prs/day}}{0.8(50) + 105 + 1.1(95)}$ $= \underline{3.24\text{pairs/day}}$		Units produced $= \frac{17,270.92\text{prs/month}}{22\text{days/month}}$ $= 785.04\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{785.04\text{prs/day}}{0.8(53) + 111 + 1.1(101)}$ $= \underline{2.97\text{pairs/day}}$		Units produced $= \frac{18,270\text{prs/month}}{22\text{days/month}}$ $= 830.45\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{830.45\text{prs/day}}{0.8(54) + 195 + 1.1(109)}$ $= \underline{2.34\text{pairs/day}}$	

Table 38: Ok Jamaica labor productivity computation

	2006EC		2007EC		2008EC		2009EC		2010EC	
mo	Total workers 97 Production workers 82 (20/35/45)% (s=16, ss=29, us=37) Non production workers 15 (mgt.=5, staff=10) Contract and temporary workers 0 8working hours/day from Monday to Friday and 5 working hrs/day on Saturday (= 24.5 days /month). leave + absences time:21+ 9days 30 days =2.5days/month <i>Side work...0;Sister company work 0</i> Effective days/month 22.	actual production (pairs/annu m)	Total workers 112 Production workers 93 (s=19, ss=33, us=42) Non production workers 19 (mgt.=5, staff=14) Contract and temporary workers 0 <i>Side work: 0 Sister company work 0</i>	actual production (pairs/month)	Total workers 130* Production workers 105 (s=21, ss=37, us=47) Non production workers 25 (mgt.=5, staff=20) Contract and temporary workers 0 <i>Side work: 0 Sister company work 0</i>	actual production (pairs/mont h)	Total 151 Production workers 132 (s=26, ss=46, us=59) Non production workers 19 (mgt.=5, staff=14) Contract and temporary workers 0 <i>Side work 0</i>	actual production (pairs/mont h)	Total 106 Production workers 83 (s=17, ss=29, us=37) Non production workers 23 (mgt.=5, staff=18) Contract and temporary workers 0	actual production (pairs/mont h)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
	Average(pairs/month)	2,654	Average	2,591	Average	3,652	Average	4,751	Average	5,148
	$\frac{\text{units produced}}{22\text{day/month}} = \frac{2,654\text{prs/month}}{22\text{day/month}}$ $= 121\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{121\text{prs/day}}{0.8(21) + 39 + 1.1(37)}$ $= \underline{1.25\text{pairs/day}}$		$\frac{\text{units produced}}{22\text{day/month}} = \frac{2,591\text{prs/month}}{22\text{day/month}}$ $= 118\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{118\text{prs/day}}{0.8(24) + 47 + 1.1(42)}$ $= \underline{1.06\text{pairs/day}}$		$\frac{\text{units produced}}{22\text{day/month}} = \frac{3,652\text{prs/month}}{22\text{day/month}}$ $= 166\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{166\text{prs/day}}{0.8(26) + 57 + 1.1(47)}$ $= \underline{1.28\text{pairs/day}}$		$\frac{\text{units produced}}{22\text{day/month}} = \frac{4,751\text{prs/month}}{22\text{day/month}}$ $= 216\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{216\text{prs/day}}{0.8(31) + 90 + 1.1(59)}$ $= \underline{1.43\text{pairs/day}}$		$\frac{\text{Units produced}}{22\text{day/month}} = \frac{5,148\text{prs/month}}{22\text{day/month}}$ $= 234\text{pairs/day}$ $LP = \frac{\text{Units produced}}{0.8S + SS + 1.1US}$ $= \frac{234\text{prs/day}}{0.8(22) + 47 + 1.1(37)}$ $= \underline{2.22\text{pairs/day}}$	
	* the number of workers is estimated based on other years									

Table 39: Anbessa labor productivity computation

	2006EC		2007EC		2008EC		2009EC		2010EC				
month	Total workers 800 Production workers 227 (20/35/45)% (s=45, ss=80, us=102)	actual production (pairs/annum) 462,747	Total workers 920 Production workers 241 (s=48, ss=84, us=108)	actual production (pairs/annum) 485,540	Total 822 Production workers 295 (s=59, ss=103, us=133)	actual production (pairs/annum) 494,778	Total 667 Production workers 230 (s=46, ss=80, us=103)	actual production (pairs/annum) 503,546	Total 776 Production workers 240 (s=68, ss=119, us=153)	actual production (pairs/month) 5,2612			
1	Non production workers 348 (mgt.=6, staff=342)	actual production (pairs/month) =462,747/12 = 38,562	Contract and temporary workers 225	actual production (pairs/month) =485,540/12 = 40,462	Non production workers 207 (mgt.=5, staff=202)	actual production (pairs/month) =494,778/12 = 41,232	Non production workers 155 (mgt.=7, staff=148)	actual production (pairs/month) =503,546/12 = 41,962	Non production workers 125 (mgt.=6, staff=119)	actual production (pairs/month) =5,2612/12 = 438.43			
2	8working hours/day from Monday to Friday and 5 working hrs/day on Saturday (= 24.5 days /month). leave:21 i.e. 21/250=0.075days/month		Effective days/month 24.425. <i>Side work: 0;Sister company work: Monpo</i>		Contract and temporary workers 293		Effective days/month 24.425. <i>Side work: 0;Sister company work: Monpo</i>		Contract and temporary workers 320		Effective days/month 24.425. <i>Side work: 0;Sister company work: Lideta</i>	Contract and temporary workers 283	Effective days/month 23.675. <i>Side work: 0;Sister company work: Lideta</i>
3	Effective days/month 24.425. <i>Side work: 0;Sister company work: Monpo</i>		Average(pairs/day)		1,579		1,657		1,688		1,718	1,718	2,222
4	units produced = $\frac{38,562\text{prs/month}}{24.425\text{day/month}}$ = 1,579pairs/day LP = $\frac{\text{Units produced}}{0.8S + SS + 1.1US}$ = $\frac{1,579\text{prs/day}}{0.8(51) + 304 + 1.1(102)}$ = <u>3.45pairs/day</u>		units produced = $\frac{40,462\text{prs/month}}{24.425\text{day/month}}$ = 1,657pairs/day LP = $\frac{\text{Units produced}}{0.8S + SS + 1.1US}$ = $\frac{1,657\text{prs/day}}{0.8(54) + 378 + 1.1(108)}$ = <u>3.07pairs/day</u>		units produced = $\frac{41,232\text{prs/month}}{24.425\text{day/month}}$ = 1,688pairs/day LP = $\frac{\text{Units produced}}{0.8S + SS + 1.1US}$ = $\frac{1,657\text{prs/day}}{0.8(64) + 424 + 1.1(133)}$ = <u>2.72pairs/day</u>		units produced = $\frac{41,962\text{prs/month}}{24.425\text{day/month}}$ = 1,718pairs/day LP = $\frac{\text{Units produced}}{0.8S + SS + 1.1US}$ = $\frac{1,718\text{prs/day}}{0.8(53) + 363 + 1.1(103)}$ = <u>3.31pairs/day</u>		units produced = $\frac{52,612\text{prs/month}}{23.675\text{day/month}}$ = 2,222pairs/day LP = $\frac{\text{Units produced}}{0.8S + SS + 1.1US}$ = $\frac{2,222\text{prs/day}}{0.8(74) + 430 + 1.1(153)}$ = <u>3.38pairs/day</u>				

Table 40: Tikur Abay labor productivity computation

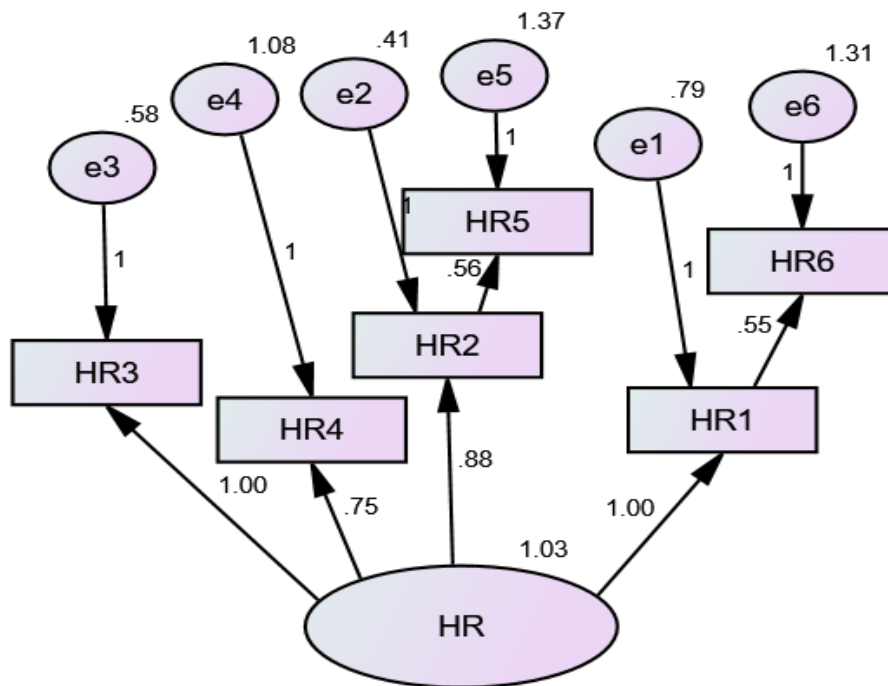
year		2006			2007			2008			2009			2010		
	factor	working days	annum	prod/day	working days	annum	prod per day	working days	annum	prod per day	working days	annum	prod per day	working days	9month	prod per day
Average prod prs/month	unit 1					525,685		276	393,269		279	373784	1,339.7	243	274,359	1,129.0
	unit 2					87,286		276	90,090		300	60062	200.2	236.5	48,746	206.1
	unit 3					17,697		276	33,232		263	39190	149.0	231.5	31,694	136.9
	sum	239	219729	919.4	353	630,668	1786.6	276	516,591	1871.7	280.7	473036	1688.9	237	354799	1472.1
effective date in month				19.92			29.42			23.00			23.39			19.75
prod prs/day				919.4			1786.6			1871.7			1688.9			1472.1
side work	upper		17743			3890*										
	leather		NO			58,566				NO			NO			NO
total workers				647			711			774			785			703
	non prod			76			92			111			123			115
	prod+techn			267			300			507			527			512
	contra+temp			304			319			156			135			76
total workers	0.2	s		60			64			108			112			109
	0.35	ss		466			509			437			435			363
	0.45	us		120			135			228			237			230
total workers																
S	0.8s		0.8	48			51		0.8	87		0.8	90		0.8	88
SS	1ss		1	466			509		1	437		1	435		1	363
US	1.1us		1.1	132			149		1.1	251		1.1	261		1.1	253
workers structured**				582			637			698			708			634
LP				1.58			2.80			2.68			2.39			2.32

*assuming 15pairs of upper produced per day /person, 1worker could do all the quantity

**there is 10% workers absentees on average

Annex V: LP improvement models and AMOS software generated outputs

a. HR model and important notes



Notes for HR Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 21
 Number of distinct parameters to be estimated: 12
 Degrees of freedom (21 - 12): 9

Result (Default model)

Minimum was achieved
 Chi-square = 15.507
 Degrees of freedom = 9
 Probability level = .078

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	12	15.507	9	.078	1.723
Saturated model	21	.000	0		
Independence model	6	257.576	15	.000	17.172

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.106	.960	.908	.412
Saturated model	.000	1.000		
Independence model	.635	.482	.275	.344

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.940	.900	.974	.955	.973
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.600	.564	.584
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	6.507	.000	21.528
Saturated model	.000	.000	.000
Independence model	242.576	194.219	298.372

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.134	.056	.000	.186
Saturated model	.000	.000	.000	.000
Independence model	2.220	2.091	1.674	2.572

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.079	.000	.144	.210
Independence model	.373	.334	.414	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	39.507	41.048	72.653	84.653
Saturated model	42.000	44.697	100.006	121.006
Independence model	269.576	270.347	286.150	292.150

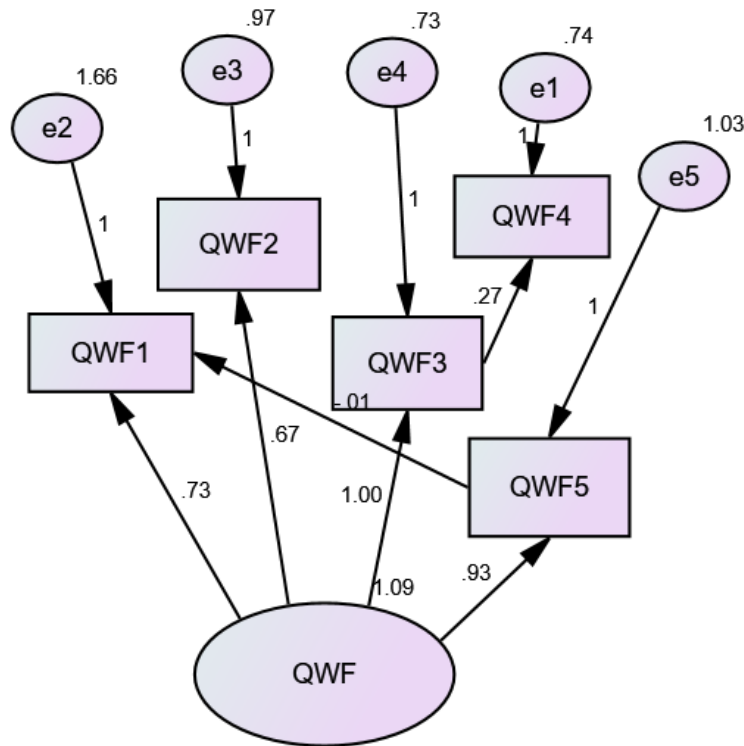
ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.341	.284	.470	.354
Saturated model	.362	.362	.362	.385
Independence model	2.324	1.907	2.805	2.331

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	127	163
Independence model	12	14

b. QWF model and important notes



Notes for QWF Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 15
 Number of distinct parameters to be estimated: 11
 Degrees of freedom (15 - 11): 4

Result (Default model)
 Minimum was achieved
 Chi-square = 10.091
 Degrees of freedom = 4
 Probability level = .039

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	11	10.091	4	.039	2.523
Saturated model	15	.000	0		
Independence model	5	124.168	10	.000	12.417

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.084	.970	.888	.259
Saturated model	.000	1.000		
Independence model	.523	.639	.458	.426

Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.919	.797	.949	.867	.947
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.400	.367	.379
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	6.091	.259	19.515
Saturated model	.000	.000	.000
Independence model	114.168	81.909	153.881

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.087	.053	.002	.168
Saturated model	.000	.000	.000	.000

Model	FMIN	F0	LO 90	HI 90
Independence model	1.070	.984	.706	1.327

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.115	.024	.205	.095
Independence model	.314	.266	.364	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	32.091	33.291	62.475	73.475
Saturated model	30.000	31.636	71.433	86.433
Independence model	134.168	134.714	147.979	152.979

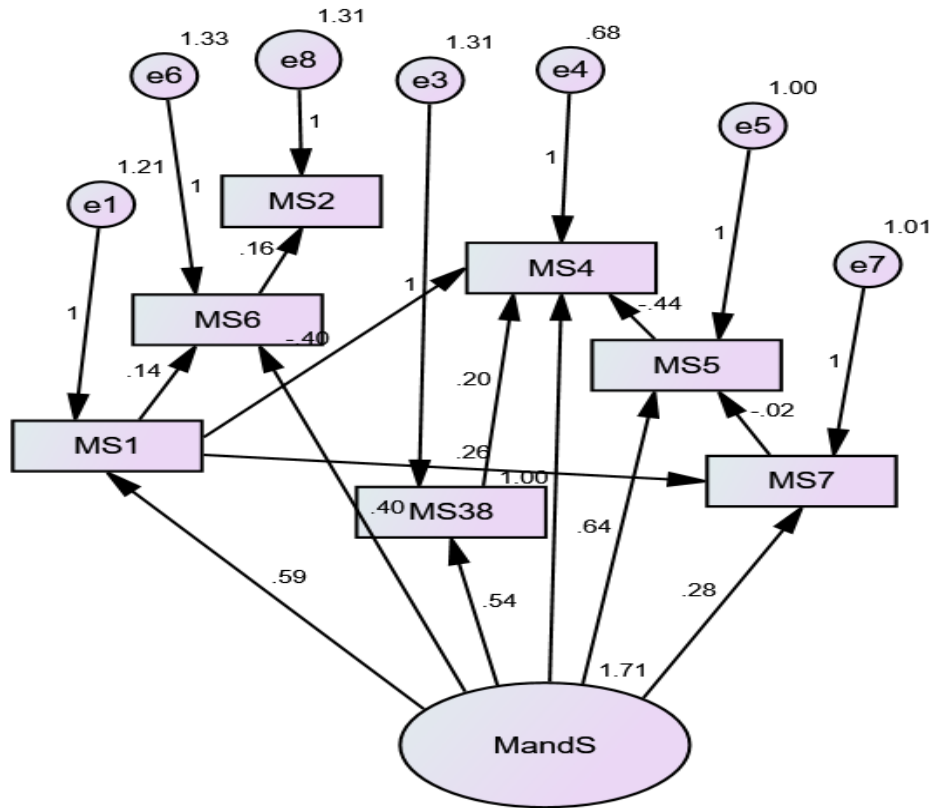
ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.277	.226	.392	.287
Saturated model	.259	.259	.259	.273
Independence model	1.157	.879	1.499	1.161

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	110	153
Independence model	18	22

c. MS model and important notes



Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 28
 Number of distinct parameters to be estimated: 20
 Degrees of freedom (28 - 20): 8

Result (Default model)

Minimum was achieved
 Chi-square = 19.222
 Degrees of freedom = 8
 Probability level = .014

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	20	19.222	8	.014	2.403
Saturated model	28	.000	0		
Independence model	7	152.953	21	.000	7.283

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.123	.958	.853	.274
Saturated model	.000	1.000		
Independence model	.418	.669	.559	.502

Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.874	.670	.923	.777	.915
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.381	.333	.349
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	11.222	2.034	28.075
Saturated model	.000	.000	.000
Independence model	131.953	96.367	175.028

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.166	.097	.018	.242
Saturated model	.000	.000	.000	.000
Independence model	1.319	1.138	.831	1.509

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.110	.047	.174	.057
Independence model	.233	.199	.268	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	59.222	62.185	114.466	134.466
Saturated model	56.000	60.148	133.341	161.341
Independence model	166.953	167.990	186.288	193.288

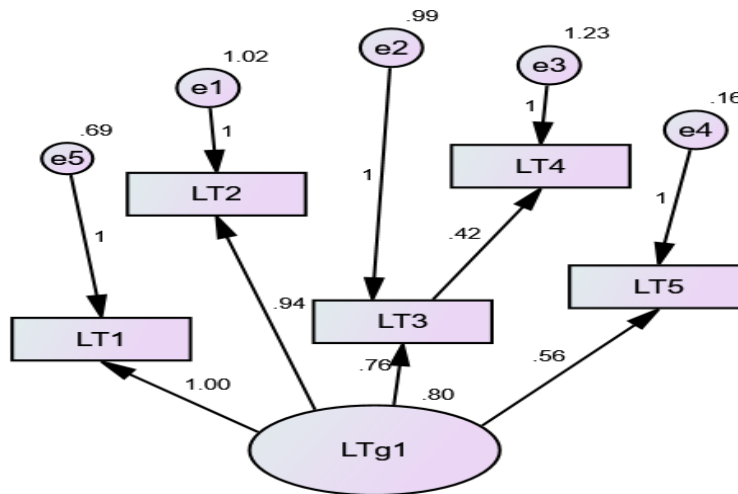
ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.511	.431	.656	.536
Saturated model	.483	.483	.483	.519
Independence model	1.439	1.132	1.811	1.448

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	94	122
Independence model	25	30

d. LT model and important notes



Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 15
 Number of distinct parameters to be estimated: 10
 Degrees of freedom (15 - 10): 5

Result (Default model)

Minimum was achieved
 Chi-square = 11.096
 Degrees of freedom = 5
 Probability level = .050

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	10	11.096	5	.050	2.219
Saturated model	15	.000	0		
Independence model	5	153.774	10	.000	15.377

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.102	.963	.889	.321
Saturated model	.000	1.000		
Independence model	.422	.583	.374	.388

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.928	.856	.959	.915	.958
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.500	.464	.479
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	6.096	.012	19.819
Saturated model	.000	.000	.000
Independence model	143.774	107.304	187.688

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.096	.053	.000	.171
Saturated model	.000	.000	.000	.000
Independence model	1.326	1.239	.925	1.618

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.103	.004	.185	.123
Independence model	.352	.304	.402	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	31.096	32.187	58.718	68.718
Saturated model	30.000	31.636	71.433	86.433
Independence model	163.774	164.320	177.585	182.585

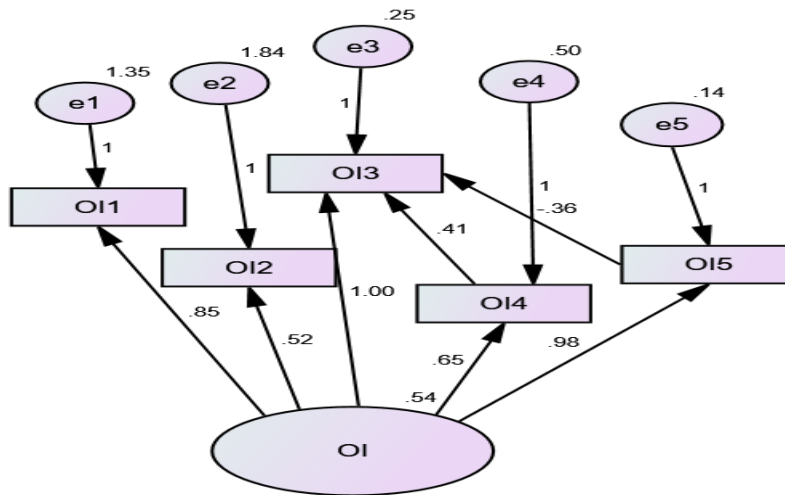
ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.268	.216	.386	.277
Saturated model	.259	.259	.259	.273
Independence model	1.412	1.097	1.790	1.417

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	116	158
Independence model	14	18

e. OI model and important notes



Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 15
 Number of distinct parameters to be estimated: 12
 Degrees of freedom (15 - 12): 3

Result (Default model)

Minimum was achieved
 Chi-square = 6.571

Degrees of freedom = 3

Probability level = .087

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	12	6.571	3	.087	2.190
Saturated model	15	.000	0		
Independence model	5	167.782	10	.000	16.778

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.081	.978	.890	.196
Saturated model	.000	1.000		
Independence model	.295	.605	.408	.404

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.961	.869	.978	.925	.977
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.300	.288	.293
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	3.571	.000	15.114
Saturated model	.000	.000	.000
Independence model	157.782	119.465	203.538

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.057	.031	.000	.130
Saturated model	.000	.000	.000	.000
Independence model	1.446	1.360	1.030	1.755

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.101	.000	.208	.164

Model	RMSEA	LO 90	HI 90	PCLOSE
Independence model	.369	.321	.419	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	30.571	31.880	63.717	75.717
Saturated model	30.000	31.636	71.433	86.433
Independence model	177.782	178.327	191.593	196.593

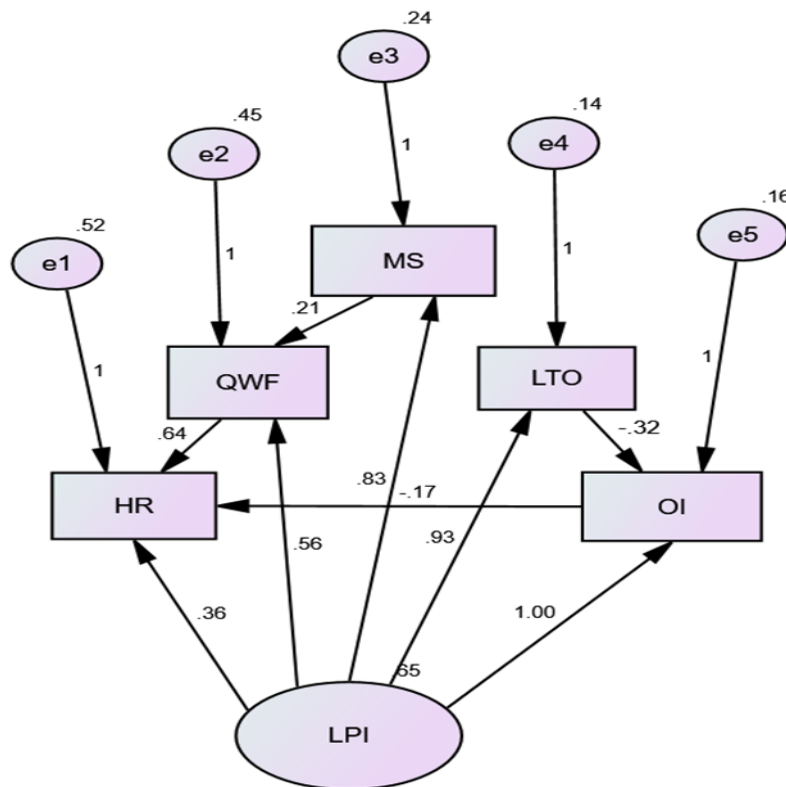
ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.264	.233	.363	.275
Saturated model	.259	.259	.259	.273
Independence model	1.533	1.202	1.927	1.537

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	138	201
Independence model	13	17

f. LPI final model and important notes



Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 15
 Number of distinct parameters to be estimated: 14
 Degrees of freedom (15 - 14): 1

Result (Default model)

Minimum was achieved
 Chi-square = 2.877
 Degrees of freedom = 1
 Probability level = .090

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	14	2.877	1	.090	2.877
Saturated model	15	.000	0		
Independence model	5	309.904	10	.000	30.990

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.013	.990	.854	.066
Saturated model	.000	1.000		
Independence model	.358	.414	.121	.276

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.991	.907	.994	.937	.994
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.100	.099	.099
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	1.877	.000	11.162
Saturated model	.000	.000	.000
Independence model	299.904	246.121	361.107

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.025	.016	.000	.096
Saturated model	.000	.000	.000	.000
Independence model	2.672	2.585	2.122	3.113

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.127	.000	.310	.136
Independence model	.508	.461	.558	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	30.877	32.404	69.547	83.547
Saturated model	30.000	31.636	71.433	86.433
Independence model	319.904	320.449	333.715	338.715

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.266	.250	.346	.279
Saturated model	.259	.259	.259	.273
Independence model	2.758	2.294	3.285	2.762

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	155	268
Independence model	7	9