FACTORS INFLUENCING LABOR PRODUCTIVITY IN THE KENYAN SERVICES SECTOR.

Amutabi Cyprian

X50/8423/2017

A Research Paper submitted in partial fulfilment of the requirements for the award of the Degree of Master of Arts in Economics of the University of Nairobi.

2019

DECLARATION

This Research Paper is my original work and has not been submitted for an award of a degree in any other university or institution of higher learning.

Signature……. Date……

Amutabi Cyprian

X50/8423/2017

This Research Paper has been submitted for examination with my approval as the University supervisor.

Signature…… Date……

Prof. Anthony Wambugu

DEDICATION

To my dear father Victor Milimu and mother Audrey Abele for having accorded me all the necessary support throughout my Master's Degree studies.

ACKNOWLEDGEMENT

My deepest appreciation and gratitude go to my dear parents and the African Economic Research Consortium (AERC) for their tireless moral and financial support. I highly acknowledge the academic guidance that my project supervisor Professor Anthony Wambugu accorded me throughout this entire research period. I also wish to extend great regards to my class mates, friends and relatives who motivated me and challenged me to take this bull by its horns.

I am solely responsible for any shortcomings and any errors of omission found in this study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

CEM Country Economic Memorandum

FKE Federation of Kenya Employers

GDP Gross Domestic Product

ICS Investment Climate Surveys

ICT Information and Communication Technology

ILO International Labor Organization

KNBS Kenya National Bureau of Statistics

KRA Kenya Revenue Authority

LSMS Living Standards Measurement Study

MLE Maximum Likelihood Estimator

OLS Ordinary Least Squares

R & D Research and Development

RPED Regional Programme on Enterprise Development

SMEs Small and Medium-scale Enterprises

VIF Variance Inflation Factor

ABSTRACT

The service sector is at the heart of Kenya's economic growth as it accounts for approximately half of Kenya's GDP at 50.7%. However, statistics from the World Bank and KNBS reveal that with adequate value addition, this sector can hit a projected target of 70%.This study employed the 2018 cross-sectional World Bank Enterprise survey data in determining those factors that influenced labor productivity in the Kenyan service sector. The study also sought to examine how the impact of these variables on labor productivity varied based on the size of the firm. Labor productivity is a measure of efficiency in the production process and refers to a firm's generation of higher value-added or production per unit of labor. Following Corvers (1997), the labor productivity model was modified and extended to capture other relevant but omitted variables. The two-stage switching regressions model was employed to correct for the firm-size effect on labor productivity. The study findings revealed that capital intensity, high school education and managers' experience impacted positively and significantly on labor productivity for both firm. The impact was higher among the large firms. Tax administration significantly decreased labor productivity across all firms with the impact being higher for the large firms. The selectivity variable was significant across both firms hence supporting the role of self-selection in labor productivity studies. To optimize labor productivity, the study recommended favorable and less bureaucratic tax regulations as well as heavy investment in human capital.

Key words: Service sector, labor productivity, two-stage switching regression, Kenya.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The profitability and survival of any firm are determined by its performance. To a large extent, this depends on labor productivity. Labor productivity is a measure of efficiency in the production process and refers to a firm's generation of higher value-added or production per unit of labor (Heshmati and Rashidghalam, 2016). High labor productivity implies that a firm can produce at least the same amount of output with fewer laborers. With increased output, a firm takes advantage of economies of scale thus increasing its profit potential (KNBS, 2017).

High labor productivity stimulates a firm's growth since high revenue enables re-investment from the surplus generated. There is more return from this re-investment on the factors of production with a rapid increase in both domestic and private consumption (KNBS, 2017). Furthermore, KNBS and World Bank statistics reveal that employee wage tends to increase with the increase in a firm's productivity across the private and public sectors of the Kenyan economy. These linkages directly impact on the overall performance of the economy. This is realized through a rise in the GDP growth rate.

1.2 The service sector in Kenya

The service sector plays a key role both directly through job creation and revenue generation and indirectly through fostering forward and backward linkages to other sectors in an economy (Were, 2016). The service industry in Kenya is divided into various sectors. Each contributes to job creation and to the Gross Domestic Product.

1.2.1 Employment contributions by sectors

The services sector is the main source of employment in Kenya. Table 1.1 shows the share of employment of the three major sectors in total employment in Kenya for the year 2018.

Table 1.1 Employment creation as a % of total employment

Sector	**%**
Agriculture	57.03
Services	35.30
Industry and manufacturing	7.67
Total	**100**

Source: (World Bank, 2019)

From Table 1.1, it is evident that the agricultural sector is the largest employer followed by the service sector. The industry and manufacturing sectors create the fewest jobs at only 7.67%.

The private sector outshines the public sector in terms of service sector employment creation. The number of employed persons (in thousands) in the service industry has been progressively increasing across the private and public sectors from 2011 to 2015. The private sector also created more job opportunities than its public counterpart over the same period. The wholesale, retail trade and education are the largest employers for the private sector while education and public administration employ the largest number in the public sector. The increment in job creation represents an annual average increase of 2.7% employment growth rate for the public and 5.8% for the private sector respectively (KNBS, 2016).

This can be shown by Table 1.2.

Table 1.2 Private and Public sectors: Employment by service sub-sector (2011-2015)

'000

Sub-sector	Year									
	2011		2012		2013		2014		2015	
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
Retail and wholesale trade, repair of motorcycles and vehicles	189.6	0.8	197.1	0.9	210.9	1.3	218.9	1.3	230.7	1.6
Storage & transportation	56.1	16.8	58.1	17.1	58.8	17.2	62.1	17.6	64.8	17.8
Food service and accommodation	64.2	1.4	67.6	1.3	72.1	1.4	71.7	1.4	74.7	1.4
Information Communication	78.8	1.7	83.9	1.8	90.6	1.8	97.3	1.8	103.8	1.9
Insurance & financial activities	48.5	7.9	51.3	8.6	56.3	9.0	58.1	9.4	62.7	10
Real estate	3.6	-	3.7	-	3.8	-	3.9	-	4.0	-
Scientific, professional & technical activities	55.6	5.7	56.9	5.8	59.4	5.8	60.7	5.9	62.6	5.9
Education	100.9	281.2	106.9	289.5	142.5	293.0	166.7	302.3	189.1	318.6
Social work & human health Activities	68.9	29.0	73.8	30.4	80.1	30.7	85.2	31.1	91.3	32.7
Entertainment, arts & recreation	3.9	2.2	4.0	2.4	4.3	2.4	4.3	2.4	4.5	2.5
Defense, public administration and compulsory social security	-	206.0	-	208.2	-	222.4	-	226.9	-	222.0
Other Service Activities	27.3	-	28.2	-	29.2	-	30.5	-	31.7	-
Total	**697.4**	**552.7**	**731.5**	**566**	**808**	**585**	**859.4**	**600.1**	**919.9**	**614.4**

Source:KNBS,2016

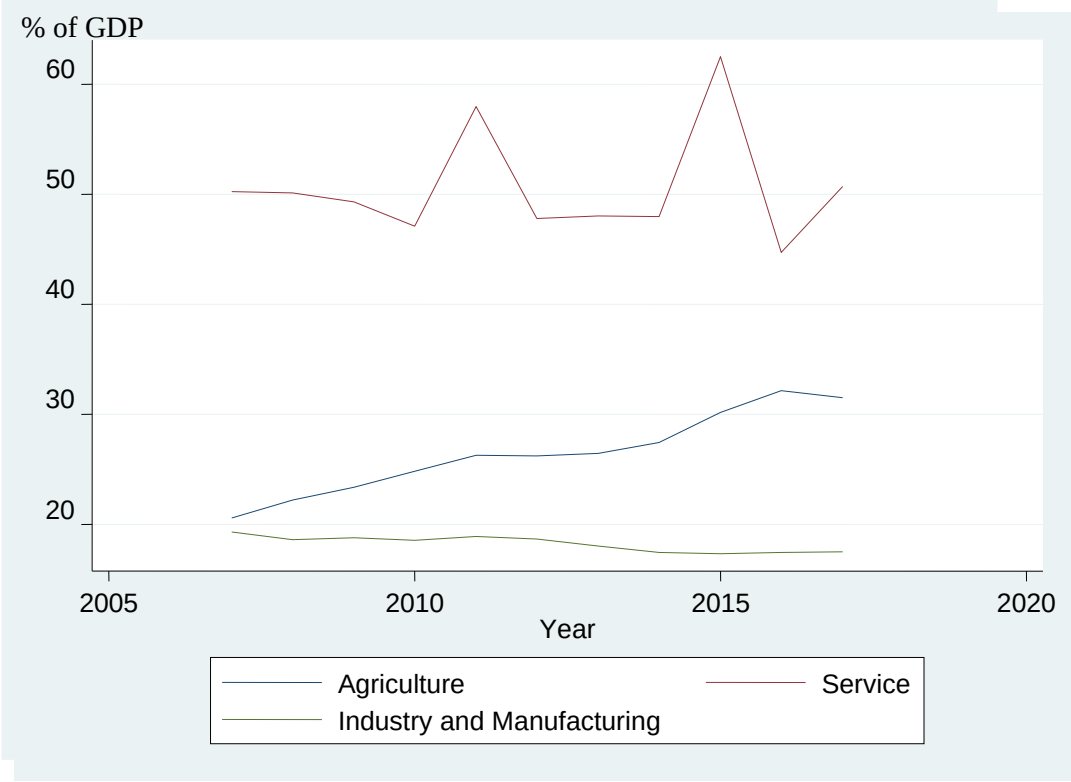
1.2.2 The contribution of the service sector to Kenya's GDP

The service sector is a key driver to Kenya's economy. The sector contributed 47% of Kenya's Gross Domestic Product in 1980. It accounted for 51% in 1990, with the figure remaining constant in 2000. It then rose significantly to 58% in 2011 with a further increase to 62.5% in 2015 (World Bank, 2015). This sector continues to play a crucial role in the acceleration of growth for the Kenyan economy with several of its intensive-knowledge sub-sectors such as telecommunications, tourism, finance and business showing continued prosperity over the past decade. From the period 2006 to 2013, 72% of the increase in Kenya's GDP emanated from the services sector (World Bank, 2015).

Kenya's service exports have grown very fast over the last one decade, with tourism and transport being the two largest contributors. The services exports have also been growing faster than goods exports since 2005, accounting for more than half of the increase in total exports (World Bank, 2015). This could be attributed to three factors: First, this sector in contrast to manufacturing and agriculture is less dependent on the high cost of raw materials such as energy and land. Second, services are less susceptible to volatile commodity prices. And third, it has a smaller physical footprint than its counterparts that have to rely on the land, physical equipment and plants (World Bank, 2015)

Statistics from the World Bank and the KNBS reveal that the service sector performed comparatively better than the industry, manufacturing and agricultural sectors.
Figure 1.1 shows the three major sectors' contribution to Kenya's GDP from the year 2007 to 2017.

Figure 1.1 Sectorial contributions to Kenya's Gross Domestic Product (2007-2017)



Source: (World Bank, 2015., KNBS, 2007-2010., KNBS, 2017)

Figure 1.1 reveals that the service sector makes up the largest contribution to GDP as compared to the agricultural, manufacturing and industry sectors. However, despite the service sector's largest share of contribution to GDP, it is also clear that this share has not reached its maximum potential. With 58% and 62.5% contributions in the year 2011 and 2015 respectively, it is possible for the service industry to hit a projected target of 70% contribution to Kenyan GDP (World Bank CEM report, 2016). This could be enhanced through value addition to the service industry. (World Bank, 2016).

The service sector is further divided into various sub-sectors with each one of them contributing to a certain share of Kenya's GDP. Table 1.3 indicates this sub-sectorial contribution of the service industry in Kenya.

Table 1.3 Composition of the service sector in Kenya (2017)

Sub-sector	**% contribution to GDP**
Real estate	8.9
Wholesale and retail	8.8
Travel and tourism	8.2
Finance	7.4
Education	6.1
Public administration	5.4
Liberal professions	2.5
Health	1.8
Information and Communication Technology	1.6
Total percentage	**50.7**

Source: (KNBS, 2017)

Table 1.3 reveals that real estate makes up the largest contribution to GDP at 8.9%, closely followed by the wholesale and retail sub-sector at 8.8%. Health and ICT contribute the lowest at 1.8 and 1.6 respectively.

1.3 Statement of the problem

The service sector is at the heart of Kenya's economic growth. In the year 2017, it accounted for approximately half of Kenya's GDP at 50.7% (KNBS, 2017). This sector's share of GDP was 51% in 1990 and 2000; 58% in 2011 and 62.5% in 2015 (World Bank, 2015). It is estimated that with adequate value addition, then the contribution of the services sector to Kenya's GDP can be increased to 70% (World Bank, 2016).

Low labor productivity is experienced across both the SMEs and large-sized service firms. Were (2016) pointed out the rampant mismatch between job and employee skill as a catalyst to low

labor productivity. Firms have to train employees in a bid to skill up the labor force; a worrying trend that results in the not only loss of time but also increased hiring costs. The political uncertainty that engulfs every electioneering period also acts as a deterrent to foreign investment thus impacting negatively on the transport and tourism service sectors (World Bank, 2015). This is evident from service productivity at these periods: 2007-2008, 2013-2014 and 2017 as well (World Bank, 2015., KNBS, 2007-2010., KNBS, 2017).

It is also apparent that even though the service share of contribution to GDP appears higher than that of agriculture, industry and manufacturing; its job creation potential remains small with a mere average of 2.7% for the public and 5.8% for the private sector (KNBS, 2016). More importantly, in the Kenyan service sector context, no empirical study has provided insight into the degree of variation of productivity determinants across different sized firms. It is thus difficult to know which factors are uniquely critical to optimizing productivity levels in different-sized firm categories.

1.4 Research Questions

i. What factors are associated with variation in labor productivity among the Kenyan service firms?

ii. Is firm-level labor productivity among SMEs and large-sized service firms determined by the same factors?

1.5 Objectives of the study

The main objective of this study was to determine the factors associated with firm-level labor productivity in Kenyan service sector. The specific objectives were:

i. To identify factors associated with variation in labor productivity among the Kenyan service firms.
ii. To examine the determinants of labor productivity across SMEs and large-sized service firms in Kenya.
iii. To draw policy implications for increasing labor productivity in the Kenyan service firms.

1.6 Significance of the Study

The service sector is a key contributor to Kenya's GDP and job creation. Therefore, knowing the drivers of labor productivity in the sector is vital for increasing firm-level productivity. The political uncertainity that engulfs every electioneering period in Kenya acts as deterrent to service firm's productivity and thus profitability. Furthermore, service firms have to bear with the high cost of doing business that is reflected through tax rates, trade customs and regulations. As a result, this study provides empirical evidence on the impact of tax administrative constraints and political uncertainty on firm-level productivity among the service sectors in Kenya. The study also addresses the selectivity bias problem by controlling for firm size in labor productivity studies.

The study findings can inform policies and interventions to be undertaken by the private sector and the government of Kenya through vision 2030 so as to increase labor productivity among the service firms. The findings will also be useful to the labor unions, Federation of Kenya Employers (FKE) and the Salaries and Remuneration Commission as they can inform wage setting policies. The tax authorities i.e. KRA are able to design favorable tax policies that can ease on the production cost of the service firms.

1.7 Organization of the study

The rest of the paper was organized as follows: Chapter two presented the theoretical, empirical and overview of the literature. Chapter three presented the methodology. It described the theoretical framework, empirical model specification, data type and sources, measurement and definition of variables. It also discussed the potential econometric issues that were likely to be encountered in this study. Chapter four discussed the empirical findings while chapter five presented a summary of the empirical findings, conclusions, recommendations and areas for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical review

The research employed the neoclassical production function, Koss-Lewis productivity theory and the human capital theory of labor productivity in an attempt to trace the factors that most importantly influence labor productivity in the service industries in Kenya.

2.2.1 Neoclassical production function

The production function specifies the maximum output from a given quantity of inputs given the available technology, that is, the technically feasible output when the firm operates efficiently (Jehle and Reny, 2011). Therefore, productivity is a measure of efficiency in the production process; that is, how much output is produced from a given set of inputs and is expressed as an output-input ratio (Jehle and Reny, 2011). The production function pioneered by Cobb and Douglas (1928) is popular in the theoretical literature. It assumes two inputs; labor and capital and that their elasticity of substitution is equal to one (Cobb and Douglas, 1928).

2.2.2 Koss-Lewis Productivity theory

According to Koss and Lewis (1993), the neoclassical production function pioneered by Cobb and Douglas (1928) could not accurately account for labor productivity. This is due to the fact that it failed to accommodate other variables that may affect firm-level productivity.

The variables proposed by Koss and Lewis include: energy (oil, gas, water, electricity); material (raw material, purchased parts); fixed capital (land, buildings, offices, machinery and equipment); working capital (inventory, cash, accounts receivable); customer and employee satisfaction; quality, labor management, market share and competitive advantage, sales revenue, dividends and interest.

2.2.3 Human capital theory of labor productivity

This theory predicts that human capital variables impact on labor productivity. It was introduced by Schultz (1961) and formalized by Becker (1964). Welch (1970) extended it by emphasizing the productive value of education through the worker, allocative, diffusion and research effects. Further seminal contributions were made by Mincer (1974).

According to Schultz (1961), knowledge and skill were a form of capital which was basically a product of predetermined investment. Schultz drew reference to the Western countries,

explaining that investment in human capital was a core reason for their increment in national output. There also existed a direct relationship between human capital investment and the overall increase in employees' wages.

Becker (1964) formalized this theory and asserted that human capital was directly beneficial in the production process. According to Becker (1964), education and training raised the workers' productivity by transmitting vital knowledge and skills. The link between human capital and labor productivity was analyzed using the earnings function framework, whereby earnings were used as a proxy to productivity.

According to Welch (1970), education had four effects on productivity namely: the worker, allocative, diffusion and research effects. Under the worker effect, education raised the marginal productivity of workers with respect to a given good. Highly educated workers were thus presumed to be more efficient in working with the given resources. With the allocative effect, better-educated workers exhibited greater efficiency through proper allocation of input factors in the production process. Through the diffusion effect, well-trained and educated workers are more able to conform to changes in technology and are thus able to introduce new techniques of production more quickly. With the research effect, higher education plays a pivotal role in fostering technological progress and productivity growth.

Mincer (1974) extended the human capital theory to capture the spillover effects of human capital investment. Mincer noted that human capital did not only involve the integration of given knowledge in laborers but also the generation of new knowledge which triggered technical progress and innovation. The human capital theory thus predicted that employees' level of education, skills, managerial experience and Research & Development impacted positively on labor productivity at a firm-level.

2.2 Empirical Review

Heshmati and Su (2011) studied the source and development of labor productivity among Chinese firms from the period 2000-2009. The drivers of labor productivity were identified at firm-level using multiple regressions. The results revealed that investment in fixed assets and the average wage for labor impacted positively on labor productivity. A 1% increase in wage increased labor productivity by 0.201% while a 1% increase in fixed asset investment increased labor productivity by 0.165% ceteris paribus. Both variables were statistically significant at 1%. Well remunerated employees have the motivation to work and are thus highly productive. Firms that invest heavily on fixed assets realize a higher value-added since capital provides labor with the tools necessary to make it efficient and effective.

Corvers (1997) studied the impact of human capital on labor productivity across seven member countries (Spain, Germany, Denmark, France, Netherlands, Belgium, Great Britain) of the European Union. Using firm-level panel data from the Eurostat's Labor Force Survey (1988-1991), the study found that an increase in years of education had a positive influence on a firm's productivity. A one more year of education increased labor productivity by 0.1 % while at the same time decreasing unit labor costs by 0.2%. Employees with university or college qualification contributed more to labor productivity compared to those with primary and secondary school education levels. The study found that labor productivity tends to increase with an increase in the skilled labor force leading to the conclusion that firms should hire highly educated workers or invest in skills development through the on-job-training if they were to realize maximum labor productivity.

In a study to determine the impact of the daily working hours on productivity, De Grip et al. (2016) drew a study sample of 332 workers from a call center in the Netherlands. The panel data collected contained employee working hours captured on a daily basis and each employee's performance. Employee output was measured by the number of calls answered. The study found that a 1 % increase in working hours increased output by a mere 0.9 %. This result suggested that as labor hours increase, fatigue sets in resulting in a decline in the marginal productivity of an extra labor hour.

Okumu et al. (2018) used the 2013 World Bank Enterprise data in determining the impact of innovation on labor productivity among SMEs in Uganda. The study employed the quantile estimation technique. The results revealed a neutral relationship between a firm's engagement in any kind of innovation and labor productivity ceteris paribus. This association was neutral across different quantiles; 25^{th} -low, 50^{th} -medium and 75^{th} -high (labor productivity firms). This implied that irrespective of a firm's level of labor productivity, firms that engaged in only one innovation were not significantly different from non-innovating firms. However, there was complementary evidence among process, marketing, product and organizational innovation. A positive relationship did exist between labor productivity and innovation when a firm engaged in all four innovation types. Thus, efforts to incentivize innovation ought to be inclusive enough so as to trigger all the four types of innovation.

Bigsten et al (2010) used firm-level data from the 2007 World Bank Investment Climate survey to assess whether the size of the firm had any impact on labor productivity. From the descriptive statistics, the findings revealed that labor productivity increased with the size of the firm. The most often cited reason is that larger firms are much more capital-intensive than smaller firms. As a result, each worker in a larger firm is more equipped with machinery hence more efficient than their counterparts in smaller firms. The study further revealed that the capital-labor ratio among large firms was about 80 % higher than that for small firms. The study thus implied that investing in machinery and equipment was very crucial in increasing labor productivity.

Heshmati and Rashidghalam (2016) studied the determinants of labor productivity in Kenyan service and manufacturing industries using the 2013 World Bank Enterprise data. The results showed that a 1% increase in capital intensity increased labor productivity by 0.007% ceteris paribus. The capital intensity variable was however surprisingly found to be statistically insignificant yet theory suggests that capital provides labor with the tools necessary to make it efficient and effective; and as a result, it should impact positively and significantly on labor productivity. Furthermore, the study revealed that a 1% increase in electricity intensity increased labor productivity by 0.053% holding other factors constant. Energy provides the grip in the production process by spearheading the growth of technological systems and innovations hence influencing labor productivity positively.

Goedhuys et al (2008) examined the drivers of labor productivity among Tanzanian enterprises using the World Bank Investment Climate Surveys (ICS) data. The study specifically sought to investigate the relative significance of the business environment and advances in technology on firm-level productivity. From the OLS regression results: Being ISO Certified increased a firm's labor productivity by 0.792% while schooling beyond secondary levels for a firm's top manager increased labor productivity by 0.791% holding other factors constant. ISO certification creates a global market network; acts as a quality signal enabling firms to charge higher prices. These two variables were also found to be statistically significant at 1%. An employee who received formal training increased labor productivity by 0.031% while a firm that reported Customs, taxes and trade regulations had a decline in its labor productivity by 0.34% ceteris paribus. Work experience and employee training leads to a vast and diversified pool of knowledge, skills and expertise which are key ingredients to high labor productivity.

Mensah (2016) estimated the influence of power outages on firm productivity among 15 Sub-Saharan African countries using panel data from the World Bank Enterprise Surveys. An augmented Cobb-Douglas production function was estimated using the Instrumental Variable method. Variations in the hydroelectric generation were used as the instrumental variable to the number of power outages. The second stage instrumental variable estimates revealed a significant and robust negative effect of power outages on firm-level productivity. The results indicated that a 1% increase in outage intensity decreased a firm's revenue by 6.18% and also the overall firm-level productivity by between 0.6% and 1.1% holding other factors constant. The results suggested that power shortages served as a negative shock to the productivity of firms by constraining the production process and consequently, the productivity of factor inputs.

Biggs et al. (1995) examined the influence of technological investment and firm-based training on enterprise productivity in three Sub-Saharan countries: Kenya, Zimbabwe and Ghana. An augmented production function was estimated using the RPED data set. From the OLS regression results, the coefficients for worker training and technology were found to be statistically significant at a 5% level. The estimated coefficient indicated that holding other factors constant, training increased enterprise productivity by 49%. Formal training programmes

impart useful skills and expertise among employees which necessitates efficiency, innovative and timely accomplishment of tasks. The relationship between investment in technology, export and a firm value-added was also found to be positive. From the probit regression, being an exporter increased the likelihood of a firm's investment in technology by 0.45. Investment in technology then increased the value-added by 29% holding other factors constant. The results revealed that highly intensive technology firms invested in R&D; an investment that significantly increased labor productivity.

Heshmati and Uwitonze (2016) conducted a study to determine the impact of innovation and Research and Development (R & D) on the service sector performance in Rwanda. The study employed Enterprise Survey data (2010-2012) from the World Bank database as well as data from the National Institute of Statistics of Rwanda. From the linear regression results, it was found that a 1% increase in a firm's innovation capacity increased total service sales output by 0.1124% holding other factors constant. Therefore, service industries that invest more in the innovation of new products boast of a competitive advantage over those firms that choose not to.

Nagler and Naude (2014) used the World Bank's LSMS-ISA panel data to estimate the impact of location on labor productivity among enterprises in four African countries: Ethiopia, Malawi, Nigeria and Uganda. Productivity dispersal statistics revealed that households whose enterprises were located up to 10 km from a population center were the most productive ones. They were followed closely by those located 25-50 km away. However, the results revealed significantly lower labor productivity for enterprises of those households located more than 50 km away. The Heckman selection model regression results showed that in the selection stage, rural households were less likely to operate a non-farm enterprise. In the second stage, a firm located in the rural area was likely to incur a decline in labor productivity by 102.6% ceteris paribus (for Ethiopian firms). The impact of the variable rural on labor productivity was also found to be negative for Malawi (-0.444), Nigeria (-0.461) and Uganda (-0.357), showing that rural enterprises were less productive. Enterprises located in urban areas have close proximity to the market, infrastructural and telecommunication amenities hence more productive than their rural counterparts.

2.3 Overview of Literature

The literature review has identified various factors that influence firm-level labor productivity. The theoretical literature pointed out energy, material, capital intensity and human capital variables (education, formal training, R&D and manager's experience) as key drivers of labor productivity. From the empirical perspective, evidence was provided for these factors in addition to other variables namely: firm size, location and power outages. The empirical literature suggested that these factors influenced labor productivity positively or negatively.

However, from the reviewed literature studies, it is clear that the estimated labor productivity models suffered from the problem of omitted variable bias. No evidence has been provided on the impact of tax administration and political uncertainty on firm-level productivity in the Kenyan service sector context. Therefore, this study will contribute to the existing literature by studying the impact of these previously omitted variables on labor productivity among the Kenyan service sectors. This study will also show that the determinants of labor productivity are not identical across the SMEs and large-sized firms, hence the essence need to control for firm size effect in labor productivity studies.

Furthermore, with the exception of Heshmati and Rashidghalam (2016), the majority of the previous studies have focused on productivity among the manufacturing firms in Kenya. Heshmati and Rashidghalam (2016) investigated the drivers of labor productivity in Kenyan manufacturing and service industries using the 2013 enterprise survey data. The study combined the two sectors. No single study has distinctly investigated the drivers of labor productivity within the Kenyan service sectors. This study will thus set out to identify factors that influence labor productivity specifically for the service sector only. This study will employ the 2018 enterprise data. This data set has more variables and firms (1001) as opposed to the 2013 data which has 781 firms.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter explained the methodology that was used in executing the research. The chapter described the theoretical framework, empirical model specification, data type and sources, variable definition and measurement and the potential econometric issues that were encountered in this study.

3.2 Theoretical framework

Consider a standard Cobb Douglas production function:

$$\boldsymbol{Y_i = AK_i^{\alpha} L_i^{*\beta}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \textbf{(1)}$$

Where $\boldsymbol{Y_i}$ is the output produced by an individual firm. $\boldsymbol{A}$ represents the state of firm technology. $\boldsymbol{K_i}$is the physical capital of an individual firm while $\boldsymbol{L_i^*}$represents efficiency units of labor. $\boldsymbol{\alpha}$&$\boldsymbol{\beta}$ are input elasticities or shares. Following Corvers (1997), labor efficiency units are assumed to comprise of the number of laborers in a firm or labor hours and the three levels of education (lower, intermediate and higher). However, as per the World Bank Enterprise Survey data 2018, the efficiency units of labor will comprise of the number of productive workers with high school education qualifications.From the data set, education is not captured as dummies (with levels), but is rather quantitatively measured.

It follows therefore that the labor efficiency equation will take the following form:

$$\boldsymbol{L_i^* = H}. \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \textbf{(2)}$$

Where $\boldsymbol{H}$ represents the number of productive workers with high school education qualifications. Substituting equation (2) into equation (1) and dividing both sides by quantity of labor gives an expression for labor productivity.

$$\boldsymbol{\frac{Y}{L} = A\left(\frac{K}{L}\right)^{\alpha} H^{\beta}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \textbf{(3)}$$

Where the parameters α and β indicate the share of contribution of each variable to labor productivity.

From equation 3, labor productivity level depends on the relative shares of capital intensity and the number of productive workers with high school education qualifications. Therefore, equation 3 shows the worker effect; that is; with a positive marginal product, a higher number of productive workers with high school education qualifications can produce more output (Welch, 1970).

3.3 Empirical model specification

Rewriting equation (4) into logarithmic form and taking into account the use of cross-sectional data as opposed to panel data by Corvers, we arrive at a standard service industry model where labor productivity is studied in different firms at the same point in time; in this case one year.

$$\boldsymbol{ln\left(\frac{Y}{L}\right)_i = A + \alpha ln\left(\frac{K}{L}\right)_i + \beta_1 lnH_i + \mu_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{4})$$

Following the 2018 World Bank Enterprise Survey data, we modify and extend Corvers (1997) model by incorporating other human capital variables. We add managers' experience and formal training which are denoted by **M** and **T** respectively.

$$\boldsymbol{ln\left(\frac{Y}{L}\right)_i = A + \alpha ln\left(\frac{K}{L}\right)_i + \beta_1 lnH_i + \beta_2 M_i + \beta_3 T_i + \mu_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (\mathbf{5})$$

Equation 5 shows the allocation effect i.e. highly-qualified and experienced labor is able to use available techniques and inputs more efficiently.

The theoretical literature review suggests that other variables influence labor productivity. Koss and Lewis (1993) have been able to vividly demonstrate the role played by energy in the production process. Energy encourages the spread of innovations and technological systems that help replace human and animal muscles. Koss and Lewis (1993) also pointed out that a production function without energy is rendered incomplete. Therefore, this study extends Corvers model to include power outages. This variable is denoted by **P**.

$$\boldsymbol{ln\left(\frac{Y}{L}\right)_i = A + \alpha ln\left(\frac{K}{L}\right)_i + \beta_1 lnH_i + \beta_2 M_i + \beta_3 T_i + \beta_4 P_i + \mu_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{6})$$

This study will contribute to the existing literature by examining the influence of tax administrative constraints and political uncertainty on firm-level productivity among the Kenyan service sectors.

$$ln\left(\frac{Y}{L}\right)_i = A + \alpha ln\left(\frac{K}{L}\right)_i + \beta_1 lnH_i + \beta_2 M_i + \beta_3 T_i + \beta_4 P_i + \beta_5 D_i + \beta_6 U_i + \mu_i \ldots\ldots (7)$$

Whereby D_i denotes tax administrative constraints while U_i denote a firm's political uncertainty status.

By letting α_s to be a common term representing the population parameters:

$$ln\left(\frac{Y}{L}\right)_i = \alpha_0 + \alpha_1 ln\left(\frac{K}{L}\right)_i + \alpha_2 lnH_i + \alpha_3 M_i + \alpha_4 T_i + \alpha_5 P_i + \alpha_6 D_i + \alpha_7 U_i + \mu_i \ldots\ldots (8)$$

However, this study not only seeks to identify the determinants of labor productivity but also the degree of variation of the impact of these variables across the SMEs and large-sized firms. In order to compare the determinants of labor productivity across the 2 different sized firms, 2 equations are specified as follows:

$$\begin{cases} ln\left(\frac{Y}{L}\right)_{s_i} = \alpha_0 + \alpha_1 ln\left(\frac{K}{L}\right)_i + \alpha_2 lnH_i + \alpha_3 M_i + \alpha_4 T_i + \alpha_5 P_i + \alpha_6 D_i + \alpha_7 U_i + \mu_{s_i} \ldots\ldots (9a) \\ ln\left(\frac{Y}{L}\right)_{l_i} = \alpha_0 + \alpha_1 ln\left(\frac{K}{L}\right)_i + \alpha_2 lnH_i + \alpha_3 M_i + \alpha_4 T_i + \alpha_5 P_i + \alpha_6 D_i + \alpha_7 U_i + \mu_{l_i} \ldots\ldots (9b) \end{cases}$$

The small letters **s** and **i** denote labor productivity equations for SMEs and large sized firms respectively. The number of firms is denoted by **i** for each type of firm. The error terms are assumed to be normally distributed with zero mean and constant variance. Using OLS method to estimate the coefficients for SMEs and large firms in equations (9a) and (9b) yields unbiased but inconsistent estimates. A sample selection problem arises since the separation of these two types of firms results into a truncated distribution. To control for this effect, a variant of the two-stage estimation method, after Heckman (1979) is employed. The sample selection or truncation is treated as a specification error. An equation for firm size determination is thus modeled and

appended onto each of the labor productivity equations in equation 9. The reason is that firm size is determined by the difference between the benefits and costs of becoming a particular size which may not be observable even though size is. The benefits and costs are however affected by a given set of both the observable and the unobservable factors. To formulate an equation for firm size, we proceed as follows:

$$\boldsymbol{H_i^* = W_i\gamma + \mu_i} \text{.....10}$$

Where $\boldsymbol{W_i}$ is a vector of observable explanatory variables already specified in Equation 9 while $\boldsymbol{\gamma}$ denotes a vector of parameters. $\boldsymbol{\mu_i}$ Captures the unobservable variables and is assumed to be normally distributed with zero mean and constant variance. $\boldsymbol{H_i^*}$ shows the threshold of the number of employees in a firm. That is,

$$\boldsymbol{I_i = \begin{cases} 1 \; if \; the \; number \; of \; employees \; lies \; in \; the \; range \; 5 \geq H_i^* \leq 99 \\ 0 \; otherwise \end{cases}} \text{.....11}$$

We do not have to design the threshold for firm size since it is already specified in the data set. In the dataset, SMEs are firms with employees ranging between 5 and 99 while the number of employees for large firms is greater than or equal to 100. With 2 possible outcomes for the firm size $\boldsymbol{H_i^*}$ and assuming that the error term is normally distributed, then the resulting formulation gives rise to a probit model:

$$\begin{cases} \mathbf{Prob(I_i = 1)} = \int_{-\infty}^{W_i\gamma} \phi(t)dt = \boldsymbol{\phi}(W_i\gamma), \; \mathbf{for \; SMEs} \\ \mathbf{Prob(I_i = 0)} = \int_{W_i\gamma}^{\infty} \phi(t)dt = 1 - \boldsymbol{\phi}(W_i\gamma), \mathbf{for \; large \; firms} \end{cases} \text{.....12}$$

Where ϕ is the cumulative function of the standard normal distribution and $\boldsymbol{\phi}$ is its density function. The estimation proceeds in two steps. The probit equation 12 is first estimated using MLE to obtain estimates of $\boldsymbol{\gamma}$. The consistent estimators of the inverse of Mill's ratio for each observation i in the sample is then computed as follows:

$$\begin{cases} \hat{\boldsymbol{\lambda}}_{\mathbf{s_i}} = \dfrac{\phi(W_i\hat{\gamma})}{\boldsymbol{\phi}(W_i\hat{\gamma})} \; \mathbf{for \; SMEs}, \\ \hat{\boldsymbol{\lambda}}_{\mathbf{l_i}} = \dfrac{\phi(W_i\hat{\gamma})}{1 - \boldsymbol{\phi}(W_i\hat{\gamma})} \; \mathbf{for \; large \; firms} \end{cases} \text{.....13}$$

In the second stage, the variable $\hat{\lambda}_{s_i}(\hat{\lambda}_{l_i})$ is then added as a regressor onto the original labor productivity equations for SMEs (large firms). This yields the final labor productivity models for SMEs and large firms as follows:

$$\begin{cases} ln\left(\frac{Y}{L}\right)_{s_i} = \alpha_0 + \alpha_1 ln\left(\frac{K}{L}\right)_i + \alpha_2 lnH_i + \alpha_3 M_i + \alpha_4 T_i + \alpha_5 P_i + \alpha_6 D_i \\ +\alpha_7 U_i + \alpha_8 \hat{\lambda}_{s_i} + \mu_{s_i} \dots \dots \dots (14a) \\ ln\left(\frac{Y}{L}\right)_{l_i} = \alpha_0 + \alpha_1 ln\left(\frac{K}{L}\right)_i + \alpha_2 lnH_i + \alpha_3 M_i + \alpha_4 T_i + \alpha_5 P_i + \alpha_6 D_i \\ +\alpha_7 U_i + \alpha_8 \hat{\lambda}_{l_i} + \mu_{l_i} \dots \dots \dots (14b) \end{cases}$$

Equation (14); now linear and free of selection bias, can then be estimated using OLS (Wooldridge, 2000). With the correction of the firm-size effect, the resulting estimated coefficients of the explanatory variables become consistent. This log-log model is most suited to take care of the wide difference of margins in the measurement units among some of the variables. With the exception of the dummy variables, the results will be directly interpretable as elasticities.

The signs of the coefficients were evaluated a priori to assess their consistency with both the empirical and theoretical literature studies. Estimating equation 14 and analyzing the magnitude and signs of the parameter estimates in order to verify whether they agree with economic theory will in effect be a test for construct validity (Bishop and Romano, 1998). The expected signs of these parameter estimates as from equation 14 are as follows:

Capital intensity $\left(\frac{K}{L}\right)$**:** Is expected to influence labor productivity positively. Physical capital provides labor with the tools necessary to make it efficient and effective (Heshmati and Rashidghalam, 2016)

High school education qualification(H)**:** Is expected to influence labor productivity positively. Education imparts knowledge and skills which enhances efficiency and timely accomplishment of tasks (Corvers, 1997)

Manager's experience$(\boldsymbol{M})$**:** Is expected to influence labor productivity positively. Work experience leads to a vast and diversified pool of knowledge, skills and expertise which are key ingredients to high labor productivity (Goedhuys et al. 2008)

Formal training$(\boldsymbol{T})$**:** Is expected to impact positively on labor productivity. Formal training programmes impart useful skills and expertise among employees which necessitates efficiency, innovative and timely accomplishment of tasks (Corvers, 1997., Biggs et al. 1995)

Power outages $(\boldsymbol{P})$: This is expected to influence labor productivity negatively since it constrains the production process and the productivity of factor inputs through machine and equipment break-ups (Mensah, 2016)

Tax administration $(\boldsymbol{D})$: Is expected to influence labor productivity negatively. A firm that reported customs, taxes and trade regulations as a major obstacle is likely to register a decline in its labor productivity (Goedhuys et al. 2008)

Political uncertainty$(\boldsymbol{U})$**:** This is expected to influence labor productivity negatively as it causes panic in the business environment thus deterring both foreign and domestic investment. Firms that report political uncertainity as a major obstacle are likely to have lower productivity than those that do not (Goedhuys et al. 2008)

3.4 Variable definition and measurement

Table 3.1 shows the definition and measurement of the explanatory variables that are to be used in this study. Labor productivity is the dependent variable.

Table 3.1 Variable definition and measurement

Variable	Description and Measurement
Dependent variable	
Labor productivity $\left(Y/_L\right)$	It is the ratio of the gross value-added per unit of labor. Value-added is measured by the log of a firm's total annual revenue less cost of raw materials and intermediate inputs.
Explanatory variables	
Capital intensity $\left(K/_L\right)$	Log of the annual value of the entire tangible and intangible asset invested by a firm per unit of labor, measured in Kenya Shillings.
Number of productive workers with high school education qualification. (H)	Log of the number of productive workers with high school education qualification.
Manager's experience (M)	The number of years of experience for the top manager, measured in years.
Formal training(T)	Dummy variable taking on the value 1 if a firm's employees received formal training programmes in the last fiscal year and 0 otherwise
Average weekly length of power outages (P)	The average weekly length of power outages, measured in hours
Tax administration (D)	Dummy variable taking on the value 1 if a firm reports tax administration constraint as a major obstacle and 0 otherwise
Firm's political uncertainity status (U)	The degree of constraint imposed by political uncertainity to a firm: Takes the value 1 if it is a Major obstacle and 0 otherwise

3.4.1 Measuring service productivity

In most measures of productivity, output is related to labor input since labor is the most easily measured input. Labor hours can be used as an input measure since they are easily available (Heshmati and Rashidghalam, 2016). The problems encountered when measuring output are quite similar in both the goods and the service-providing industries. It is expected that the output indicator is quantifiable and independent of the input measure. If this is not the case, then we cannot ascertain any change in productivity (Mark, 1982).

According to Mark (1982), data on gross sales in Kenya shillings deflated by appropriate price indexes can be used to estimate real output in the retail trade sector as long as there are no shifts among services with different values. In the transportation sector, the output units are easily quantifiable as they reflect the amount and distance. That is; ton-miles, passenger-miles, barrel-miles, etc can directly be used as output indicators with final revenue collected being attributed to the same. For the communication services, revenue deflated by price indexes is used as the output measure. However, for the local telephone services, assessing the real value of service output becomes problematic especially for the case of flat charges. The unfair treatment of the variations in intensity usage of the service also arises.

Mark (1982) pointed out that for the business and personal services (including education, social and repair services), no physical quantity information is available. Therefore, price-deflated values can be used to measure real output. The output indicators are then aggregated using revenues and labor hours. Finance services could be measured by loans, deposits and trust services extended by financial institutions to their clients; with liquidity and transaction approach being used as the productivity measure.

3.5 Data type and source

This study used the 2018 cross-sectional World Bank Enterprise Survey data. The firms were selected using a stratified sampling technique. The service sectors covered comprised of retail and other services namely: wholesale, ICT, restaurants and hotels, transport & construction and motor vehicle services. The dataset was collected from 10 counties in Kenya (Nairobi, Kirinyaga, Kiambu, Nakuru, Mombasa, Kisumu, Kilifi, Machakos, Trans Nzoia and Uasin Gishu). These regions had the largest share of the most notable service firms in the country. Out of the total 1001 firms, 546 firms made up the service sector.

CHAPTER FOUR: EMPIRICAL FINDINGS

4.1 Introduction

This chapter presented the empirical findings on the factors influencing labor productivity in the Kenyan service sectors. The chapter presented the data analysis and interpretation of results. It discussed the summary statistics, correlation analysis, post-estimation statistics, probit model estimates and the labor productivity OLS regression results.

4.2 Summary statistics

Table 4.1 gives a summary of the basic descriptive statistics of the data. It shows the variables, number of observations, the mean values, standard deviation and the minimum and maximum values for each of the variables employed in this study.

Table 4.1 Descriptive statistics of variables in the study

Variable	Observations	Mean	Std. Dev	Min	Max
Labor productivity (Y/L)	429	4818745	1.06e+07	0	1.50e+08
Capital intensity (K/L)	429	524876.5	2013684	1	3.84e+07
High school education (H)	373	86.99196	27.6154	0	100
Managers' experience (M)	429	14.24242	10.29958	1	60
Formal training (T)	429	0.4592075	0.498915	0	1
Power outage duration (P)	358	9.53352	14.46575	0	59
Tax administration (D)	429	0.1934732	0.3954819	0	1
Political uncertainty (U)	429	0.3566434	0.4795675	0	1
Firm size (Z)	429	0.8974359	0.3037429	0	1

Source: Stata computation

The service firm's value added per unit of labor (labor productivity) averaged 4,818,745 Kenya shillings. Labor productivity also exhibited the highest level of dispersion or spread at 10,600,000. The capital-labor ratio which denotes a service firm's investment in tangible and intangible assets averaged 524,876.50 Kenya shillings. Capital intensity had a dispersion rate of 2,013,684. On average the number of employees with high school education qualifications was approximately 86 per every service firm. The high school education variable also exhibited a lower spread of 27.6154. The years of experience for a service firm's top manager approximately averaged 14 years. The variable exhibited a dispersion rate of 10.29958.

The average length of power outage duration experienced by service firms was approximately 9 hours. The variable had a dispersion rate of 14.46575. On average, 45.92% of the service firms provided formal training programmes to its employees. 19.35% of the service firms reported tax administration as a major obstacle while 35.66% of the service firms reported political uncertainity as a major obstacle. Of the total sample size, 89.75% of the sampled service firms were SMEs.

4.3 Multicollinearity

The pair wise correlation matrix and Variance Inflation Factor were used to check for the degree of multicollinearity among the explanatory variables. Since multicollinearity inflates the variance of the parameter estimates, there is need to ensure a weak degree of association among the explanatory variables (Gujarati, 2003). This will lead to correct magnitudes of the coefficient estimates. Table 4.3 presents the pair wise correlation matrix.

Table 4.2 Pair wise correlation matrix of the explanatory variables

	Capital intensity	High School education	Managers Experience	Formal Training	Power outage duration	Tax administration	Political uncertainty
Capital intensity	1.0000						
High school education	0.0556	1.0000					
Managers experience	0.0367	-0.0476	1.0000				
Formal Training	0.0715	0.0499	0.0906	1.0000			
Power outage duration	-0.0470	0.0058	-0.1286	-0.0190	1.0000		
Tax administration	0.0941	-0.1896	-0.0482	0.0442	-0.0817	1.0000	
Political uncertainty	0.0998	-0.0112	0.1429	0.0635	-0.0800	0.1181	1.0000

Source: Stata computation

From Table 4.2, it is evident that there exists a weak degree of association among the explanatory variables. However, a more formal test using the Variance Inflation Factor method was employed.

VIF shows how the variance of an estimator is inflated in the presence of multicollinearity (Gujarati, 2003). The degree of correlation among the explanatory variables is deemed weak if the mean VIF value of all the explanatory values does not exceed 10 (Kennedy, 1992). Table 4.3 shows the VIF values of the explanatory variables employed in this study.

Table 4.3 Variance Inflation Factor

Model	**SMEs**		**Large firms**	
Variable	**VIF**	**I/VIF**	**VIF**	**I/VIF**
Inverse Mills ratio **(λ)**	18.20	0.054938	22.19	0.045072
Formal training	7.40	0.135211	8.90	0.112408
Managers' experience	5.36	0.186701	6.01	0.166258
lnHigh school education	3.73	0.268428	4.61	0.216916
Political uncertainty	2.11	0.474315	2.34	0.427514
Tax administration	1.74	0.573815	1.91	0.524110
lnCapital intensity	1.19	0.837320	1.22	0.820495
Power outages duration	1.09	0.914036	1.10	0.909407
Mean VIF	**5.10**		**6.03**	

Source: Stata computation

Table 4.3 revealed that the mean VIF value of all the explanatory variables was 5.10 and 6.03 for the SMEs and large firm models respectively. This is less than the recommended maximum mean VIF value of 10; further revealing a weak degree of correlation among the explanatory variables.

4.4 Heteroskedasticity test

The Breusch and Pagan (1979) test was used to test whether the error variances were constant or rather varied across observations. The null hypothesis proposes that the error variances are constant (homoskedasticity). Rejecting the null hypothesis implies heteroskedasticity. Table 4.4 gives the results for the Breusch-Pagan test for the 2 models employed in this study.

Table 4.4 Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

	Calculated chi2	Prob>chi2
SMEs	7.09	0.0078
Large firms	6.54	0.0105
Hypothesis	H_0: Constant variance	

Source: Stata computation

Since the probability values for chi-squared were less than the alpha level of significance (0.05) for both the SMEs and large firms, the null hypothesis of homoskedasticity was rejected. Both the 2 models were found to be heteroskedastic. Robust standard errors were thus used to correct for heteroskedasticity.

4.5 Econometric estimates

Table 4.5 presented the estimation results for the probit and the labor productivity models for both the SMEs and large-sized firms.

Table 4.5 Probit and labor productivity estimates

VARIABLES	(1) Firm size (SMEs=**1**, **0** otherwise)	(2) lnLabor productivity (SMEs)	(3) lnLabor productivity (Large firms)
lnCapital intensity	-0.0032	0.660***	0.661***
	(0.0134)	(0.0680)	(0.0691)
lnHigh school education	-0.0548	0.530***	0.546**
	(0.0381)	(0.190)	(0.209)
Managers experience	-0.0025*	0.0781***	0.0772***
	(0.0015)	(0.0157)	(0.0165)
Formal training	-0.0733**	0.548	0.554
	(0.0349)	(0.431)	(0.467)
Power outage duration	-0.0002	-0.00438	-0.00452
	(0.0011)	(0.00518)	(0.00519)
Tax administration	0.0287	-0.438*	-0.441*
	(0.0397)	(0.233)	(0.246)
Political uncertainty	0.0291	-0.396*	-0.396
	(0.0341)	(0.236)	(0.246)
$\hat{\lambda}$		-7.096**	-5.296**
		(3.223)	(2.614)
Constant	-	4.373***	-0.926
		(1.044)	(3.392)
Prob > F	-	0.0000	0.0000
Log likelihood	- 102.75596	-	-
Observations	310	309	309
R-squared	-	0.429	0.427

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable in equation (2) and (3) is labor productivity for SMEs and large firms respectively. Equation (1) is a probit model for firm size determination. Firm size=1 if the firm is an SME and 0 otherwise. $\hat{\lambda}$ is the estimated inverse of Mills ratio and denotes the selectivity variable.

4.5.1 Firm size correlates

Holding other factors constant, a 1% increase in capital intensity decreased the likelihood of a firm being an SME by 0.32%. The higher the capital-labor ratio, the lower the likelihood of a firm being an SME. Enterprises with access to a larger financial pool are more likely to be the larger firms. A 1% increase in the number of employees with high school education qualification decreased the likelihood of a firm being small by 5.48% ceteris paribus. The higher the education level, the larger the knowledge pool, expertise and skill. This increases the likelihood of investing in a larger firm as opposed to a smaller one. Capital intensity and high school education were however found to be statistically insignificant.

An additional year of experience for the top manager lowered the likelihood of a firm being an SME by 0.25% ceteris paribus. A firm is likely to grow and expand with an increase in the number of years of experience for the top manager. The variable was also found to significantly determine firm size at 10% level of significance. Holding other factors constant, a firm with an employee who received formal training programs was less likely to be an SME by 7.33%. SMEs are less likely to train their employees due to the costs associated with training. Furthermore, SMEs may not require complicated expertise and skill to operate. Formal training was found to be statistically significant at 5% level of significance.

A one hour increase in the power outage duration decreased the likelihood of a firm being an SME by 0.02% ceteris paribus. SMEs are less likely to be constrained by power outages since power is not a necessity for the majority of these firms when compared to the larger firms. Holding other factors constant, a firm that reported tax administration as a major obstacle was more likely to be an SME by 2.87%. Smaller firms are more hard hit by tax obligations as compared to the larger firms. If tax is reported as a major obstacle, then it is more likely to wipe out SMEs out of operation due to their lower profit base. A firm that reported political uncertainity as a major obstacle was more likely to be an SME by 2.91% ceteris paribus. Majority of the firms in Kenya are SMEs hence the impact of political uncertainity is more likely to be felt by them. The three variables: power outage duration, tax administration and political uncertainity were however found to insignificantly determine firm size.

4.5.2 Determinants of labor productivity

Holding other factors constant, a 1% increase in capital intensity increased labor productivity by 0.660% for the SMEs and 0.661% for the large-sized firms. The impact was slightly higher for the large-sized firms as compared to the SMEs. The variable was also highly statistically significant at 1% level of significance. Capital provides labor with the tools necessary to make it productive and should thus impact positively and significantly on labor productivity. The result is consistent with that of Heshmati and Su (2011) as well as that of Heshmati and Rashidghalam (2016).

A 1% increase in the number of employees with high school education qualifications increased labor productivity by 0.530% for SMEs and 0.546% for large firms ceteris paribus. The impact of education on labor productivity was found to be higher for the large firms than for the SMEs. Education increases the marginal productivity of employees hence an additional year of education beyond the primary and high school studies increases labor productivity (Corvers, 1997). Large firms require more sophisticated skills, knowledge and expertise to run as opposed to a majority of the SMEs. High school education variable was found to be statistically significant at 1% for both SMEs and the large-sized firms.

An additional year of experience for the top manager increased labor productivity by 8.12% for SMEs and 8.03% for large firms ceteris paribus. Managerial experience had a slightly lower impact on labor productivity for the large firms when compared to the SMEs. SMEs require less sophisticated expertise, knowledge and skills to operate. Their productivity is thus more sensitive to any slight increase in managerial experience as compared to large firms. The variable was highly significant at 1% level of significance for both the SMEs and large firms. Work experience leads to a vast and diversified pool of knowledge, skills and expertise in the accomplishment of a given task (Goedhuys, 2008). As a result, it should impact both positively and significantly on firm-level productivity.

An employee who received formal training programmes increased labor productivity by 72.98% for the SMEs and 74.02% for the large firms as opposed to non-trained employees ceteris paribus. For the large firms, the impact was higher. Most SMEs do not necessarily require formal training programmes to realize high productivity. Formal training programmes impart useful skills and expertise among employees which necessitates efficiency, innovative and timely

accomplishment of tasks (Corvers, 1997., Biggs et al. 1995). The variable was not statistically significant at conventional levels of significance.

A one hour increase in power outage intensity decreased labor productivity by 0.44% for SMEs and 0.45% for the large firms ceteris paribus. Energy provides a grip in the production process by spearheading the growth of technological systems and innovations hence replacing human and animal muscle power (Heshmati and Rashidghalam, 2016). Therefore, power outages constrain the production process and the productivity of factor inputs through machine and equipment break-ups hence the negative impact on labor productivity (Mensah, 2016). Power outage intensity was however found to be statistically insignificant at conventional levels of significance. This could be attributed to the presence of other power back up sources such as the solar energy, generators and fuel energy.

A firm that reported tax administration as a major obstacle registered a decline in its labor productivity by 54.96% for SMEs and 55.43% for the large firms ceteris paribus. This was in comparison to those firms that did not report tax administration as a constraint to their productivity levels. The variable was statistically significant at 10% level for both firm size categories. The impact was highly felt by large firms due to high tax rates, custom and compliance procedures they have to abide with. The result was consistent to that of Goedhuys et al. (2008).

Political uncertainty was found to be associated with a decline in labor productivity irrespective of the size of the firm. Holding other factors constant, a firm that reported political uncertainty as a major obstacle recorded a decline in labor productivity by 48.59% for both firms as compared to those firms that did not report political uncertainty as a constraint to their productivity. The variable was however found to be statistically significant at 10% for the SMEs but insignificant for the large firms. Political uncertainity creates panic in the business environment thus deterring both domestic and foreign investment.

The coefficient of the selectivity variable was found to be negative and statistically significant at 5% for both the SME and large-sized firm models. The coefficient was found to be -7.096 for SMEs and -5.296 for large firms. This implied that a negative correlation existed between firm size and labor productivity across both the SMEs and large-sized firms. Furthermore, selectivity

bias was a major issue in this study. It was thus necessary to control for firm size effect when studying labor productivity across firms of different sizes.

The overall probability value for the F statistic was found to be of 0.000 for both the SME and large-sized labor productivity models. This is less than the conventional levels of significance. We thus rejected the null hypothesis and concluded that the coefficients of the independent variables in the model were statistically different from zero. This implied that the two models were statistically significant. From the regression results in Table 4.6, R-squared was found to be 42.9% for SMEs and 42.7% for the large-sized firm models. This implied that the independent variables in each of the models: capital intensity, high school education, managers' experience, formal training, power outages, tax administration, political uncertainty and the selectivity variable (inverse mills ratio) explained 42.9% and 42.7% of the variations in labor productivity for the SMEs and large-sized firm models respectively.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarized and made conclusions based on the empirical findings. It also provided policy implications on the findings and areas for further research.

5.2 Summary of empirical findings

The main objective of this study was to determine the factors influencing labor productivity among the Kenyan service sectors using the 2018 World Bank Enterprise data. It also sought to examine the degree of variation in the impact of those variables on labor productivity across the SMEs and large firms. The service sectors covered comprised of retail and other services namely: wholesale, ICT, restaurants and hotels, transport, construction and motor vehicle services. Labor productivity was regressed against capital intensity, high school education, managers' experience, formal training, power outages, tax administration, political uncertainity and the selectivity variable. The selectivity variable was generated from the Maximum likelihood estimation of the probit model for firm size determination.

The regression results revealed that capital intensity, high school education and manager's experience significantly and positively impacted on labor productivity. For capital intensity and high school education, the impact was higher among large firms when compared to the SMEs. Managers' experience had a higher impact on the SMEs than on the large firms.

Tax administration and political uncertainity on the other hand, were found to have impacted negatively on labor productivity. Tax administration significantly decreased labor productivity. The degree of this constraint was found to be higher for the large firms than for the SMEs. Political uncertainty significantly decreased labor productivity among the SMEs but was insignificant for the large firms.

5.3 Conclusions

The study concluded that capital intensity, high school education and managers' experience positively and significantly impacted on labor productivity across all firms. This implied that in order to adequately increase the levels of labor productivity, service firms should invest more in

capital intensity as well as hire an educated and experienced labor force since theory demonstrated that human capital significantly impacted on labor productivity.

Tax administration was found to significantly constrain productivity across all firms with the impact being higher among the large firms. Political uncertainty was also found to significantly decrease labor productivity among the SMEs. The magnitude of the impact of these determinants on labor productivity also varied across the SMEs and large-sized firms for all the explanatory variables. To optimize labor productivity, efforts should be channeled by the government towards creating a conducive and favorable business environment in which firms can comfortably operate. This would include enacting favorable tax laws and ensuring a safe business environment for the service firms at all times irrespective of the political uncertainity obstacle.

The selectivity variable was also found to be negative and statistically significant across all firms. This implied that a negative correlation existed between firm size and labor productivity across both the SMEs and large-sized firms. Furthermore, the study concluded that selectivity problem was a significant issue in this study. Correcting the effect of firm size truncation or separation was thus very crucial when studying labor productivity across different sized firms; something that had been largely ignored in previous productivity studies.

5.4 Recommendations

The following are the policy implications that ought to be put into consideration by various stakeholders in order to realize the objective of optimizing labor productivity within the Kenyan service sectors.

There is an urgent need by the management of the service firms to hire well educated and experienced labor force. Human capital investment triggers innovation and invention which enables a firm to gain competitive advantage over other rival firms. It also boosts the expertise and technical know-how which forms key ingredient to high labor productivity.

The study also recommends high investment in both the tangible and intangible assets since capital intensity contributes largely to high labor productivity. Capital investment plays a massive role in the production process as it complements labor by providing the necessary tools that enhance productivity and firm efficiency.

The government needs to ensure an all-time conducive business environment for the service firms. The study has shown that tax administration poses a productivity constraint to the service firms. Favorable tax rates and less bureaucratic business regulations should be enacted and enforced by the government of Kenya through the Kenya Revenue Authority so as to optimize labor productivity. Similarly, service firms are very sensitive to political uncertainity. Safety and protective investment policies ought to be enacted and enforced by the government so as to ensure high labor productivity is maintained at all times. A favorable business environment attracts both the domestic and foreign investment.

5.5 Areas for further research

This study examined the determinants of labor productivity in the Kenyan service sectors using the 2018 World Bank Enterprise data. The study identified capital intensity, high school education, managers' experience, formal training, power outage, tax administration and political uncertainty as key drivers of labor productivity within the service sector. However, additional variables such as pollution waste & management and firms' organizational structures should be included in future studies of labor productivity.

The service sectors covered in this study comprised of retail, wholesale, ICT, restaurants and hotels, transport, construction and motor vehicle services. Other service sectors such as education, health, real estate, liberal and professional services were omitted from the 2018 data set. These sub-sectors contribute largely to Kenya's GDP and should therefore be included in any future studies on labor productivity. It would also be interesting to distinctly study each service sub-sector on its own; something that is not possible with the current data set.

This study employed total revenue less cost of inputs as the service output measure. However, this may not accurately reflect productivity across different service sub-sectors. Due to these notable challenges, further studies on the measurement of output from the service sectors should be done so as to arrive at a harmonized index of measurement.

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