DETERMINANTS OF LABOR PRODUCTIVITY IN KENYAN MANUFACTURING FIRMS

HANNAH WANJIRU NGUGI

X50/87768/2016

A RESEARCH PAPER SUBMITTED TO THE SCHOOL OF ECONOMICS, UNIVERSITY OF NAIROBI IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF ARTS IN ECONOMICS.

2019

DECLARATION

I declare that this research paper is my original work and has not been presented for the award of a degree in this or any other university.

Signature: _____   Date: _____

Hannah Wanjiru Ngugi

X50/87768/2016

This paper was submitted for the award with my approval as the supervisor.

Signature: _____   Date: _____

Prof. Damiano Kulundu

DEDICATION

I dedicate this work to my loving parents Joseph Ngugi and Anne Wanjiku. To my dear husband Collins Kataka and our children Patience Wanjiku and Hawa Buyanzi. My siblings Leah, Priscillah, Jeremiah and Ruth. Thank you for your love and support. You are valued.

ACKNOWLEDGEMENTS

I thank the Almighty God for this far that He has brought me. Thank you for the opportunity to pursue this course. Your love and mercy have refreshed me. For the strength, health and sound mind to go through this season of my life. Times have been hard but your hand of grace and comfort has been upon me. I am so grateful. May your name be praised. Amen.

My sincere gratitude goes out to Prof. Damiano Kulundu who has walked with me through writing this paper. Your commitment, guidance, support and encouragement have been of great value, without which it would have been impossible to write a good paper. Your criticisms have helped me grow. May God bless you .

I am grateful for the financial support I received from the University of Nairobi towards the attainment of this degree. Thank you.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

Labor productivity is key in determining a country's economic growth and development. Using firm-level cross-sectional data from the Kenyan manufacturing sector, the aim of this paper is to investigate the determinants of labor productivity. The study used Ordinary Least Squares to estimate the model. The main determinants of labor productivity are capital intensity and human capital which include education of workers and training. Hiring workers with higher education leads to higher labor productivity. Capital-labor ratio is also an important determinant of labor productivity. Other important determinants of labor productivity are firm size, foreign ownership of the firm, location of the firm dummy, number of managers hired and the export status of the firm. These findings have crucial policy implications for increasing competitiveness in the manufacturing sector. Firms can realize higher labor productivity by hiring workers with higher education, creating a conducive environment for foreigners to invest, as well as increasing their stock of physical capital.

CHAPTER ONE:INTRODUCTION

1.1 Background of the Problem

Kenya is East Africa's largest economy. It is a country with few resources, a high population growth, an agricultural rich economy and a sluggish manufacturing sector. It is also characterized by low skills, low capital and low incomes. Agriculture remains the backbone of Kenya's economy currently contributing about 29% of the GDP directly and another 25% indirectly. The sector also accounts for 65% of Kenya's total exports and more than 18% of formal employment. More than 70% of informal employment is in the rural areas provided for by agriculture (Republic of Kenya, 2010). The country therefore strongly relies on agriculture. Agricultural sector may not attain sustained growth in per capita incomes in the future. Kenya must therefore ensure that there is high growth rate in the formal manufacturing sector to spur generation of job opportunities for the rapidly growing Kenyan population. The manufacturing sector is therefore crucial for long-term economic development (Kenya, 2007).

Kenya's manufacturing sector is presently at a critical stage of its development. Studies show that the sector has fallen short of its expectations with previous evidence showing consistent weak export performance. In the 1980s and mid-2000s, Kenya recorded poor economic outcomes. This was majorly because of poor and inappropriate agricultural, land and industrial policies alongside bad governance. In 2003, economic growth started to increase with a real GDP growth of 2.8% and continued to increase steadily. However, the manufacturing sector has continued to record poor performance even with the structural adjustment programs being in place. After 2002 elections, Kenya's economy improved. However, it was not long before it started deteriorating again after the 2007-2008 post-election violence from growth of 6.5% in 2007 to 2% in 2009.Economic growth later increased to 6.5% in 2015 (Odero et al, 2015).

The industry and manufacturing sectors contribution to Kenya's overall GDP has only increased minimally from the time Kenya gained its independence in 1963.This sector has developed dismally since the 1980s mostly recording stagnated growth. In 1990, it contributed 19% of the total GDP, then declined to 17% in 2000 and increased to 19% in 2011.In contrast, the service sector has contributed much to Kenya's GDP. In 1980, it contributed 47% of Kenya's overall GDP, 51% in 1990, 51% in 2000 and 58% overall GDP in 2011 (The World Bank, 2015).

Value addition per worker in this sector has also reduced tremendously over the last 30 years, and the relative size of the sector has stagnated and developed minimally compared to other countries. Kenya's manufacturing sector has lost market share abroad mainly due to inefficiency, low levels of productivity, poor quality products that do not meet the international standards as well as large differentials in productivity in firms across different sectors due to lack of competition. In terms of industries, Kenya happens to be the most developed country in East Africa. However, Kenyan manufacturing contributes very little to its GDP (World Bank, 2015).

The Kenyan manufacturing sector is characterized by low private and public investments that limit it to take off. Private investment enables manufacturers to improve their technology and therefore produce efficiently. Public investment, especially in infrastructure reduces transaction costs. This increases efficiency in transactions and helps firms to successfully compete internationally. As outlined by the government in its Vision 2030, plans are underway to increase investment levels in manufacturing to above 30%. Accessing more markets and acquisition of new production technology would help the Kenyan manufacturing sector to benefit from increased trade. The sector also needs to improve its competitiveness against imports and in export markets by reducing production costs and improving product quality. Long-run improvements in Kenyan manufacturing depend strongly upon the ability to increase productivity.

The contribution of productivity towards development cannot be underestimated. Productivity refers to generation of higher value-added. It spurs a country's economic growth, creates employment and improves welfare of its citizens. Productivity also determines how competitive a firm is as it increases viability, profitability and creation of sustainable jobs of firms. Several interventions have been made to improve Kenya's productivity levels as seen in the National Development Plan (1963-1970), the first wage guidelines (1973), Sessional Paper No.1 of 1986 Economic management for Renewed Growth, Economic Recovery Strategy or Wealth and Employment Creation (2003-2007) and the Vision 2030. These interventions have not borne much fruit. Kenya still lags behind in terms of productivity levels compared to South East Asian tigers and other Sub-Saharan economies such as Namibia, Botswana and South Africa (World Economic Forum, 2010).

Given these facts about the Kenyan manufacturing sector, there is need to improve productivity in this area. In this study, we will focus on labor productivity, with the firm as the unit of analysis. Productivity is a measure of efficiency in the use of inputs to produce output. Productivity implies achieving more in the same amount of time, and thus investing the free resources elsewhere. Labor productivity measures the amount of real gross domestic product (GDP) produced by an hour of labor. It is therefore a measure of economic growth. It is an indicator of economic performance and influences standards of living. High labor productivity can reflect higher capital intensity, an increase in the hiring of workers with higher productivity or gains from efficiency and innovation.

Labor productivity determines the productive potential of the firm, and this translates to the economy as well. For instance, increased labor productivity in a firm would lead to increased real output. This increases revenues which translate to increased wages, so that the workers have higher purchasing power and this drives the economy towards growth. Japan, the third largest economy in the world has the highest labor productivity index at 7.6. If Kenya has to be a middle income nation as outlined in the vision 2030 blueprint, its labor productivity index has to increase from the current 2.2 (World Bank, 2015).

Average labor productivity in Kenya has declined over time. Kenya has been continuously receiving less from its labor as well as from all other factors of production. These results have been driven by changes in technology and in technical efficiency. Given the relationship between labor productivity and output growth, if Kenya's labor productivity increases, the country will experience economic growth, reduced costs and inflation, rising real wages as well as international competitiveness. However, it starts from the firm's level before it translates to the overall economy.

1.2 Statement of the Problem

The manufacturing sector plays an important role in any economy by generating employment and contributing to overall GDP growth. This enhances the growth and development of other economic sectors. Developing this sector is therefore key for any country. Increased labor productivity in manufacturing would lead to increased profitability and thus growth and expansion in this sector. The goal of all developing nations is to industrialize by the year 2030 (United Nations, 2015). Despite the goals to develop, labor productivity especially in developing

3

countries remains low and this translates to reduced profits and consequently reduced investments. According to evidence based on survey data, very low profits are re-invested in African manufacturing firms. This is due to low labor productivity that hinders firms' profitability (Bigsten et al.1999).

According to a study conducted on Sri Lankan manufacturing industry, the key major factors causing low labor productivity were found to be: Ineffective resource use (equipment, workers, and material), poor accessibility to information and workers shirking on the job. Evidence supports that low productivity is an important factor that hinders economic growth. In South Asia, low productivity in the manufacturing sector is associated with labor unrest, poor working attitudes, insufficient management and so on, which relates directly to labor productivity (Vilasini PPGN1 et al.).

Kenya in particular, continues to exhibit low productivity characterized by low purchasing power, low capacity utilization, limited capital formation, slow productivity growth, high domestic prices and costs of production as well as constant agitation for wage increments (Magati and Ng'ang'a, 2012). This has directly affected the productivity of its labor. The factors affecting productivity and particularly labor productivity are not unique to Kenya but they cut across many developing nations. Should this problem of low labor productivity persist, the developing countries may find it hard to attain the set development targets.

There are very few studies that have been done on Kenyan manufacturing firms, and where such exist, some combine a few other countries in their analysis. Where Kenyan studies have been performed, they have not been purely on manufacturing and they have been combined with other sectors for example, the service sector. Such results cannot give solutions that are specific and unique to the problems facing the Kenyan manufacturing sector. There is need to investigate the determinants of labor productivity particularly in Kenya. This study will analyze the factors affecting labor productivity in Kenyan manufacturing firms.

1.3 Research Questions
1) What are the factors determining labor productivity in Kenyan manufacturing firms?
2) What can be done to improve labor productivity in manufacturing firms?

1.4 Research Objectives

1) To analyze the factors that influences labor productivity in Kenyan manufacturing.

2) To make policy recommendations for improving labor productivity in manufacturing based on the findings

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Adam Smith's Theory of Labor Productivity

This theory is mainly based on labor division. Adam Smith identifies four key ingredients for basic and positive labor productivity. These ingredients are labor division, skill, expertise and experience. Smith acknowledges the importance of technical separation and specialization of different work steps in improving labor productivity. In addition, this separation of the individual work steps results in a diversification and development of different professions and industries and therefore enhances specialization. According to Smith, division of labor improves labor productivity while using the same manpower. The success of the process is dependent upon the skill of the worker completing the task given, the avoidance of time wastage while changing the tasks and the use of machines to enhance efficiency. These factors represent the modern approach of process optimization: Specialization, economy of time and technological progress.

Smith also identified geographical location or environment to be of influence to labor productivity especially due to market size. According to him, the trading of commodities and services and the resulting increase in productivity due to labor division is not possible in a geographically limited area. Critics have agreed with Adam Smith theory because to a great extent it facilitated the onset of the industrial revolution and enabled people to create wealth. However, they argue that the division of labor and specialization causes people to do repetitive tasks and thus creates monotony. This may cause lack of happiness and dissatisfaction to the working population.

2.1.2 Karl Mark's Theory of Labor Productivity

Marx defined labor productivity as "The increase of labor productivity is said to be a change of the working process that reduces the working time of the society necessary for the production of a product. Therefore, less work is needed to produce a bigger amount of practical value" (Marx, 1867).

He then came up with the concept of value added and thus made the following remark, "It is no longer sufficient to produce. Value must be added. Only such a worker is productive that creates added value for the capitalist or that is used for the self-exploitation of the assets."

Marx equates the value of work with the ability to produce the amount of provisions needed to survive. As such, he terms anything above this equilibrium added value which must be divided into the absolute value added and the relative value added. The absolute added value represents the work of the laborers to earn their wages, while the relative added value represents the rationalization of the actual working steps. Therefore, labor productivity according to Marx is achieved through the laborer himself as well as the production and working conditions created by the employer.

The theory also states that efficiency in production can only be achieved by optimizing the work processes through reduction of work hours to produce certain amount of products. This is the concept of using reduced amounts of inputs and resulting to increase in output. He identifies several factors which influence labor productivity. "The productivity of work is determined by various factors, amongst others there is the average skill of the worker, the level of development science, and the technological applicability, the social combination of the production process, the extent and the capacity of the means of production and the natural conditions"(Marx, 1867).

It is these natural prevailing circumstances and social developments that he terms most important in determining productivity of the work, besides skill and technical change by use of machines. He identifies natural wealth in terms of soil fertility and waters rich in fish as the natural conditions that spur increase in labor productivity.

2.1.3 Theory of Frederick Taylor's Labor Productivity

Taylor states that, "The principle object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employee."

His theory is based on both involved parties-the employers and the employees -who can only mutually increase labor productivity. Taylor identifies key factors necessary for the optimum functioning in the organization and for improving labor productivity.

- Definition of work steps and a differentiation between executed work and managed work.
- The existence of a viable labor force as well as its training.
- The oneness between employees and management.

- The existence of workers and management that takes responsibility jointly.

The theory also advocates for performance-based compensation that would help avoid shirking in the job. Scholars before Taylor clearly separated the bourgeoisie (assets) and proletariat (workers).Taylor demands that there must be a close relationship between the parties in the whole work process if productivity has to be increased. He also attributes the behavior and methods of workers as to having great influence on labor productivity. Low attitude towards work causes shirking on the job. He proposes the introduction of performance-based compensation to boost the morale of workers and influence their basic attitude positively thus leading to more productivity.

2.1.4 Henri Fayol's Theory of Labor Productivity

The goal of the classical organizational theory was to utilize the worker in such a way that would create a high value added as possible while at the same time maintaining a high quality standard. Fayol aims at increasing productivity that is achieved by optimizing the administration and organization. He aims at supplementing the purely technical part of the manufacturing process with a management theory to fill in the gaps.

Fayol's theory is based on 5 key elements of industrial management namely: Outlook and planning, coordination and governance, organization, control and instructions. He finds these to be necessary conditions to improve labor productivity though they are not sufficient. The management has to possess certain leadership and managerial skills which include: the ability to divide labor, authority, discipline by management and ensuring that workers are held responsible for their behavior, low labor turnover thus reducing costs of disrupting production and training new workers, unity of placing orders (there is only one superior who gives orders to avoid confusion) among others.

The theory emphasizes on the importance of a safe and ordered structure in management which is necessary for the sustainable increase of labor productivity and for the success of the firm.

2.1.5 Barnard's Theory of Labor Productivity

In his theory, Barnard analyzes the relationship between formal and informal groups and the resulting decision-making process. His theory aims at using the organization's efficiency to

increase the firm's productivity, which will consequently increase labor productivity. The structure of this theory of labor productivity is organized into two main elements: Formal organization and the executive. The formal organization emphasizes on specialization, incentive, authority, decision making as well as opportunity. The executive element focuses on the executive function of management and making decisions, the executive process and the executive responsibility. The management and the people on the ground doing the production work must work hand in hand by making sure that each one of them performs their duties in an excellent and efficient way.

Barnard emphasizes on the importance of human cooperation with regards to productivity and development. He argues that each person must be responsible and held accountable for the decisions they make. The firm's organization as well as the interaction of the human well-being spurs higher labor productivity and causes the firm to be successful.

2.1.6 Henry Ford's Theory of Labor Productivity

Ford was the founder of Ford Motor Company. He introduced the use of conveyor-belt in production in a bid to optimize the processes of production. This would result to high output and lower costs of production. He also incorporated socio-economic changes in his company by reducing the number of working hours to 8 per day and paying his workers' wages way above average (Ford, 2006).

Ford identified some key factors that contributed to the increase of labor productivity and consequently to the success of his company.

a) Smaller working steps and labor division.
b) Implementation of batch production.
c) Standardization of products and production processes to produce higher quality goods and have faster processes.
d) Utilization of conveyor belt production so that the product to be manufactured is moving to the worker and not the worker moving to the product. The speed and timing of the belt saves resources and avoids physical overload.
e) Training of the workers so that there are qualified workers each according to their tasks to enhance performance in the best way possible.

f) Each worker takes full responsibility for their tasks. This ensures quality assurance and personal commitment.

g) Equality and equal opportunities. Treating workers equally irrespective of the hierarchy go a long way to encourage workers especially those in low positions.

h) Motivation. Every employee stands a chance to grow in their career if they show and possess the necessary commitment and skill. This is done through compensating employees with higher wages for well executed tasks and commitment.

i) Fair working conditions. Using tools and machinery that avoid any physical overload avoids overworking the employee as well as fluctuations in normal production.

Ford implemented occupational safety measures (better working conditions) and the high daily wages as methods to increase the productivity of labor. Perhaps his is the most insightful and practical theory in recent times. One of the advantages of his theory is that he used it on his company to realize an increase in labor productivity.

2.2 Empirical Literature Review

This section reviews literature on labor productivity from empirical studies outside Africa, in Africa and Kenya in particular.

A number of studies have been done outside Africa to analyze determinants of labor productivity. Xiaobong et al. (2006) examined how high temperature conditions in China affect labor productivity in the construction sector. The findings were that employees working in high temperature areas suffer distress on their bodies and this reduces labor productivity in the industry.

Another study was done by Corvers on firms in the European Union. He found that increasing years of education affects the organization's competitiveness positively. An additional year of education increases labor productivity by 0.1 to 0.2 % and lowers labor costs by 0.2%.Workers with tertiary qualification were found to contribute more to labor productivity compared to lower levels of education. This implies that labor productivity tends to increase the higher the workers' skills. Human capital investment in workers with low skills was insignificant in improving labor productivity among the firms studied. These results are consistent with those of Aggrey, Eliab and Joseph (2010).This implies that improving labor productivity depends mainly on developing

the firms' stock of human capital. Firms can realize this by hiring workers with higher education or investing in developing skills through the on-the-job training. According to this study, higher labor productivity has positive externalities which could include innovation and development opportunities and the possibilities of transfer of skills among workers (Corvers, 1996).

On-the-job training is another way of developing skills and increasing labor productivity. According to a study conducted in Europe on the extent to which vocational training had impacted labor productivity between 1999 and 2005, vocational training proved to be a key determinant of labor productivity. The findings were that a one hour increase in training per employee increased labor productivity by about 0.55 (Sala and Silva, 2011).Similarly, according to Dearden et al. (2006), on-the-job training was directly linked to increased productivity. In a study conducted on a panel of British industries, the findings were that a percentage increase in training of workers increased the employee's productivity by about 0.6 percent per hour and therefore translating to increases in the hourly wage by about 0.3 percent. This shows that there are gains from increased productivity brought about by training workers.

In yet another study conducted in Portugal, firm-provided training was found to have an impact on value-added per hour. Doubling the number of firms' training hours (16 hours per year), increased productivity by 1.8%.Similarly, training workers for 10 hours would increase productivity by 1.2%.These results are consistent with the findings of Almeida and Carneiro (2009) who found that training workers for ten extra hours per worker resulted to a 0.6 to 1.3% increase in productivity. Investigations were also made to establish whether training spillovers between workers existed. This would help to know how much low skilled workers benefited from their highly skilled counterparts. The findings were that the wages of workers with lesser skills depended directly on their training intensity as well as on the training intensity of their more skilled workmates. This points out that positive externalities exists across workers which is ultimately beneficial to the firm (Lopes and Teixeira, 2013).

Klotz et al (1980) studied labor productivity in U.S manufacturing. They found that differences in productivity across firms could be explained by factors such as variation in the employment of relative quantity of factor inputs in combination with the labor force. Highly productive firms employed both labor and capital assets. Another source of difference in productivity could be

brought about by any tendency to hire production workers of various characteristics. Some firms may prefer to hire a highly skilled and efficient workforce and thus pay higher wages. This is translated to higher value added per worker. The contrary is also true.

Wacker et al. (2006) found that investing in both human and equipment resources will increase firm efficiency as well as non-production activities such as well-defined tasks. However, according to Jan (1994), factors such as new technological investments, employee motivation through incentives, planning and management reformation could not be linked to improvements in productivity. Studies conducted in Japan by Yamada et al. (1997) and Tomiura (1997) show that capital affects productivity positively and significantly.

Liu et. al (1999) conducted a study on the Taiwanese electrical machinery and electronics industry using plant-level panel data. Their aim was to study how exporters differ from non-exporters in terms of productivity. Their findings were that exporters have more employees and larger premises, pay higher wages, invest more in capital and modern technology and their labor is generally more productive than that of non-exporters. However, their results indicate that the differences in productivity between exporters and non-exporters are not as a result of gained knowledge or expertise through exposure to the export market. Rather, higher productivity is a requirement to survive in the export market.

A study conducted in Thai on human capital linkages to labor productivity shows that firm size has a positive and significant effect on labor productivity. Firms with the highest labor productivity are medium-sized firms relative to small firms by 19-20%.Large firms exhibit higher labor productivity than small firms by up to 17%.Increasing capital intensity also affects labor productivity positively and significantly. A 10% increase in capital-labor ratio leads to about 2% increase in labor productivity. The age of the firm is also found to impact labor productivity and average wage positively. An increase in firm age by 10 years increases labor productivity by 6%.The impact of education on labor productivity is also found to be positive and increasing the organization's competitiveness. Increasing education by one year raises labor productivity by 0.1-0.2%.This is consistent with findings from other studies (Pungpond and Piriya, 2016).

A study performed on 45 countries representing four different income regions of the world shows that the differences in the productivity of labor across different income groups and regions of the world mainly occur due to differences in the levels of education, diverse sectoral distribution of labor, financial capacity and ICT investment. Economies with low incomes have low labor productivity mainly due to their high labor concentration in the agricultural sector, underdevelopment of the financial sector, low levels of education, high price fluctuations and underdevelopment in ICT investment (Misbah, 2009).

In a study done by Moon and Lee (2013), on agriculture and labor productivity in Asia, it was found that the agricultural GDP per worker is very low in most countries and this is associated with high incidences of poverty. According to Hayami and Ruttan (1971), three sources of productivity differences in agriculture include: Resource endowments, technology and human capital which includes education, skills, knowledge and capacity embodied in a country's population.

There are also a number of studies in Africa.

Aggrey, Eliab and Joseph (2010) used the World Bank's Enterprise Survey to examine relationships between human capital and labor productivity of countries in East African countries. They found that higher labor productivity in firms was realized by employing more highly educated workers. This was particularly outstanding in Tanzania, where employing managers who are highly educated seemed to increase labor productivity more than employing ordinary workers.

Nagler and Naude (2014) measured labor productivity of enterprises in rural Africa and made a comparison with the urban firms. The findings were that urban areas are on average more productive than rural areas and that firms belonging to women realized less productivity than those that belonged to men. Enterprises that were in operation throughout the year were also found to be more productive as compared to those that were inconsistent in their operations. According to their study, gender, education, access to credit and the geographical location of the particular firms mattered in terms of labor productivity, and that policies and recommendations to reduce the challenges could create a more conducive environment for business as well as increased labor productivity.

David and Jameelah (2013) analyzed how health capital affects labor productivity in Nigeria. They found that health capital investment influenced labor productivity in a positive and significant way. Therefore, investment in health capital enhances productivity of the labor force. They also found that there was statistical significance of the education-labor and health-capital labor interaction terms. This is consistent with the findings of other studies that education increases labor productivity and that a healthier population is more productive.

A study conducted in Tanzania indicates that management practices also affect the productivity of the firm. Higher productivity is reported where the firm manager has university education. Higher productivity is also observed where the manager is more experienced which concurs with the concept of human capital considerations. The study also examined the impact of foreign experience on productivity and it was found that foreign experience affects productivity positively and significantly. The study therefore supports strengthening of international cooperation such as students' exchange programs and professionals. This study used ordinary least squares to estimate pooled OLS regressions (POLS) as well as firm fixed effects OLS regressions (FEOLS) (Pfeifer,2015).

A few studies on labor productivity have also been conducted on Kenyan manufacturing firms.

Bigsten et al (2010) used firm-level data to investigate how firm size influences labor productivity across firms in the Kenyan manufacturing sector. Their findings were that labor productivity increases with firm size. This is consistent with the findings of Lundvall (1999).This is because large firms use more capital than small firms. This allows each worker to have more access to machinery than workers in small firms. Other firm characteristics like age of the firm and foreign ownership of firms were not found to be associated with large labor productivity differences.

In Kenya, manufacturing firms that train their workers record higher labor productivity compared to those that do not train their workers. Average education was also found to be positively correlated with labor productivity in some firms. This is consistent with the main assumption of human capital theory that education raises productivity. Workers' age variable was used as a proxy for worker's experience. The resulting coefficient had no statistically significant effect on labor productivity. Foreign ownership of firms was also found to have no

significant effect on labor productivity in Kenyan manufacturing firms. Firm size coefficient was negative in Kenyan manufacturing firms and a possible reason could be due to diseconomies of scale as the firm increases in size. However, high capital intensity exhibited high levels of labor productivity in Kenyan manufacturing firms (Niringiye et. al, 2010).

In yet another study, capital intensity has no effect on labor productivity. This is unexpected because capital helps labor to become more productive. Wages and fuel intensity were found to be the main factors influencing labor productivity in Kenyan manufacturing. Training of workers was also found to have a large positive effect on labor productivity as is consistent with economic theory and other findings. Allowing for a non-linear relationship between labor productivity and age of the firm, coefficients of firm age and age squared were found to be both positive. This suggested that firm age affected labor productivity positively and at an increasing rate. However, they were statistically insignificant suggesting no difference in labor productivity across firms of different ages. The location of the firm had a positive effect on labor productivity. However, this effect was insignificant (Heshmati and Rashidghalam, 2016).

Human capital investment plays a key role in yielding a qualified workforce that will meet the needs of the labor market. Human capital reflects the value of human capacities. It is similar to other forms of capital. Its investment could be through education, training, and enhanced benefits that enhance quality and increased production (Schultz, 1961).The measure of success in human capital investment is labor productivity, which leads to higher wages and better standards of living.

Results also suggest that the higher education of managers affects labor productivity positively and significantly. An additional year of managers' education increases productivity by about 3% which consequently increases the firms' profits by about 3%.However, a higher education level among ordinary workers was found to have no statistically significant effect on labor productivity. Training was also found to have positive effects on labor productivity, since training is positively correlated to other firm characteristics (Hayami and Ruttan (1971).

2.3 Overview of the Literature

Theoretical studies identify some key determinants of labor productivity. These factors include: division of labor and specialization, skill, expertise, experience and training of workers. They

also identify the use of machines to enhance efficiency in production as one of the key factors influencing labor productivity. Other factors include well-organized management with clearly defined roles, the existence of management possessing relevant leadership and managerial skills, paying high wages to workers, motivation of workers and creating fair working conditions. These factors are necessary for the sustainable increase in labor productivity and the success of the firm.

Empirical studies as shown above also tend to agree that labor productivity is key for a firm's profitability and growth. The different studies conducted show investment in human capital affects labor productivity in a positive and significant way. This includes employing highly educated workers and training workers to enhance their skills. The studies also show that management that is well educated and experienced is more effective and this increases the firm's productivity. Capital use in production alongside with labor is also seen to improve labor productivity. Other factors found to be influencing labor productivity are working conditions, level of ICT investment, firm age, size of the firm, health capital, access to credit, geographical location of the firm, distribution of employment in different sectors, among others. However, there seems to be a difference in two studies on education and productivity as one has contrary findings that higher level of education among workers other than the managers has no statistically significant impact on labor productivity. Other studies have different findings on the effect of capital use in production as well as impact of foreign ownership of firms on labor productivity.

High wages were found to be as a result of increased labor productivity in firms. However, in other studies, high wages were also found to increase labor productivity as paying workers higher wages motivated them to work harder and show commitment in their tasks. While most variables have been included in the studies, some key variables like availability of public infrastructure and sub sectors in manufacturing are not captured. Most empirical studies have used panel data to estimate their model while a few have used cross-sectional data. OLS (Ordinary Least Squares) method is used in the estimation of the models.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter gives the theoretical framework of firm behavior, an econometric model that links labor productivity to the various variables, variables definition and measurement and the data to be used.

3.2 Theoretical Framework

The study uses the production function conceptual framework to estimate labor productivity in Kenyan manufacturing firms. The production function is the functional relationship between quantities of inputs used in production and outputs to be produced. The production function describes the maximum amount of output that can be produced with a given quantity of inputs given the available technology. It also describes what is technically feasible when the firm operates efficiently.

In this study, our dependent variable is labor productivity. There are several independent variables our main ones being human capital such as education of workers, and training of workers. Economic theory suggests that investment in human capital increases labor productivity. Our other main independent variable is capital-labor ratio. Economic theory also suggests that the increase of capital-labor ratio in a firm increases labor productivity.

Consider a manufacturing firm. The firm's objective function is profit maximization. The firm chooses both inputs and outputs so as to maximize profits. The firm's profit function can be written as

$$Л = Л(W, P).$$

In this case, profit is a function of input prices W and output prices P.

Therefore, firm's profit can be written as

$$Л = YP - CY$$

Where Y is output and C is the cost of production per unit of output.

The objective of the firm therefore is to maximize profits subject to a cost constraint. That is,

$$Y = Y(L, K)$$

Subject to C=WL+RK, where L is labor and K is capital used in production, W is the price of labor, wages, and R is the price of capital.

In order for the firm to maximize profits, it must find optimal values of labor and capital that maximize output.

Л=R(Y)-C(Y)   (R refers to revenue in this equation)

The firm will adjust the variables under its control until it cannot increase profit further.

R(Y) = P(Y).Y

R and P are functions of Y and Y=f (K, L)

C is also a function of Y and Y=f (K, L).

Therefore, Л (Y) =P (Y).Y – C (Y)

$$= R \text{ (Y)-C (Y)}$$

To maximize profit, we find the first order conditions for profit maximization. Differentiating the equation with respect to Y, we find,

$$\frac{d\pi}{dY} = \frac{dR}{dY} - \frac{dC}{dY} = 0$$

This implies that $\frac{dR}{dY} = \frac{dC}{dY}$ or MR =MC.

MR =MC is the profit maximization rule.

The second order condition for profit maximization is,

$$\frac{d^2\pi}{dY^2} \Big| Y^* < 0$$

At the optimal quantity Y^*, marginal profit must be declining.

3.3 Model Specification

The study uses the production framework for manufacturing .The production function shows how factor inputs are transformed into outputs with a given level of technology. We start with the general production function where output is a function of labor and capital.

18

1) $Y = f(K, L)$

We can transform equation (1) into a specific functional form, in this case Cobb-Douglas form. We adopt Corvers' (1997) model of human capital.

2) $Y_i = A K_i^{\alpha} L_i^{*\beta}$

In equation 2, production is a function of capital, labor and technology which is represented by A.

L^* Represents efficiency units of labor. This consists of the number of workers in the firm and three levels of education, that is, primary and below, secondary and university education.

i is the number of firms ranging from 1...n.

The equation showing the efficiency units of labor is given by:

3) $L_i^* = L_i . L_{1i}^{\theta_1} L_{2i}^{\theta_2} L_{3i}^{\theta_3}$

Where,

L_i is the number of employees in firm i, and $L_E^{\theta_E}$ is the number of employees with education level E = 1, 2, 3 respectively.

The parameters θ_K show the contribution of the different levels of education to the efficiency units of labor.

We substitute equation (3) into (2).and since we are looking for the expression for labor productivity; we divide through by labor to get:

4) $\frac{Y_i}{L_i} = A(\frac{K_i}{L_i})^{\alpha} L^{(\alpha+\beta-1)}(1 - L_2 - L_3)^{\beta(1-\theta_2-\theta_3)} L_2^{\beta\theta_2} L_3^{\beta\theta_3}$

We can modify and extend Corvers (1997) model by including more human capital variables. These variables include; education proxied by levels, training of workers dummy and education of the manager.

We therefore have that:

5) $\frac{Y_i}{L_i} = A(\frac{K_i}{L_i})^{\alpha} L_i^{(\alpha+\beta-1)} L_{1,i}^{\beta\theta_1} L_{2,i}^{\beta\theta_2} L_{3,i}^{\beta\theta_3} L_{4,i}^{\beta\theta_4} L_{5,i}^{\beta\theta_5} {}_{+...+} L_{n,i}^{\beta\theta_n}$

Where n is the number of human capital variables that could be included in the model.

Rewriting equation (5) in logarithmic form, and taking into account the use of cross-sectional data , where labor productivity is studied in different firms at the same point of time, in this case one year,

6) $ln\frac{Y_i}{L_i} = A + \alpha \ln\left(\frac{K_i}{L_i}\right) + \beta\theta_1 lnL_{1,i} + \beta\theta_2 lnL_{2,i} + \cdots + \beta\theta_n lnL_{n,i} + Z_i$

Where L_1 is the education of workers in levels

L_2 is the training of workers

Z is the vector of control or firm-specific variables.

This model also takes into account other variables affecting labor productivity, which are: capital intensity/capital-labor ratio, size of the firm, regional location dummy, foreign ownership of the firm dummy, export dummy, and percentage of managers, skilled workers, unskilled workers and professionals in the firm.

Adding the control variables, we have the following econometric model:

7) $ln\frac{Y_i}{L_i} = \beta_0 + \beta_1 lncapitalintensity_i + \beta_2 firmsize_i + \beta_3 firmsize\ squared_i +$

$\beta_4 primeduc_i + \beta_5 seceduc_i + \beta_6 univeduc_i + \beta_7 location_i + \beta_8 export_i +$

$\beta_9 managers_i + \beta_{10} professionals_i + \beta_{11} skilledworkers_i + \beta_{12} unskilled\ workers_i +$

$\beta_{13} foreignownership_i + \beta_{14} training_i + \mu_i$

3.4 Variables Definition

Labor productivity, which is our dependent variable, refers to the total value added by labor in production. It is a measure of efficiency in production. Our main independent variables are capital-intensity (capital-labor ratio) and human capital variables (education of workers and training of workers.).The control variables will include size of the firm, foreign ownership of the firm dummy, location of the firm, the composition of the workforce (managers, professionals, skilled workers and unskilled workers) and the export status of the firm. The purpose of this study is to analyze how the above variables affect firms' labor productivity. In this case, labor productivity is measured as the ratio of gross value added to labor. This is

given by total sales less the cost of intermediate inputs. The expected sign could be positive or negative.

Education of the workers is a human capital variable that influences labor productivity. Human capital theory and past literature suggests that an extra year of education raises labor productivity. This is because a more educated worker is well able to understand and execute tasks much better than their less educated counterparts. Education also enhances specialization and professionalism in performing tasks and thus realizing higher productivity. In this case, education of workers is measured in terms of the number of workers with different levels education. These levels are primary education and below, secondary education and university education. The expected effect of this variable on labor productivity is positive.

Capital-labor ratio refers to the number of machinery per worker to be used in the process of production. Economic theory suggests that a higher capital-labor ratio increases labor productivity. This is because capital in production enhances efficiency of the worker and helps produce more within the same amount of time thus increasing the amount of output per worker. It is measured in terms of the ratio of the replacement value of machinery and equipment adjusted for capacity utilization to labor. The expected effect of this variable on labor productivity is expected to be positive.

Firm size and firm size squared variables are measured in terms of the number of workers which include permanent, temporary and casual workers. Economic theory and past literature suggests that this variable affects labor productivity depending on the actual firm size and the benefits and costs that may come with it. Small firms may suffer inefficiencies in production due to high average costs. Larger firms may benefit from economies of scale and thus able to produce more efficiently and make more profits. There are also instances where further increases in the size of the firm may be disadvantageous due to diseconomies of scale. In this case, we will measure firm size in terms of the number of employees in the firm. The effect of this variable on labor productivity can either be negative or positive.

Location of the firm refers to the geographical location of the particular firm. Economic theory suggests that the location of a firm can influence its labor productivity. This is because of factors like access to infrastructure, climatic conditions, security and so on. In this case, we will have a dummy variable taking the value of 1 if firm is located in Nairobi and 0 if

otherwise. The expected effect of this variable on labor productivity can either be positive or negative.

Training of the workers will also be measured as the proportion of workers that were trained in the past one year. The expected sign is positive. Economic theory suggests that training employees increases their knowledge and ability to perform the various tasks better as well as helping their untrained counterparts as workers tend to learn from each other .This increases efficiency and improves labor productivity.

The export status of the firm also influences labor productivity. Existing literature suggests the existence of increased labor productivity in firms after exporting. This is because firms benefit from economies of scale in production due to access to large markets as well as learning by exporting which leads to improved productivity. Another possible explanation is that exporting firms are able to handle competition better and they must also endeavor to meet international standards for their products. Therefore, it could be that labor has no choice but to be productive to meet these market demands. Export will be measured using a dummy variable that takes the value of 1 if the firm is an exporter and 0 if otherwise. The expected effect of this variable on labor productivity is positive.

Foreign ownership of firms acts as a means of transferring international skills, foreign experience and technology. This is a dummy variable that takes the value 1 if firm is owned by a foreigner and 0 if otherwise. The expected effect of this variable on labor productivity is uncertain.

The variables that capture the composition of the firm's workforce are four. These variables are; skilled workers, unskilled workers, managers and professionals. These variables are continuous variables which are measured by the percentage of workers in each of these categories. The expected effect on each of these variables on labor productivity is expected to be positive.

Table 1: Variables Definition and Hypothesized signs

Variable	Definition	Expected Sign
Dependent Variable		
Labor productivity	Continuous variable (Gross value added divided by labor)	Uncertain
Main Independent variables		
Capital-labor ratio	Continuous variable(Measured as capital divided by total employees)	Positive
Education of the workers	Continuous variable(measured in terms of levels: primary and below, secondary and university)	Positive
Training	Continuous variable.(Measured as proportion of workers trained)	Positive
Structure of the workforce (Managers, skilled workers ,unskilled workers and professionals)	All are continuous variables. Measured as percentage of workers in each group.	Positive
Firm-specific control variables		
Export	Categorical varia ble (1 if firm is an exporter, 0 if otherwise.)	Positive
Foreign ownership	Categorical variable (1 if firm is owned by a foreigner, 0 if otherwise.)	Uncertain
Location	Categorical variable (1 if firm is	Uncertain

	in Nairobi, 0 if otherwise.)	
Firm size	Discrete variables. Measured as the number of employees in the firm.	Uncertain
Firm size squared		

Source: RPED 2002/2003

3.5 Data Sources

The study uses cross-sectional data obtained from Kenya Investment Climate Survey. The survey was carried out in 2002-2003 by the World Bank's Regional Program on Enterprise Development (RPED) in collaboration with Kenya Institute of Public Policy Research and Analysis (KIPPRA).The survey was conducted on 284 formal manufacturing firms selected randomly based on various characteristics and as such the data available is representative of Kenyan manufacturing firms. The geographical location of the firms covered among other places, five major Kenyan towns that is, Nairobi, Mombasa, Kisumu, Nakuru and Eldoret. The data provides a wide array of quantitative and qualitative information collected through face to face interviews. Owners, managers and workers of firms were interviewed to give information regarding the investment climate and productivity of firms. Among the topics covered in the survey were labor, finance and firm productivity. This therefore gives confidence that the information on the variables required is contained in this dataset.

CHAPTER FOUR: EMPIRICAL FINDINGS AND DISCUSSION OF THE RESULTS

4.1 Introduction

This chapter analyzes and discusses the descriptive and regression results. The dependent variable is labor productivity with the firm as the unit of analysis. A multiple linear regression model is estimated. The chapter is organized into: descriptive statistics, correlation analysis, test for heteroscedasticity as well as regression results for the determinants of labor productivity in Kenyan manufacturing firms.

4.2 Descriptive Statistics

This section provides the descriptive statistics analysis with mean for continuous variables and percentages and proportions for categorical variables. In this study, the firm is used as the unit of analysis. The sample size was 284 Kenyan manufacturing firms with a considerable number of observations missing for some variables. The maximum number of observations was 283 firms while the minimum was 83 firms. This disparity was due to missing information on some of the variables.

Of the firms analyzed, the average number of workers per firm with primary education was 26, secondary education had 55 workers and only around 8 for university education. Approximately 30% of the workers in each firm were skilled. The managers were about 18%, the professionals were 5% while unskilled workers were approximately 31%.The average proportion of workers who had received formal training in the past one year was approximately 0.1 in each firm.

Firms that were found to be exporters were slightly more than half (about 54%) of all that were sampled. Most of the firms (62%) were located in Nairobi while the other 38% were distributed among major towns of Kisumu, Eldoret, Nakuru and Mombasa. Approximately 9% of all firms were owned by foreigners. The average number of employees in the firms that were sampled was approximately 215 workers.

Table 4.1: Summary descriptive statistics for the dependent and independent variables

Variable	Mean (Std.Dev)
Ln(Labor Productivity)	13.25(2.19)
Ln(Capital-labor ratio)	12.93(2.41)
Number of workers with primary education	26.43(140.26)
Number of workers with secondary education	55.29(156.90)
Number of workers with university education	8.03(25.18)
Percentage of Skilled workers	29.87(26.33)
Percentage of Managers	18.01(19.54)
Percentage of Professionals	4.98(11.04)
Percentage of unskilled workers	31.21(28.85)
Training(proportion of workers trained)	0.09(0.21)
Export dummy (1 if firm is an exporter)	0.54(0.50)
Location dummy (1 if firm is located in Nairobi)	0.62(0.49)
Foreign Ownership dummy(1 if firm belongs to a foreigner)	0.09(0.29)
Firm size(number of employees)	214.93(437.07)
Firm size squared	236546(1581355)

Source: Author's own estimates from RPED 2002/2003

4.3 Correlation Analysis

Table 4.2 below presents the Pearson correlation matrix. Correlation between most of the variables is found to be low, that is, between 0.5 and 0.01 and between -0.5 and -0.01.High correlation was found between primary and below education, secondary education and firm size. The primary and below education variable will therefore be excluded from our regression. The high correlation between firm size and firm size squared is due to the non-linear quadric effect of size of the firm on labor productivity. The variance inflation factor test approach will be used to confirm if multicollinearity is a serious problem in this analysis. In table 4.3 below, since most of the variables have a VIF of less than 5 and the mean VIF is also less than 5, we conclude that multicollinearity is not an inherent problem. Therefore, we can go ahead and estimate the model.

Table 4.2: Pearson correlation matrix for dependent and independent variables

	LnLP	Lnkl	Training	Primary education	Secondary education	University education	Professionals	Managers	Skilled workers	Export
LnLP	1.0000									
Lnkl	0.7348	1.0000								
Training	0.0699	0.0111	1.0000							
Primary education	-0.0928	-0.0905	0.4890	1.0000						
Secondary education	-0.0667	-0.0474	0.5205	0.9345	1.0000					
University education	0.3998	0.4175	0.4111	0.3218	0.4744	1.0000				
Professionals	0.1154	0.1172	-0.0014	-0.0509	-0.0624	0.2089	1.0000			
Managers	0.1411	0.1206	-0.2011	-0.1333	-0.1853	-0.1796	-0.0341	1.0000		
Skilled workers	-0.0150	-0.0170	-0.0884	-0.0792	-0.0515	0.0296	-0.0260	-0.3051	1.0000	

| Export | 0.2847 | 0.1143 | 0.1441 | 0.0736 | 0.0382 | -0.1004 | -0.0450 | -0.1214 | -0.0858 | 1.0000 |

Source: Author's estimates from RPED 2002/2003

Table 4.3: Test for Multicollinearity using Variance Inflation Factor (VIF) approach

Variable	VIF	1/VIF
Firm size	12.30	0.081288
Firm size squared	12.20	0.081972
Secondary education	9.99	0.100067
Unskilled workers	4.40	0.227186
Skilled workers	3.60	0.277611
University education	3.11	0.321108
Managers	3.00	0.333664
Ln(capital-labor ratio)	2.06	0.484860
Professionals	2.00	0.500382
Foreign ownership	1.64	0.610433
Export	1.28	0.782869
Location	1.12	0.889904
Training(proportion)	1.07	0.935513
Mean VIF	4.44	

Source: Author's Estimates Using RPED 2002/2003

4.4 Breusch-Pagan test for heteroscedasticity

Heteroscedasticity is a situation where the error term has a variance that varies across observations. This is a common problem when dealing with cross-sectional data. We therefore carry out a test to ascertain whether or not the variance of the error term is constant across observations.

H0: Homoscedastic variance

Ha: Heteroscedastic variance

$Chi^2 = 0.61$

Probability $> Chi^2 = 0.4338$

Since the p value, 0.4338 is greater than 0.05, we do not reject the null hypothesis of constant variance. Therefore, heteroscedasticity is not a major problem.

Table 4.4: Multiple Linear Regression Estimates for the log of Labor Productivity

Variable	Coefficient (t statistic)
Capital-labor ratio(log)	0.3524**
	(5.20)
Proportion of workers trained	0.4969
	(0.72)
Number of workers with secondary education	-0.0005
	(0.30)
Number of workers with university education	0.0226**
	(3.17)
Percentage of Skilled workers	0.0161
	(1.90)
Percentage of Managers	0.0279**
	(2.74)
Percentage of Professionals	0.0099
	(0.89)
Percentage of Unskilled workers	0.0181*
	(2.00)
Export dummy(1 if firm is an exporter)	0.9268**
	(3.41)
Location dummy(1 if firm is in Nairobi)	0.5732*
	(2.11)
Foreign Ownership dummy(1 if firm is owned by a foreigner)	1.7895**
	(3.49)
Firm size(number of employees)	-0.0016*
	(2.22)
Firm size squared	0.0013

		(0.92)
Intercept		5.9742**
		(6.18)

N	= 91
F(13,77)	= 14.49
Prob>F	= 0.00
R-squared	= 0.71
Root MSE	= 1.14

Note:*p<0.05   **p<0.01

Source: Author's Estimates using RPED 2002/2003

4.5 Discussion of Econometric Results

In this model, the R-Squared is 0.71.This implies that the fitted model explains about 71% of all variations in the dependent variable. All the variables in the model have positive coefficients except for the first order coefficient for firm size variable and secondary education which have negative coefficients.

The coefficient on the log of capital-labor ratio is positive and significant as expected. A 1 percent increase in capital-labor ratio increases labor productivity by 0.35 percent.This is as supported by economic theory that increasing capital intensity raises labor productivity. This is because capital in production equips workers to increase their productivity. The use of machines in production also reduces human effort and thus workers are able to produce more within the same amount of time. Wacker et.al (2006) found that investing in equipment resources increases firm efficiency as well as non-production activities such as well-defined tasks. Training workers has positive but insignificant effect on labor productivity. This implies that labor productivity in firms that train their workers is not significantly different from those that do not offer training.

The education of workers is captured by the number of workers with different levels of education (secondary and university). The coefficient on university education is positive and significant at the 1% level. Hiring an additional worker with university education would increase firm's labor productivity by about 0.023 units. This is consistent with human capital considerations that education raises labor productivity. These results are consistent with those of Niringiye et.al

(2010) who found that increasing years of education increased labor productivity in Kenyan manufacturing firms. In the recent past, Kenya has been recording a high number of higher education enrolments compared to those of vocational training and lower levels of education. This could be due to the expected benefits and returns to higher education which act as a motivation to pursue university education. Such benefits could include higher wages paid to laborers possessing higher education compared to those with lower levels of education (Piriya et.al, 2016). Secondary education was not significantly associated with labor productivity.

The study also analyzed the structure and composition of the labor force and its effects on labor productivity. The coefficient on the managers is also positive and significant at the one percent level. A one unit increase in the managers hired raises firm's labor productivity by about 2.8%. Past evidence shows that more managers in the firm are able to better supervise workers and therefore avoid shirking. This makes labor more effective (Fafchamps et.al, 2001). The coefficient on the unskilled workers variable is also positive and significantly associated with labor productivity. Increasing the percentage of unskilled workers by 1 increases firm's labor productivity by about 1.8%. These results are not as expected. We expect that skilled workers would better raise productivity compared to their unskilled counterparts. Rehman et.al (2013) found a negative relationship between unskilled workers and labor productivity. Skilled workers and professionals variables were not significantly associated with labor productivity.

The size of the firm was proxied by the total number of employees in the firm. Allowing for a non-linear relationship between labor productivity and size of the firm, coefficients of firm size and firm size squared are negative and positive respectively. The first order coefficient of firm size is significant. This implies that an additional worker in the firm decreases labor productivity up to a certain point and then it starts increasing. The reduced labor productivity could be due to high average costs of production when the firm is smaller. As the firm becomes larger, it could benefit from economies of scale and consequently low average production costs and therefore realize higher value added per employee. Another reason could be that large firms use more capital than small firms. Workers therefore have more access to machinery than those in small firms. This could lead to increased value added from labor. (Niringiye et.al, 2010).

The location dummy (1 if Nairobi and 0 elsewhere) is positive and significant. Firms located in Nairobi exhibit significantly higher labor productivity (77% more) compared to firms in other

major towns. This could imply that Nairobi has better infrastructure that facilitates increased productivity. Another possible explanation could be that firms in Nairobi have access to larger markets and therefore are required to produce more to meet the high demand for their products.

This study also examined the export status of the firm and its impact on labor productivity. The coefficient on the export dummy is positive and significant. Labor productivity in firms that export is significantly higher than that in firms that do not export. These results are similar to those of Liu et.al (1999) who found that exporting firms record higher productivity from their labor. This is because these firms tend to be larger and they have the pressure to remain relevant in international markets. Therefore, higher productivity is seen as a requirement to survive in the export market.

The coefficient on the foreign ownership variable is positive and significant. This study finds that firms owned by foreigners exhibit significantly higher levels of labor productivity compared to local firms. This is in line with the view that foreign ownership acts as a channel for transferring international skills such as management, leadership and information technology. (Teece, 1997) However, this was contrary to Lundvall (1999) who conducted a study on Kenyan manufacturing firms and found that foreign firms had no effect on labor productivity.

CHAPTER FIVE:CONCLUSION

5.1 Summary, Conclusion and Policy Recommendations

Labor productivity is a crucial policy issue in developing countries. It is a measure of the organization's competitiveness. It can also be used as a measure of success in human capital investment. Human capital investment plays a key role in yielding a qualified workforce that will meet the needs of the labor market. Improving labor productivity depends mainly on developing the firm's stock of human capital as well as equipment resources. This paper analyzed the factors that affect labor productivity in Kenyan manufacturing firms using firm-level cross-sectional data. The main findings of the study were that human capital and investment in machinery are associated with raising labor productivity. Higher education (university education) of workers was positive and had a statistically significant effect on labor productivity. This is consistent with human capital considerations that increasing years of education raises productivity. Capital-labor ratio was also positive and significant. Using machines in production reduces human effort and saves time thus producing more within the same amount of time

The geographical location of the firm also had a positive and significant effect on labor productivity. Firms located in Nairobi were on average more productive than those located in other major towns such as Nakuru, Eldoret, Mombasa and Kisumu. A possible reason for these differences could be that firms in Nairobi have access to better infrastructure that increases productivity. The study also examined the impact of foreign ownership of firms on labor productivity which was found to be positive and significant. The effect of hiring more managers to a firm's labor productivity was also found to be positive and statistically significant. This is because managers' supervisory duties enhance effectiveness of labor. Increase of managers particularly those with higher education enhances better adaptability to new production technologies and thus increasing productivity of labor. Contrary to our expectations, the coefficient on unskilled workers was also positive and significant. Labor productivity was found to increase the larger the size of the firm. Larger firms benefit from economies of scale and lower average production costs.

Exporters exhibited significantly higher levels of labor productivity than non-exporters. Training of workers, though positively affecting labor productivity, was insignificant. Past studies have shown that where this variable is insignificant, training may be serving other interests, such as

job promotions and career opportunities elsewhere, other than acquiring the necessary skills required for raising productivity.

In this particular study, despite the higher education of workers being positively and statistically significant, it is not a necessary and sufficient condition for increasing labor productivity in firms. This explains why Kenya has many graduates yet labor productivity index still remains low. This could imply that graduates released in the labor market are not meeting employers' requirements. Therefore, much emphasis should be placed on imparting workers with necessary skills required in improving productivity. This could be done by the government promoting middle-level colleges and technical colleges to equip learners with relevant skills before their release to the labor market.

The government should also create a conducive business environment that will encourage foreigners to invest in Kenya. This could help local firms to benefit from international technology and skills as well as foreign experience which could be necessary in increasing productivity in their firms. Individual firms should also endeavor to increase their stock of physical capital to be used in production. This will equip their workers with the necessary tools required to raise their productivity.

5.2 Areas of Further Study

This study examined the determinants of labor productivity in Kenyan manufacturing firms using RPED 2002/2003 data. The data available did not contain details of the types of skills possessed by workers in Kenyan manufacturing firms. It was therefore not possible to establish the types of skills present or lacking in these workers. This study can therefore be extended by considering the level of different skills in all workers. This could be crucial in determining which type of skills are mostly lacking in workers in Kenyan manufacturing firms and therefore give recommendations as to how these skills can be improved to consequently increase productivity of labor.

REFERENCES

Almeida, R and Carneiro, P (2009), "The Return to Firm Investment in Human Capital," *Labour Economics.Vol 16,Issue 1,pp 97-106*

Barnard, C.I (1968).The Functions of the Executive. (Thirtieth Anniversary Edition.) *Cambridge Massachusetts, London England, Harvard University Press.Issue 978-0674 328006*

Bigsten,A,Collier,P,Dercon,S,Gauthier,B,GunningJ.W,Isaksson,A,OduroA,Oostendorp R,Pattillo C,Soderbom M,Sylvain M,Teal F and Zeufack A.(1999)."Investment in Africa's Manufacturing Sector: A Four Country Panel Data Analysis, *"Oxford Bulletin of Economics and Statistics.Vol 61,Issue 4,pp489-512*

Bigsten, Arne, Peter Kimuyu & Måns Söderbom (2010). "Chapter 10: The Manufacturing Sector," forthcoming in (ed.) C. Adam, P. Collier and N. Ndung'u, Kenya*: Policies for Prosperity. Oxford University Press and Central Bank of Kenya.*

Choudhry,M.T.(2009).Determinants of Labor Productivity: An Empirical Investigation of Productivity Divergence. *University of Groningen, the Netherlands.Journal of Economics.pp 1-21*

Corvers, F.1996.The Impact of Human Capital on Labor Productivity in Manufacturing Sectors of the European Union.*Maastritch: University of Limburg.Journal of Applied Economics.Vol 29,Issue 8,pp 75-87*

Corvers, F. (1997). The Impact of human capital on labor productivity in manufacturing sector the European Union. *Joiurnal of Applied Economics.Vol 29,Issue 8,pp 75-87*

Dearden, L., H. Reed, and J.V. Reenen (2006). The impact of training on productivity and Wages*: Evidence from British Panel Data. Oxford Bulletin of Economics and Statistics..Vol 68,Issue 4,pp 397-421*

Fafchamps, M, ElHamine and A.Zeufack, (2001).Learning to export: Evidence from Moroccan manufacturing. *Paper presented at: New Industrial Realities and Firm Behavior in Africa.20-22 September. Oxford.*

Fayol, H (1969).General and Industrial Management. *London, Sir Isaac Pitman and sons(1949).*

Ford, H (2006).My Life and Work.*Filiquarian Publishing*

Hayami,Y and Ruttan,V.W.(1971).Agricultural Productivity differences among countries. *American Economic Review.Vol 60,Issue 5,pp 895-911*

Heshmati,A and Rashidghalam,M 2016.Labour Productivity in Kenyan Manufacturing and Service Industries. *Discussion Paper.No.9923*

Jan H.1994.The relationship between speed and productivity in industry networks: A study of industrial statistics. *International Journal of Production Economics.vol 34,Issue 1,pp 91-97*

Klotz,B Madoo, R and Hansen,R (1980).A Study of High and Low "Labor Productivity " Establishments in U.S Manufacturing.*In New Developments in Productivity Measurement.ISBN 0-226-43080-4,pp 239-292*

Liu,J-T,Tsou,M-W and Hammitt,J.K (1999).Export Activity and Productivity: Evidence from the Taiwan Electronics Industry.*Weltwirtschaftliches Archive.Vol 135,Issue 4,pp675-691*

L.Yellen, J. (1984). Efficiency Wage Models of Unemployment.*The American Economic Review.Vol 74,Issue 2,pp 200-205*

Lopes,A and Texeira,P(2013).Productivity Wages and the returns to firm-provided training: Fair shared capitalism? *International Journal of Manpower.Vol 34,Issue 7,pp 776-793*

Lundvall,K.(1999).Essays on Manufacturing Production in a Developing Economy: Kenya 1992-94.*Economiska Studier 93,Doctoral Thesis, University of Gothenburg, Sweden.*

Magati ,P and Ng'ang'a,M(2012).Sectoral Productivity Awareness in Kenya.*International Journal of Business and Social Science.Vol 3,Issue 17,pp 72-82*

Marx,K(1867).Das Kapital.*Koln,Anaconda Verlag*

Moon, W and Lee, J.M, 2013.Economic Development, Agricultural Growth and labor Productivity in Asia. *Journal of Comparative Asian Development.Vol 12, Issue 1,pp 113-146*

Nagler, P. and W. Naudé (2014).Labour Productivity in Rural African Enterprises: *Empirical Evidence from the LSMS-ISA. IZA Discussion Paper, No.8524.*

Niringiye,A,Luvanda,E and Shitundu,J(2010).Human Capital and Labor Productivity in East African Manufacturing Firms. *Current Research Journal of Economic Theory .Vol 2, Issue 2, pp 48-54*

Odero, W.O, Reeves, W.A and Kipyego, N (2015).Kenya 2015(14th Edition).*African Economic Outlook.*Retrieved from https://www.un.org>africa>osaa>pdf>pubs>2015 afrecooutlook-afdb.

Pfeifer, C 2015.The Nexus between top managers' human capital and firm productivity.*Applied Economics Letters,Vol 22,Issue 12,pp 982-986*

Rehman,A and Mughal,K(2013).Impact of Technical Education on the Labor Productivity. *International Journal of Economics, Finance and Management.Vol 2,Issue 7,pp 462-471*

Rukumnuaykit,P and Pholphirul,P (2016).Human Capital Linkages to Labor Productivity: Implications from Thai Manufacturers. *Journal of Education and Work.Vol 29,Issue 8,pp 922-955*

Sala, H. and J.I. Silva (2011).Labor Productivity and Vocational Training*: Evidence from Europe.Journal of Productivity Analysis,Vol 40,Issue 1,pp 31-41*

Schultz, T. W. 1961. "Investment in Human Capital.*The American Economic Review,Vol 51,Issue 1,pp 1-17*

Smith,A(1776).An Inquiry into the Nature and Causes of the Wealth of Nations (Glasgow edition),*Vol 1,1976,Oxford University Press.*

Taylor, F.W. (1998).The Principles of Scientific Management:*New York,Institute of Industrial Engineers,Mineola,NewYork:Dover Publications.1911*

Teece, D. J, G. Pisano and A.Shuen, 1997.Dynamic Capabilities and Strategic Management. *Strategic Management Journal,Vol 18,Issue 7,pp 509-533*

Tomiura, A, 1997.Productivity in Japan's Manufacturing Industry. *International Journal of Production Economics,Vol 52,Issue 1-2,pp 239-246*

Umoru,D and Yaqub,J.O (2013).Labor Productivity and Health Capital in Nigeria: The Empirical Evidence. *International Journal of Humanities and Social Science.Vol 3,Issue 4,pp 199-221*

United Nations, (2015).Sustainable Development Goals. Retrieved from https://www.undp.org> development > desa > disabilities > envision2030.

Vilasini PPGN[1,] Gamage JR[2,], Kahangamage UP[3],and Thibbotuwawa N[4]. Low Productivity and Related Causative Factors: A Study Based on Sri Lankan Manufacturing Organizations. In *Accessed atwww. ppml. url. tw / EPPM/conferences / 2012 / download /.../39% 20E140. Pdf on (Vol. 13).*

Wacker, J.G.,Yang,C.L and Sheu,C.(2006).Productivity of production labour,non-production labor and capital. An International Study: *International Journal of Production Economics.Elsevier,Vol 103,Issue 2,pp 863-872*

World Bank (IBRD-IDA) 2015.Retrieved from https://openknowledge.worldbank.org>handle.

Xiaodong, L, K.H. Chow, Y. Zhu, Y. and L. Ying (2016).Evaluating the impacts of high temperature outdoor working environments on construction labour productivity in China: A case study of rebar workers. *Building and Environment,Vol 100,Issue 95,pp 42-52*

Yamada,Tetsuji,Yamada,Tadashi and Liu, G.G,(1997).Value-added productivity of Manufacturing Industries in Japan.*Journal of Applied Economics,Vol 29,Issue 10,pp 1317-1324*