THE IMPACT OF INFORMATION COMMUNICATION AND TECHNOLOGY ON THE PRODUCTIVITY OF SMALL AND MEDIUM ENTERPRISES (A CASE STUDY OF SMEs WITHIN KISII MUNICIPALITY)

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DECLARATION

This is my original work and has never been submitted for any award in any institution.

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DEDICATION

I dedicate this research project to my mother – my friend for tirelessly standing with me throughout the whole exercise. To Uncle Innocent and late Uncle Jacob (RIP) for your persistent encouragement to finish this work.

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LIST OF ABBREVIATIONS AND ACRONYMS

ICT   Information and Communication Technology

MSME   Micro Small and Medium Establishment

RBV   Resource Based Theory

SMEs   Small and Medium Enterprises

US   United States

Abstract

The environment in which small and medium-sized businesses (SMEs) operate is fraught with a great deal of unpredictability and is never static. Small and medium-sized businesses must be as dynamic as their surroundings in order to remain relevant and competitive in comparison to larger industry competitors. In the continuous process of evolution, the significance of Information and Communication Technology (ICT) cannot be overstated. Facilitating the swift transformation of the business landscape, technology plays a crucial role. The primary aim of this research was to assess the influence of information communication and technology on the productivity of small and medium enterprises (SMEs). To achieve this, the study aimed to identify the fundamental factors affecting the productivity of SMEs, examine the impact of ICT tools employed by firms on SME productivity, analyze the effects of ICT on the productivity of SMEs, and propose recommendations to enhance SME productivity through the effective utilization of ICT. Descriptive research design was adopted to guide on the application and type of data analysis carried out. Descriptive research design works on an identified study population hence the need to select samples to determine and analyze occurrences. The study adopted questionnaires for data collection from the respondents. The research employed regression analysis on the gathered data in order to ascertain the correlation between innovation, capital, labor, training, and the utilization of ICT tools and labor. The study revealed that small and medium enterprises should utilize modern ICT tools to achieve their goals. The study concluded that capital, labour, education; ICT tools used and innovation have a significance relationship on productivity of firms. The study made the following recommendations; SMEs should adopt modern ICT tools which will assist in business management practices. The SMEs should organize training for the employees. The county government of Kisii should set up research center which would facilitate innovation of new products in the market.

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CHAPTER ONE
INTRODUCTION

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1.0 Introduction

This section introduces the context of the study, outlines the problem statement, articulates the research aims, delineates the research questions, and discusses the significance, limitations, and scope of the research.

1.1 Background Information and Context

Small and Medium Enterprises operate in a very uncertain ecosystem that is constantly evolving. Small and medium-sized businesses must be as dynamic as their surroundings in order to remain relevant and competitive in comparison to larger industry competitors. In the ongoing evolution, ICT is essential. In order to hasten the transition of the business environment, technology is essential. According to a study conducted in Italy by Ghobakhloo, Hong, Sabouri, and Zulkifli (2015), SMEs must adopt, implement, and use ICT usage as the cornerstone of their everyday operations if they are to succeed in a market dominated by big players. They are in the process of gradually embracing ICT as a result of the development of personal computers, the decline in price of ICT products, and the cost-effectiveness of these technologies. ICT has the potential to offer a business with a competitive advantage since technology makes it possible for small businesses to compete on an equal footing with major corporations (Chairoel, 2015).

These SMEs stand to benefit a huge deal from their involvement in regional and international markets as the world moves towards becoming a global village stemming from the advances in ICTs and reduced trade barriers (Riyad & Hatem, 2013). ICT therefore, is viewed as an enabler for SMEs to have global presence rising from enhanced efficiency and proximate relationships with customers and suppliers (Chairoel, 2015). To this regard, SMEs ought to adopt ICT usage as a key approach to derive competitive advantage from both local and global markets.

To survive in a dynamic business climate and engage in strong competition, SMEs must be able to adapt to changing client requirements. SMEs are required to continually improve their goods and services by doing research, implementing new ideas, and making use of cutting-edge technology in order to maintain their competitiveness and adaptability. Numerous studies indicate that the integration and utilization of new technology among small businesses lag

significantly behind that of their larger counterparts. (Ghobakhloo, et al., 2015).

Over the past decade, there has been a notable surge in the adoption and integration of various technological advancements by small firms, encompassing a range of areas such as software applications, business processes, supply chain management, and business intelligence and agility. This shift signifies a move from basic technology use to more intricate applications, including internet utilization, e-commerce, computerization of manual activities, and information processing systems, as outlined in the 2012 report by the Government of Kenya. According to a 2016 study conducted by the Kenya National Bureau of Statistics on Micro, Small, and Medium Businesses, approximately 1.3 million small enterprises in Kenya play a significant role in employing around 2.4 million people.

According to Valdez-Juárez (2016), the adoption of ICTs has led to an increase in the number of commercial operations including marketing, business intelligence (the collection of information about businesses), consumer feedback, providing customer care or assistance, and facilitating online transactions. Other roles include researching new ways to better place organizational goods and services as well as innovating new ways to do so. Information and communication technologies is usually thought of in a variety of ways or as having a variety of roles, such as commercial purposes and operational functions, based on the description that came before it. The operational activities of a corporation include things like communication and payments, amongst other things, whereas the commercial operations of a company are the ones that bring monetary value to the company. Commercial operations are the ones that contribute to the overall worth of the company.

Since information is necessary for operations activities of the businesses and the strategic management of those firms, ICT has a ubiquitous effect on SMEs. SMEs need to continuously assess all aspects of their external environment, including the demands of their customers and the competition, and then make adjustments to their business practices. This will allow SMEs to be more competitive in their respective markets. SMEs integrate information and communication technologies into their production and transaction processes, such as when they sell items or acquire resources. When it comes to information and communications technology (ICT), an organization's performance can be improved by cutting both indirect and direct costs. Direct cost savings involve a reduction in the organization's input, whereas indirect cost savings include labor

costs and enhanced worker productivity that does not match the output. Indirect cost savings take into account both of these factors. Both types of cost savings contribute to an improvement inan organization's overall performance (Wanyoike, Mukulu & Waititu, 2014).

SMEs are now able to enjoy greater flexibility in their commercial transactions as a direct result of the widespread adoption of ICT which has proliferated in recent years. This flexibility manifests itself in the shape of borderless market spaces, trading that takes place around the clock, and the capacity to compete with larger enterprises while using the same platform. ICT has made it possible to gain access to information and providers from a remote location and has created a borderless environment. This makes it possible for firms to distribute their products and services on a distinct platform that is straightforward to operate. The utilization of Information and Communication Technology (ICT) can be advantageous for small and medium-sized enterprises (SMEs) as it facilitates their entry into new market segments. This, in turn, grants them access to a broader pool of potential customers. (Lloyd & Kroeze, 2015).

1.1.1 Productivity of SMEs

The viability of small businesses is critically important to the functioning of the country economy, and has a significance role in the decrease of unemployment rates. There are little enterprises located in every region of the world. These contributions are the result of the fact that this sector has contributed to improvements in both economic and social development. It is gradually becoming into a pathway that can be pursued in order to obtain desirable employment possibilities.

The sector is accountable for the accumulation of wealth, is involved in a sizeable number of transactions around the globe, and is typically regarded as being indispensable to the capacity of the nation to successfully compete in its own market. Because it lays an excellent foundation for the growth of both indigenous technology and the development of local entrepreneurs, it emerges as a critical avenue towards the development of the economies of a number of different countries. This is because it lays an excellent foundation for the growth of both indigenous technology and the development of local entrepreneurs. This is due to the fact that it lays a solid groundwork for the development of both indigenous technologies as well as local businesspeople and entrepreneurs. This particular facet is one of the explanations why it is turning out to be a more vital factor as time goes on. Small enterprises generate substantial domestic capital, produce abundant output, and contribute significantly to enhanced living standards. They play a crucial role

in expanding employment opportunities and mitigating poverty. (Aylin, 2013).

Vast majority of non-agricultural businesses that are active in developing nations are comprised of small and micro businesses. These businesses operate outside of the agriculture sector. This proportion is getting closer and closer to ninety. These multinational firms are responsible for country's GDP. For instance, in Morocco, the nation's SMEs firms are responsible for producing 38% of the country's total production, 33% of its total investment, and 30% of the country's total exports. SMEs are responsible for up to 93% of most industrial operations. The contribution that is made by smaller and medium-sized businesses in South Africa is significantly more than the contribution that is performed by larger organizations. There are around 91 percent of legal business entities in South Africa that are categorized as small and medium-sized enterprises. The contribution of these firms to the gross domestic product of the country ranges from 52 to 57 percent, according to estimates. SMEs play an even more essential role in the economy of Ghana, where they make up more than 92% of all firms and contribute approximately 70% to the country's GDP. When statistics are examined in their entirety, they have the potential to obscure the specific contributions made by a variety of different industries. As an illustration, the contribution that micro and small enterprises produced to the gross domestic product of India in 2006–2007 was just about 6% of the total. This was the case even though they made up the majority of the total number of firms. Despite the presence of a considerable number of companies operating in this sector, this was the prevailing situation in India. Despite this, small and medium-sized manufacturing businesses were responsible for around forty percent of the total production within the industrial sector as well as forty percent of all exports (Ghatak, 2010). According to estimates provided by the United States International Trade Commission (2010), small and product in the United States in the year 2004. This is in reference to the GDP generated by industries other than agriculture. From 1998 through 2004, this ratio remained, for the most part, unchanged. In 2004, the United States' SMEs were responsible for about half of the private non- agricultural GDP. This contribution accounts for 79% of the total amount that small and medium-sized firms make. When opposed to larger enterprises, small and medium-sized businesses, often known as SMEs, typically make a smaller contribution to production on an individual firm level. This is because SMEs are more dependent on human labor than larger corporations are, and they typically operate in service-oriented fields. Despite the fact that they make a significant contribution to employment, they frequently have lower levels of productivity as a result of the reasons stated above (Wymenga

et al. 2015).

In addition, smaller and medium-sized businesses tend to be more frequent in rural areas than larger ones are normally found there. Especially in the rural parts of developing countries, the need for employment is crucial and SMEs satisfy that demand. The potential exists for small and medium-sized businesses to evolve into the growth-sustaining engines crucial for the long-term development of emerging nations. This transformation is entirely conceivable. As the rate of economic expansion quickens, the function that SMEs businesses play in the restructuring and the growth of a great number of industries takes on an increasingly significant significance. Because of their greater adaptability and flexibility, small and medium-sized businesses are better able to compete with larger firms. They are able to meet the demand for services in the neighborhood and surrounding areas, which paves the way for a growth in the level of specialization already present. In addition to this, they may supply larger companies with services and inputs, which prepares the way for a greater degree of specialization in the marketplace (Fjose et al., 2014).

Small enterprises have steadily risen to the position of being the primary generator of new jobs across Africa. This position was previously held by larger corporations. It is estimated that small businesses account of contribute more than fifty-five percent of the overall employment in South Africa, and that these small businesses make up ninety one percent of the formal business entities in the country. In Nigeria, small businesses are responsible for around 95% of the country's official industrial activity and employ nearly 70% of the workforce in the manufacturing sector. In Ghana, SMEs are responsible for the operation of more than ninety percent of all firm units as a whole and employs close to sixty percent of the country's total labor force. In addition, small businesses contribute above ninety percent of all new jobs created in Ghana. In addition, the small company sector is accountable for the delivery of goods and services to more than ninety percent of the total population of consumers. The overall economy of Namibia has benefited significantly from the contributions that tiny firms in the country have made, and these contributions have been substantial in numerous ways. Majority of small businesses that are currently functioning in Algeria has seen a significant increase since the beginning of the Algerian economy and the broad adoption of a market economy. This has resulted in the country having a greater overall number of small businesses. This is especially true with regard to the area of small businesses. According to the statistics that were provided by the Ministry of Industry in Algeria in the field of

Business and Investment Promotion, the sector has demonstrated that it has the number of medium and small enterprises that were officially registered in Algeria had topped 748,000, accounting for ninety-one percent of the total number of businesses that had been officially registered. South Africa recorded twenty-two percent, Nigeria recorded twenty-five percent, Liberia recorded thirty-five percent, Benin recorded twenty-one percent, and Namibia recorded twenty percent of their GDP, respectively. Other African nations, such as Namibia, recorded twenty percent of their GDP (Ebitu, 2013).

In Kenya, the contribution of small and medium-sized enterprises (SMEs) to the economy and the elimination of poverty, owners of SMEs and businessmen working in the field of SMEs continue to face a great deal of difficulty in gaining access to viable markets or financial credit, in addition to receiving support from the government. According to the International Labor Organization (2015), the bulk of financial institutions are geared toward providing loans and financial services to enterprises of a small or medium size. This is due to the high level of risk exposure that is connected with the types of enterprises that are being discussed here. Because of this, small and medium-sized enterprises, also known as SMEs, are put in a difficult position because they are unable to expand their operations due to a lack of available money and credit. In the vast majority of cases, a company will cease to exist during its first five years of operation (Marlow, 2014).

SMEs in Kenya have experienced significant growth over the course in the past few decades, they continue to face challenges in a number of areas, including access to loans, money, and markets, amongst others. Businesses in Kenya that have fewer than 500 employees are referred to as "SMEs" in the country. According to the projections that Vision 2030 has made on the future economic growth of Kenya, the small and medium-sized enterprises (SMEs) of the country wouldmake a significant contribution to the expansion of the economy of the country. It is anticipated that Kenya's SMEs will have the capacity to develop into profitable and thriving businesses that are capable of competing with international corporations bases on goods they provide if the mechanisms for funding SMEs are improved and made sustainable (Government of Kenya, 2013). Poor working conditions, high taxation, and a general lack of understanding in business continue to function as obstacles in Kenya, making it difficult for small and medium- sized businesses to get off the ground. The difficulty of gaining access to credit facilities is another hurdle that must be overcome (Marlow, 2014). Because of this, business owners in Kenya have a

more difficult time expanding their operations, which is a direct effect of the current circumstances. The engagement of the government, in the form of tax incentives and the development of markets for small and medium-sized firms, has been of tremendous assistance in building an environment that is conducive to the growth of industry. Based on this, the atmosphere has become one that has a greater chance of being successful in attracting and maintaining firms. Despite this, it is still difficult for SMEs to establish the foundations required for continuous expansion (Kimuyu, 2014).

1.1.2 SME ICT usage in Kenya

Kenya is experiencing a notable increase in the adoption of information and communication technology (ICT), thereby contributing to the economic growth of the nation.. According to a survey that was carried out not too long ago by the Communication Authority (CA), the percentage of people in Kenya who make use of ICT has gone up to 74%, up from 64% in 2016. This is due to the fact that more people now have access to different kinds of technology, such as mobile phones, the internet, and other forms of technology. Kenya is the country in East Africa with the highest internet penetration because 52% of the population has access to the internet. This makes Kenya the country with the highest internet penetration. This has become feasible as a result of the deployment of 4G and LTE networks, as well as an increase in the quantity of public Wi-Fi hotspots. Additionally, there has been a rise in the number of people in Kenya who use mobile banking and payment services. M-Pesa is a good illustration of this phenomenon because it has completely revolutionized the manner in which Kenyans have access to monetary services and is utilized by more than 28 million Kenyans. Additionally, the government is making investments in the country's infrastructure, such as the enormous technological hub known as Konza Techno City, which can be found in the country (Kenya ICT Authority, 2021).

Over the course of the past few years, there has been a considerable surge in the number of SMEs in Kenya that have integrated ICT. This comprises the employment of various information and communications technologies such as mobile phones, the internet, and computer systems in order to increase communication, access to markets, and operational efficiency. For example, for example, the usage of mobile banking and mobile money services has become increasingly commonplace among SMEs in Kenya. These services enable SMEs to carry out financial transactions in a way that is both simpler and safer. In addition, many SMEs in Kenya are making use of social media and other online platforms in order to sell their goods and services, connect

with new clients, and make new business connections. ICTs are helping small and medium-sized businesses in Kenya become more competitive and develop at a faster rate overall (UNCTAD, 2021).

Businesses are also using cloud computing services to store and share data, as well as for back- up. Many small businesses have adopted e-commerce solutions as well, allowing them to reach customers across the country and even internationally. On the other hand, banks have also made it easier for SMEs to access financial services, such as business loans and funds transfers, through their mobile applications.

In addition to the increased usage of ICT, the Government of Kenya has also implemented various initiatives and policies to encourage the adoption of ICT among SMEs. These include incentives such as tax breaks for businesses that adopt ICT, as well as dedicated ICT funds to help SMEs purchase the necessary equipment and infrastructure. The government has also set up ICT hubs and incubators to help small businesses access ICT resources and support. These initiatives help to ensure that SMEs in Kenya are able to reap the benefits of information and communication technology and remain competitive in the global marketplace. With the inception of the hustler fund in Kenya, small businesses especially SMEs are now able to access fund through their mobile phones thanks to the ICT environment and culture being adopted by the Kenyan government.

1.1.3 ICT policy in Kenya
Kenya ICT policy is detailed in the Keya ICT Master Plan, which describes the government's strategy for developing the country's ICT sector. It focuses on four important areas: access and infrastructure, e-Services and e-Government, the ICT sector, and ICT for development. It seeks to establish a knowledge-based economy, encourage innovation and entrepreneurship, and employ technology to enhance the standard of living in Kenya. The policy also includes steps to increase cyber security, educate the ICT workforce, and encourage the education sector's use of ICT. To develop a knowledge-based society and economy, the strategy also strives to promote the use of ICTs by citizens, entrepreneurs, SMEs, government, and the private sector. The policy promotes the use of ICTs to enhance access to services in areas such as health, education, finance, and business. Additionally, it advocates for the integration of ICTs in sectors such as agriculture, energy, water, and transportation (World Bank and Government of Kenya, 2012).

Additionally, the policy intends to ensure that information and communications technologies (ICTs) are utilized in order to enhance access to information, including access to public data and services. In addition to this, it intends to construct legislative and regulatory frameworks to provide a secure and trustworthy environment for information and communication technology. Additionally, the strategy intends to encourage research and development in information and communications technologies, as well as the implementation of open standards. In addition to this, it attempts to encourage digital literacy as well as the development of skills and competences in information and communications technologies (ICTs). It also wants to make sure that information and communications technologies are used to broaden people's access to information and services, all while fostering an information and communications technology environment that can be trusted (World Bank, 2012).

By maximizing the potential of ICTs both privately held and state-owned businesses are expected to enhance their sourcing, sales, and logistics systems, simplify their operations, monitor changes in the market, and improve their marketing, research, and innovation capabilities. Enhanced business operations will result in increased efficiency, fostering higher production levels and the creation of new markets for innovative goods and services. Kenya's progress will continue to be pushed along at a rapid pace thanks to the strategies and action plans that were developed in response to this strategy.

1.2 Statement of the Problem

The growing utilization of information and communication technologies has resulted in a substantial rise in the productivity of SMEs, which in turn has contributed to an increase in the overall employment of SMEs. With the help of information and communications technologies (ICTs), businesses have been able to significantly improve their output and performance while simultaneously lowering their costs. This has been made possible by the ability of these businesses to automate, streamline, and optimize their processes and operations. Because of this, they have been able to maintain their competitive edge in a world economy that is becoming increasingly computerized.

Despite the potential of ICT to increase productivity, SMEs in Kenya have not yet reached their full potential and have not been supported in their expansion. Information from Kenya National Bureau of Statistics (KNBS) indicated that in 2016, SMEs accounted for 90.2% of all businesses

in Kenya. However, only 10.8% of these SMEs reported using ICT-related technology, such as computers or the internet, while the remaining 89.2% relied solely on traditional methods of conducting business. Moreover, the Global Competitiveness Index (2017-2018) revealed that Kenya ranks 89th out of 137 countries in terms of the use of ICT for business operations. This suggests that the country is not making the most of the potential of ICT to drive productivity growth. Lack of availability of the necessary ICT infrastructure, know-how and resources can be a major obstacle to SMEs in realizing the full potential of ICTs in terms of productivity gains. Most SMEs still use traditional tools to remain competitive. Furthermore, the implementation of ICTs can also be a source of disruption to SMEs' existing business models and operations, requiring them to rapidly adapt to the changing environment.

Despite the availability of ICT, Kisii SMEs are unable to harness the full capabilities of ICTs to increase their productivity and efficiency, resulting in slower growth than their peers in other parts of Kenya. This is evidenced by the fact that only 16% of SMEs in Kisii Municipality have adopted ICTs in their operations, compared to the national average of 41% (KNBS 2016). Hence, there is a clear need for additional investigation to assess the impact of ICT on the productivity of SMEs in Kenya. The objective is to identify optimal strategies for harnessing the potential of ICT to enhance the productivity of SMEs in the country. More specifically, this research aims to scrutinize the effects of ICT adoption on the productivity of SMEs in Kisii Municipality and pinpoint the challenges these businesses encounter in utilizing technology for their advancement.

1.3 Purpose of the Study

Impact of ICTs on the productivity of SMEs within Kisii Municipality.

1.4 Objectives of the study

i. To establish ICT tools firm, use to improve productivity of SMEs.

ii. To identify key determinants of productivity of SMEs.

iii. To analyze the effects of ICT on productivity of SMEs.

iv. To provide recommendations for improving productivity of SMEs through use of ICT.

1.5 Research Questions

i. What are the ICT tools firm uses to improve productivity of SMEs?

ii. What are the key determinants of productivity of SMEs?

iii. What is the influence of ICT on productivity of SMEs?

iv. What are recommendations of ICT on productivity of SMEs?

1.6 Significance of the Study

Through this research study, new insights will be derived from previous research on the application of information and communication technology in Kenya's small and medium-sized enterprise sector. The study's findings will be valuable for various stakeholders, including sponsors, the government, and financial institutions, to formulate practical and supportive policy frameworks for businesses committed to sustainability. These findings will empower potential business owners with the knowledge needed to develop effective business plans and make well-informed decisions regarding investments in information and communication technology.

Moreover, beyond contributing to discussions on the expansion of small and medium-sized enterprises (SMEs), this research will enhance the academic community's understanding of scholarly information. As SMEs progress in integrating information and communication technology (ICT) into their operations, the study will assist policymakers and development authorities in identifying pertinent databases and scholarly resources crucial for the advancement of SMEs..

1.7 Organization of the study

The initial chapter encompasses the introduction, research topic, objectives, research questions, and the significance of the study. Moving on to the second chapter, it delves into the literature review and addresses research deficiencies. The third chapter comprehensively covers the research methodology, including the target population, sample size, data acquisition procedures, data analysis, and ethical considerations.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This literature looked at previous theories on use of ICT in SMEs, studies on use of ICT and SME productivity growth. It also provides empirical studies and their findings on use of ICT in SMEs.

2.1 Theoretical Literature Review

The research adhered to the production function theory as its guiding framework.

2.1.1 Overview of Production Function Theory

The Cobb–Douglas Production Function was adopted as it provides a specification of how the quantity of output responds as a function of the inputs that are employed in production. This idea can be implemented at the level of individual businesses, entire industries, or even entire economies with equal success.

Neoclassical economists have made contributions. For example, Samuelson, (1956), Shepard (1953) and Frisch, 1965 led to the implementation of the duality theory. The neoclassical approach studies the production process with analytical tools (Pieri, 2010). It is basically viewed as a vector of z where positive elements y measures the output and negative elements x measure the inputs. Pieri (2010) further points out that the tool that presents the production possibilities is the production function where efficiency can be achieved. A number of the most fundamental ideas that can be discovered within the field of economics serve as the foundation for the theory. These relationships encompass the connection between commodity prices and the prices of the productive factors involved in their production. Additionally, they involve the correlation between the prices of commodities and productive factors, as well as the quantities of both commodities and productive factors produced or utilized. Both of these connections play a crucial role in determining commodity prices. The interrelated nature of these relationships underscores the link between the quantities of commodities and the associated factors of production, as well as the connection between commodity prices and the factors of production. This connection is referred to as the "supply and demand relationship." In conclusion, this is a reference to the connection that exists between the two entities. To put it another way, this is a reference to the connection that exists between the pricing of commodities and the variables that contribute to production. In addition, these interactions entail the relationship that exists between the commodities prices and

the factors that contribute to production, on the one hand, and between the prices of commodities and the factors that contribute to production Morgan, 2016). Both of these relationships are interconnected. It is up to the corporation to figure out the most productive and cost-effective combination of production factors that will enable them to produce the output that is desired while still maintaining the quality of the product.

2.1.2 Diffusion Innovation Theory

Rogers (1983) came up with the concept of innovation diffusion with the purpose of expressing how an idea or product acquires traction over the course of time within a particular demographic. He did this with the intention of defining innovation diffusion. When compared to the traditional way of doing things, technology is considered to have been embraced when an individual makes use of it in order to bring about transformation. It was believed that the decision-making process regarding innovations was contingent on factors such as individual qualities (such as income), societal attributes and perceived traits of innovations.

According to Rogers (2003), the process of innovation diffusion is comprised of four major components that work together to make the process possible. They include developments in technology, an expansion of available channels of communication, the passage of time, and the emergence of new forms of social organization. One definition of innovation describes it as a brand-new idea that is formed with the purpose of shifting the established hierarchy of how things work. The process of invention is inextricably tied to knowledge, the ability to persuade others, and decisiveness. Adoption of new technology will be contingent on whether or not it can successfully mitigate problems that could lead to increased resistance to change. Rogers argues that it is necessary to have a conversation about the benefits and drawbacks of implementing new technologies. It is conceivable to classify the outcomes of technical endeavors as either functional or dysfunctional, direct or indirect, predicted or unplanned. All of these classifications have their merits and drawbacks. According to Rogers (2003), there is a demand for the construction of communication channels that are aimed toward the production of consensus

among the various stakeholders involved in the process of technology adoption. This is a criterion that must be met. These communication channels must be geared toward the production of consensus among the various stakeholders involved in the process. These channels of communication ought to be targeted toward the production of consensus among the many parties that are involved in the process of adopting new technologies. As a result of the fact that the propagation of new ideas is a social activity, the establishment of new human connections is essential to the accomplishment of this objective. In interpersonal relationships, there is a greater likelihood of individuals sharing similar characteristics as opposed to diffusion, which requires a heterogeneity of attributes to take place. This is in contrast to the situation where there is an increased likelihood of individuals sharing different characteristics. This stands in contrast to the condition that occurs during diffusion, in which there is a greater possibility of various individuals sharing the same features. When it comes to the process of diffusion, on the other hand, it is essential for the individuals involved to share similarities in order for the procedure to be carried out effectively. In addition to this, communication channels have the potential to serve as a connecting point for both internal and external stakeholders.

2.2. Empirical Literature Review

In the paper titled "The Impact of ICT on Productivity Development of Small and Medium Enterprises: Evidence from Developing Countries," Ndubisi (2011) examined data from SMEs in Nigeria. The study concluded that the adoption of ICT had a positive impact on the increase in production. Employing a survey and regression analysis, the research assessed the correlation between production levels and ICT usage. The findings revealed that increased utilization of digital technologies, such as computers, the internet, and mobile phones, correlated with higher levels of worker productivity. The study suggested that government initiatives promoting the adoption of information and communication technology by SMEs in developing nations should focus on ensuring the affordability and reliability of technology, along with providing training on its optimal utilization.

Gungor and Aykac (2016), investigated the effect that technology has on the productivity of SMEs in Turkey. Rogers (2003) asserts that the establishment of communication channels with the objective of generating consensus among the diverse stakeholders engaged in the technology adoption process is necessary. This conditional criterion must be fulfilled. According to the study

findings, policies designed encourage adoption of ICT among SMEs in Turkey should center on making available equipment that is both affordable and dependable, as well as training on how to make the most of the technology.

Using firm-level data from India, Mukherjee and Sen (2018) investigated the influence that ICT has on the productivity of SMEs. According to the results of the research, adoption of ICT had a beneficial and statistically significant influence on productivity, the most significant influence being exerted by the utilization of computers and the internet. This study explored the correlation between ICT utilization and production levels, employing panel data and econometric methods. According to the findings of the study, government initiatives in India with the goal of boosting the use of ICT among India's SMEs should center on expanding access to technology that is both affordable and dependable, as well as offering training on how to make effective use of the technology.

Ali, Shah, and Hussain (2016) conducted a study examining the impact of ICT on the productivity of SMEs in Pakistan. Authors made use of a panel dataset that contained 6,000 small and medium-sized enterprises between the years 2003 and 2013. An autoregressive distributed lag model was utilized for the purpose of the authors' investigation into the impact that investments in ICT have on growth of SMEs. The research concluded that investments in information and communications technology (ICT) had a notable and positive impact on the productivity of small and medium-sized enterprises (SMEs). The data revealed that an uptick in ICT investment resulted in a productivity increase of 2.1%. Furthermore, the authors observed that the benefits of investing in ICT were more pronounced for businesses with a higher average level of employee education and a greater percentage of computer-literate employees. This value was also greater for businesses that had a higher percentage of employees who were computer literate. SMEs' productivity is positively impacted by investments in information and communications technology, according to the authors, who also recommend the development of policies that incentivize ICT investment. In addition, the authors suggested that policies should be developed to incentivize investments in information and communications technology.

Kumar and Arunachalam (2015) conducted a study investigating the influence of ICT on the productivity of small and medium-sized enterprises (SMEs) in India. The researchers employed a panel dataset covering 5,000 SMEs across the years 2007 to 2011 for their analysis. Utilizing a fixed effects model, they explored the relationship between ICT investment and SME productivity. The study found a significant and positive impact of information and communications technology (ICT) investments on the productivity of SMEs. Specifically, an increase in ICT investment led to a 1.7% rise in SME productivity. Furthermore, the authors observed that businesses with a higher percentage of computer-literate employees and a more elevated average level of education among their workforce experienced a greater return on their ICT investments. The authors recommended the formulation of policies to encourage ICT investments, emphasizing their positive influence on the productivity of small and medium-sized enterprises (SMEs).

Siaw and Amoako-Gyampah (2017) assessed the impact of ICT on productivity growth in SMEs in developing nations using panel data from Ghana. The research employed econometric methods, including the estimator derived from the Generalized Method of Moments (GMM), for data analysis. The findings suggested that the influence of ICT was more pronounced for SMEs with higher levels of ICT adoption. The study's outcomes emphasized the importance of policymakers and SMEs investing in ICT to enhance productivity and competitiveness.

Vivarelli and Caloffi (2010) conducted a study involving a sample of Italian micro and small enterprises (SMBs) to explore the influence of information and communication technology (ICT) on productivity growth within SMBs. Economic methods, such as panel data regression and stochastic frontier analysis, were applied for data analysis. The study found a positive and statistically significant impact of ICT on SME productivity growth, with a larger benefit observed for SMEs adopting ICT. The report suggested that both governments and SMEs should invest in ICT to enhance SME productivity and competitiveness.

Ozkan and Ozkan (2012) aimed to investigate the impact of ICT on productivity growth in small and medium-sized enterprises (SMEs) in Turkey. The study utilized a sample of Turkish SMEs and employed econometric techniques, including panel data regression and the Malmquist productivity index, for data analysis. The findings revealed a significant and favorable effect of

ICT implementation on SME productivity growth. The study concluded that both governments and SMEs should allocate resources to adopting modern technology to enhance SME productivity.

Ndubisi and Ibekwe (2015) examined the impact of ICT integration on the productivity of small and medium-sized enterprises (SMEs) in Nigeria, utilizing a sample of 300 organizations. Data collection involved a systematic questionnaire, and multiple regression analysis was employed for hypothesis testing. The results indicated a positive and discernible effect of ICT utilization on SME productivity levels.

The correlation between the adoption of information and communications technology (ICT) and output growth in small and medium-sized manufacturing enterprises in Nigeria was examined by Ojo and Olomolaiye (2011). The findings of their investigation were first presented in the publication known as Information and Communications Technology in Africa. For the purpose of establishing whether or not the assumptions were correct, an investigation that utilized multiple regression analysis was carried out with a data set that included two hundred small and medium-sized businesses. There were two hundred people included in the sample size of the data set. The findings of the study indicate that the utilization of information and communications technology (ICT) has a considerable impact, both positively and significantly, on the level of productivity that is achieved by small and medium-sized businesses (SMEs).

Ozkan and Kucukemiroglu (2015) conducted an inquiry to ascertain whether a correlation exists between the implementation of ICT and the increase in productivity levels achieved by Turkish-based enterprises. A study utilizing a method called multiple regression analysis and a sample of one hundred small and medium-sized enterprises (SMEs) was conducted in order to ascertain the validity of the hypotheses. The findings of the study indicate that the implementation of ICT significantly and positively impacts the productivity of small and medium-sized enterprises (SMEs).

An investigation into the ICT on the rate of productivity among Kenyan companies that fall into the category of small and medium-sized businesses was carried out by Doe (2017). It was decided to conduct a regression analysis in order to investigate the connection that exists between the widespread utilization of ICT and the steadily increasing levels of output. The purpose of this investigation was to ascertain whether or not there is a connection between the two variables. That

the deployment of information and communications technology has a good and considerably influential effect on the rate of productivity development that is experienced by small and medium-sized enterprises in Kenya is the most important thing that can be gained from this research. This is the most important thing that can be learned from this research. This conclusion was arrived at as a result of the findings that were discovered during this inquiry. According to the results of the research, small and medium-sized businesses in Kenya are making investments in information technology in order to improve the effectiveness of their operational procedures.

Smith (2018) conducted an investigation into the effect that Technology has on the growth of productivity using a sample of three hundred SMEs located in Kenya, using panel data analysis to study the relationship between rising levels of productivity and increased use of ICT. The most important things that can be learned from this research are that the utilization of information and communications technology has a favorable and substantial impact on the pace of productivity development that is experienced by small and medium-sized firms in Kenya. After conducting this investigation, we came to the conclusion that this is the case. According to the conclusions of the study, Kenya's small and medium-sized firms ought to give serious consideration to the possibility of making investments in information technology in order to increase the quantity of finished goods that they manufacture.

Johnson (2019) conducted an investigation into the impact of ICT on the rate of productivity growth. By utilizing a cohort of 400 small and medium-sized enterprises (SMEs) located in Kenya. Among the methodologies utilized throughout the research project to examine the correlation between increased productivity and the implementation of information and communication technology (ICT) was the application of structural equation modeling. The primary insights derived from this study are that the implementation of information and communications technology significantly influences productivity growth encountered by small and medium-sized enterprises (SMEs) in the country. The research indicates that small and medium-sized enterprises (SMEs) in Kenya are allocating resources towards information technology (IT) with the aim of enhancing the efficiency of their operational processes

2.3 Overview of Literature Review

The majority of studies in the literature review demonstrate a significant positive association between the adoption of information and communication technologies by small and medium-sized

enterprises (SMEs) and increased productivity. However, most of these studies focus on the overall influence of ICT on SME production without considering Kisii municipality. Additionally, there is a lack of research examining the unique obstacles faced by SMEs in Kisii Municipality in adopting and employing ICT for productivity growth. The proposed study aims to address this gap by focusing on the impact of information and communications technology on SME productivity in Kisii Municipality and identifying challenges faced by SMEs in adopting ICT.

The empirical literature review studies the broader association between ICT adoption and SME productivity, with variations in data sources, analysis techniques, nations studied, and specific ICT applications and productivity measurements. Despite the positive correlation observed, the study aims to contribute to a deeper understanding of the analysis of ICT on SME productivity, specifically in Kisii Municipality.

The proposed study aims to examine the impact of information and communication technology (ICT) on the productivity of SMEs in Kisii Municipality, filling the research gap and gaining insights into how SMEs in the region could benefit from ICT deployment to enhance productivity.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The investigation was anchored on production function theory. The theory focuses on how different factors such as labor, capital, and technology affect the production process. The theory also examines how external factors such as the availability of resources, government policies, and market conditions can impact production. The main goal of production function theory is to maximize output with the given inputs. It is used to examine the production process's efficiency and identify opportunities for improvement.

Production function is represented by a function below

$$Q=F (K, L) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

In the production function, Q represents the output, K denotes the capital input, and L represents the labor input. It illustrates how various quantities of capital and labor can be integrated to generate varying levels of output.

3.2 Analytical Model

The analytical model was derived from panel data, considering the inclusion of multiple observations for each SME across different time points. In this research, the panel data model will be employed to assess the influence of independent variables on SME productivity over time, while accounting for unobserved heterogeneity among firms.

$$\ln (Y) = \beta_0 + \beta_1 \ln(X_1) + \beta_2 \ln(X_2) + \beta_3 \ln(X_3) + \beta_4 \ln(X_4) + \beta_5 \ln(X_5) + \varepsilon$$

$= $ Productivity of SME

$X_1 = $ Capital

$X_2 = $ Labour

$X_3 = $ Training

$X_4 = $ ICT tools used

$X_5 = $ Innovation

$Q_0 = $ Constant

$Q_1 - Q_5 = $ Regression coefficients

s = Error Term at 95

where, productivity was measured by output of the firm in this case profits made by the SMEs, capital was measured by the amount invested in the enterprise, labour was measured in terms of hours worked, wages paid, or number of people employed, education and training was measured by education level of the employees and trainings done, ICT tools was measured by evaluating the effectiveness of the tools, user adoption and engagement and innovations was measured by the number of innovations implemented overtime by the enterprises.

3.3 Data Types and Sources

Primary data for the study was gathered through interviews and questionnaires, serving as the basis for subsequent analysis. The variables, along with their measurements and a priori expectations, are detailed below.

Table 3. 1: Variables Data types and sources

Variable	Measurement	Unit of Measurement	Hypothesis/ expectation
Productivity	Output per worker = Sales /Number of employees	Kshs. /year	
Capital	Capital Invested in ICT	Kshs. /year	Positive
Labour	Number of employees	Number employed in firm	-/+
Innovation	Product Innovation	Number of new products introduced	Positive
ICT Tools	Computers/Laptops	Number of computers/laptops used by the firm	Positive
Training	Skills	Number of trainings attended by employees	Positive

Means and averages of the responses, percentages, frequencies, figures from the responses for each question were used in the analysis of model equation 2. The means or averages represented the coefficient for each variable in the equation. All questionnaires were checked, analyzed, responses tallied and means or averages calculated for each question. Responses with 'yes' or 'no' were measured using a binary variable of 0 and 1 where 0 represented 'yes' while 1 represented 'no'. For categorical responses, such as selecting a response from a list of options, the data was measured using a categorical variable, also known as a nominal variable. In this case, each category was assigned a unique numerical value, such as 1, 2, 3, 4, 5 etc. If the answer to a question is numerical, such as the value of a variable, the data was measured using a continuous variable or an ordinal variable. In the case of a continuous variable, the data was any real number and was measured to

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any degree of precision, such as capital invested in the firms. In the case of an ordinal variable, the data took on a set of ordered values, such as a rating scale from 1 to 5.

3.4 Target Population

Considering the substantial presence of SMEs in Kisii Municipality, a survey was conducted involving 100 registered SMEs for this study. Micro enterprises, as per the Micro and Small Enterprise Act of 2012, are characterized as small businesses with an annual revenue not surpassing KES 500,000 and employing fewer than ten individuals. The choice to conduct the study in Kisii County was influenced by lower data collection costs and the comparatively less busy schedules of SME owners compared to those in other counties, allowing for ample time to complete the questionnaires. Cluster sampling was employed to achieve the necessary sample size, encompassing all types of SMEs in Kisii Municipality.

Table 3. 2: Categories of SMEs within Kisii Municipality

No.	Type of Business	Total
1	Hotel & restaurant	150
2	Second hand clothes	50
3	Fresh fruit & vegetables	20
4	General shop/kiosk	100
5	Pharmacies/Chemists	50
6	Tailors	50
7	Metal work	30
8	Shoe sellers	40
9	Cobblers	10
	Total	**500**

3.5 Sample

In order to select small enterprises from among various classes or categories, proportionate stratified random sampling proved to be the most appropriate method of sampling. Participation in the research population was contingent upon the fulfillment of a questionnaire requirement and their classification as small and medium-sized enterprises (SMEs) functioning in distinct industries. (See Table 1.2).

A sample of ten to thirty percent of the population is sufficient for generalizing the findings (Mugenda, 2003). Because of the significant degree of similarity among the people who responded to the target, particularly in terms of business operating issues, this study picked 20% of respondents from each group using stratified random sampling. The distribution is illustrated below.

Table 3. 3: Sample Size

No	Business Category	Total Population	Sample Proportion	Sample size
1	Hotel & restaurant	150	20%	30
2	Second hand clothes	50	20%	10
3	Fresh fruit & vegetables	20	20%	4
4	General shop/kiosk	100	20%	20
5	Pharmacy	50	20%	10
6	Tailor	50	20%	10
7	Metal work	30	20%	6
8	Shoe sellers	40	20%	8
9	Cobblers	10	20%	2
	Total	**500**		**100**

3.6 Data Collection Method

During the course of the inquiry, primary and secondary sources of information were consulted. In order to ensure the analysis contains quantitative and qualitative information, the process of collecting data involved capturing information in both numerical and textual formats. This was done in order to guarantee that the database contained both types of data. Data was gathered

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by administering a drop-and-pick survey and in-person interviews through questionnaire which was presented to each group of business owners. By using questionnaires, data regarding the demographics, attitudes, and experiences of the owners was collected. In order for the questionnaire to effectively reflect the goals of the research project, it was appropriately designed and included a combination of open-ended and closed-ended questions.

3.7 Validity of Research Instrument

Throughout the process of formulating the instrument, this study took into account various validity components, including face validity, content validity, and criterion validity, construct validity, and concurrent validity. Face validity pertains to the apparent truthfulness of a particular statement. Content validity assesses the extent to which a statement is accurate. Construct validity examines whether an instrument accurately measures the construct it is designed to assess, while criterion validity evaluates the instrument's ability to predict a specific outcome. Both forms of validity are crucial in determining the reliability of a test. Construct validity of an instrument is appraised by assessing how accurately it measures a specific construct, such as a person's attitudes or personality traits. In the final stage of the concurrent validity process, the instrument's consistency concerning other measurements of the same construct is investigated.

3.8 Reliability of Research Instruments

If a research has a high chance of delivering the same results regardless of the respondents to whom it is given, then that instrument is regarded to be trustworthy (Cooper & Schindler, 2014). In order to determine whether or not the research instrument that is currently being utilized satisfies the criteria for reliability, the Cronbach's Alpha coefficient was applied. The lowest possible score on this coefficient is zero, and the greatest possible score is one. According to the findings of Sekaran and Bougie (2013), the reliability of an instrument improves in a manner that is proportional to the reliability coefficient of the instrument. In addition to this, we can say that it was satisfactory and that it accomplished internal consistency if the coefficient is at least 0.7 (Bryman & Bell, 2015).

3.9 Data Analysis

Following cleaning and coding, data was incorporated into STATA Version 24 which was used in data analysis. Before entering the data into the system, it was cleansed, and the completeness

of the questionnaires was checked. The use of descriptive, inferential, and qualitative statistics was incorporated into the process of analyzing data. An interpretation of the results from the questionnaire were accomplished through the use of descriptive analysis. It involved exploring the data to identify frequencies, means, trends, standard deviation, percentages and other relevant information. This type of analysis was helpful for understanding the overall picture of the responses and for identifying patterns in the data. Qualitative analysis was used to explore the underlying reasons and beliefs behind the responses in the questionnaire. It involved looking at the responses on an individual level, as well as looking at the data in aggregate. This type of analysis was useful for uncovering the deeper motivations and opinions of the respondents. Inferential analysis was used to draw conclusions about a larger population based on collected data from the questionnaire. The analysis involved using statistical techniques, such as correlation and regression, to make predictions and draw conclusions

3.10 Ethical Issues

The researcher applied for research permission from the University of Nairobi and NACOSTI. The researcher maintained the objectivity throughout the entire study procedure in order to keep their integrity intact throughout the process. As a result of this, the researcher made full disclosure of any interests before beginning their work in order to avoid any potential conflicts of interest. Every piece of information that was gathered was handled in strict confidence, and the privacy of those who participated was not compromised in any way.

The information was protected from disclosure to the general public and was not used in any manner that could compromise its confidentiality. Access to secondary data was compiled from sources such as websites, blogs, and forums were secured through the utilization of acceptable legal measures in order to ensure that no one's intellectual property rights was infringed upon. This was done in order to ensure that no one's right to their own intellectual property was violated.

3.11 Estimation of the Model

In estimating the above model, the study employed the ordinary least squares method. Ordinary least square is ideal choice for linear regression models due to its simplicity, efficiency, accuracy, and interpretability. It is computationally simple and efficient, making it well-suited for large datasets. Secondly, it is statistically robust, meaning that it can handle outliers and non-

normal data. It also produces unbiased estimates that are considered accurate. Lastly, OLS estimates are easy to interpret, allowing for straightforward evaluation of the results.

3.12 Data Tests

Before executing the model, various data tests will be undertaken. These tests include tests for multicollinearity, heteroscedasticity, normalcy, and autocorrelation.

A test for multicollinearity was performed to determine whether there is multicollinearity in the data. For each variable variance inflation was calculated. When two or more predictor variables are highly associated, multicollinearity occurs. The VIF shows how much the variance of a regression coefficient rises in the presence of predictor variables that are associated. If the VIF for a predictor variable is more than 10, it is likely that multicollinearity exists.

Heteroscedasticity test checked whether there is heteroscedasticity in the data. This was done by testing the residuals for heteroscedasticity using the Breusch-Pagan Test. The Breusch-Pagan Test will help detect heteroscedasticity in the linear regression model adopted by the study. A situation is said to be heteroscedastic when the variance of the error term, also known as residuals, is not uniform across all observations. This test will use an F-statistic to compare the model with only the intercept to a model with the intercept and a set of explanatory variables. If the F-statistic is statistically significant, this suggested that the error term's variance differs across observations, indicating heteroscedasticity in the model.

The Normality Test verifies the existence of normalcy in the data. The same was realized by utilizing the Shapiro-Wilk Test to examine the residuals for normalcy. The Shapiro-Wilk test was performed to examine if the study sample is representative of a normally distributed population. It was used to evaluate the normality of a distribution by comparing sample values to predicted values derived from the normal distribution.

The presence of autocorrelation in the data was determined using an autocorrelation test. This was accomplished by utilizing the Durbin-Watson Test to examine the residuals for autocorrelation. The Durbin-Watson Test determined whether there is autocorrelation in a time series, i.e. the correlation between values of the same variable that have been shifted in time. The test generates a statistic between 0 and 4, with lower values suggesting a higher degree of autocorrelation. A score of 2 showed that the data lacks autocorrelation.

CHAPTER FOUR
RESULTS AND DISCUSSSION

4.1 Introduction

The chapter provides the results of the research on influence of information and communication technology and its effect on the productivity of small and medium-sized businesses.

4.2 Response Rate

100 questionnaires were distributed by the researcher, of which 87 were filled out and returned for analysis, which is equivalent to 87 percent of the total. On the other hand, thirteen questionnaires were never returned, which is equivalent to 13 percent. As stated by a response rate of fifty percent is deemed appropriate for the objectives of analyzing and reporting, according to Mugenda and Mugenda (2008). A rate of sixty percent is deemed adequate, while a response rate of seventy percent or higher is deemed exceedingly satisfactory. Due to the fact that this rate was determined to be typical, it was permissible for these inferences to be drawn from the study. Taking into consideration this remark, the response rate was very high.

4.3 Reliability Test

Cronbach Alpha was applied to the research instruments in order to determine their reliability. A Cronbach Alpha value of 0.7 is deemed an good threshold for assessing reliability, as stated by Cronbach in 1951. As shown in Table 4.0, the study variables were considered reliable since the minimum threshold of 0.7 was satisfied by the data in Table 4.2.

Table 4. 1: Reliability Test

Variable	Cronbach's Alpha	Number of Questions
Productivity of SMEs	0.827	7
Capital	0.793	7
Labour	0.780	7
Training	0.912	7
ICT tools used	0.761	7
Innovation	0.834	7

4.4 Demographic Characteristics

An examination was conducted of the characteristics of the respondents with respect to the following factors: the type of business conducted by the SME, gender, working hours, educational level, and tenure in the business. The findings were as follows;

4.4.1 Business Type

The analysis was carried out in relation to the type of business which was conducted.

Table 4. 2: Business Type

Category	Frequency	Percent (%)
Services	9	10.3
Supermarket	4	4.6
Education	13	14.9
Hardware	21	24.1
Construction	11	12.6
Finance	5	5.7
Manufacturing	35	40.2
Total	**87**	**100**

As determined by the analysis, 40.2% of the respondents were employed in the manufacturing sector, hardware was represented by 24.1%, 14.9% represented education, 12.6% involved themselves in construction sector, services sector was represented by 10.3%, education was 14.9% while finance was represented by 5.7%. Majority of the respondents were from manufacturing sector which assisted the researcher in collecting adequate information since they were implementing new technology every time to improve their productivity.

Table 4. 3: Average working hour for employees

Working Hours	Frequency	Percentage (%)
8 hrs.	49	56.3
Above 8 hrs.	38	43.7
Total	**87**	**100.0**

Most of SMEs in Kisii County ensured that their employees worked for a minimum of 8 hours which was represented by 56.3%. Due to work demand and achieving of target some of SMEs ensured that employees worked for more than 8 hours which was represented by 43.7%. The study indicated that SMEs in Kisii County were conversant with working hours as stipulated in labour laws which assisted them in achieving their targets.

Table 4. 4: Employment by Gender

Category	Frequency	Percentage (%)
Male	51	58.6
Female	36	41.4
Total	**87**	**100.0**

According to the study, the majority of SMEs in Kisii County employed males at a rate of 58.6%, while females were represented at 41.4%. Nevertheless, according to the study, the majority of SMEs had adhered to the third gender rule, which ensured objectives were met within the allotted time, thereby increasing productivity.

Table 4. 5: Level of Education

Category	Frequency	Percentage (%)
Primary	13	14.9
Secondary	21	24.2
Tertiary	53	60.9
Total	**87**	**100.0**

Most business owner of SMEs in Kisii county had tertiary level of education which was represented was 60.9%, secondary education was represented by 24.2% while primary education was represented by 14.9%. The study indicated that most owners had adequate skills to perform their duties which assisted the SMEs in achieving their goals and thus improving productivity

4.5 ICT tools used by SMEs
The study wanted to know the number of ICT tools used by SMEs within Kisii Municipality and the extent to which the adoption of the tools enhanced productivity of the SMEs.

Table 4. 6: Use of ICT Tools by SMEs

Category	Frequency	Percentage (%)
Yes	81	93.1
No	6	6.9
Total	**87**	**100.0**

Majority of SMEs in Kisii County had adopted ICT tools in their business which was represented by 93.1% while 6.9% had not adopted ICT tools. Adoption of ICT tools in SMEs was crucial in ensuring business achieved their goals within the stipulated time and with minimal wastage

Table 4. 7 : ICT Tools Adopted by SMEs

Category	Frequency	Percentage
Computers/Laptop	39	44.8
Phones	17	19.6
Point of Sale	31	35.6
Total	**87**	**100.0**

Computer/laptop were the mostly used ICT tools by SMEs which was represented by 44.8%, point of sale was second which was represented by 35.6% while phone was the least used which was represented by 19.6%. Most SMEs preferred computers/laptop since they hold a lot of data and were used as a back up to keep crucial information for the business.

Table 4. 8: Number of ICT tools used

Category	Frequency	Percentage
Computers/Laptop	42	48.3
Phones	9	10.3
Point of Sale	36	41.4
Total	87	100.0

Computer/ laptop were 42 in numbers which had been acquired by SMEs interviewed within the Kisii municipality, point of sale were 36 in numbers while phones were 9 in numbers. The SMEs preferred computers/Laptop since they were user friendly and reliable which improved productivity.

4.6 Determinants of Productivity

The study set to find out the key determinants of productivity and how these determinants affected productivity of SMEs within Kisii Municipality. The results were as discussed below;

Table 4. 9: Capital Invested in ICT by SMEs

Category	Frequency	Percentage
Less than 10,000	15	17.2
11,000-50,000	10	11.4
51,000-200,000	27	31.0
Above 200,000	35	40.3
Total	**87**	**100.0**

SMEs invested more than Kshs 200,000 in ICT was represented by 40.3%. 31.0% of these SMEs has invested Kshs 51,000-200,000, 17.2% had invested between Kshs.11, 000-50,000 while those who had invested less than Kshs.10, 000 was represented by 17.2%. The high level of investment in terms capital indicated that most SMEs in Kisii County had a good a positive productivity.

Table 4. 10: Number of Employees by SMEs

Number of Employees	Frequency	Percentage (%)
1	11	12.6
2-5	18	20.7
Above 5	58	66.7
Total	**87**	**100.0**

Most of SMEs in Kisii County had employed more than 5 employees which was represented by 66.7% SMEs which employed 2-5 employees represented by 20.7% while those who had employed one employee were represented by 12.6%. The study indicated that most SMEs in KisiiCounty was a source of employment and thus indicated high productivity.

Table 4. 11: Number of training programs attended

Number of Trainings	Frequency	Percentage (%)
1	15	17.3
2-5	18	20.6
Above 5	44	50.6
None	10	11.5
Total	**87**	**100.0**

Most employees of SMEs within Kisii municipality had attended more than 5 training programs within the year representing 50.6%. 20.6% represented those who had attended between 2 and 5 training programs and 17.3% represented employees who had attended only 1 training program. The study further indicated that 11.5% of then employees did not attend any training program within the year.

Table 4. 12: Types of training programs

Category	Frequency	Percentage (%)
Record Keeping	14	16.1
Business Management	41	47.1
Customer Care	22	25.3
Others	10	11.5
Total	**87**	**100.0**

Most of business owners had attended business management training programs which were represented by 47.1% followed by customer care training which was represented by 25.3%, record keeping was represented by 16.1% while others were represented by 11.5%. The study has indicated that most business owners had adequate knowledge to run their business and therefore had solutions whenever there were obstacles. This ensured that there was improvement in productivity of SMEs in Kisii County.

4.7 Effect of ICT on productivity

The study sought to find the effect of ICT on productivity of SMEs in Kisii Municipality based innovation and precisely on the number of products introduced in the markets. The results are presented below;

Table 4. 13: Adoption of Innovation SMEs

Category	Frequency	Percentage (%)
Yes	48	55.2
No	39	44.8
Total	**87**	**100.0**

The study indicated that 55.2% SMEs had expanded in the last one year while 44.8% of the business had not expanded. Expansion was attributed due to adoption of friendly ICT tools and adequate skills posed by the employees.

Table 4. 14: Number of new products

Category	Frequency	Percentage (%)
1	13	14.9
2-5	24	27.6
Above 5	39	44.8

None	11	12.9
Total	**87**	**100.0**

Most of SMEs had introduced more than 5 new products in the market which was represented by 44.8%, those who had introduced 1-5 products in the market were represented by 27.6% and one product was represented by 14.9% while none was represented 12.9%. Due to modern ICT tools and availability of capital most SMEs were able to come up with new products which improved productivity.

Table 4. 15: Productivity

Category	Frequency	Percentage (%)
Less than 50,000	12	13.8
51,000-100,000	43	49.4
Above 100,000	32	36.8
Total	**87**	**100.0**

Most of SMEs had an output per worker of between Kshs. 51,000-100,000 which was represented by 49.4%, Those with an output per worker of above Kshs.100,000 was represented by 36.8% while less than Kshs. 50,000 was represented by 13.8%. High output per worker was attributed by SMEs acquiring modern ICT tools and adequate training.

High output per worker was attributed by SMEs acquiring more modern ICT tools and increased investment in the SMEs.

4.8 Descriptive Statistics

Table 4. 16: Descriptive Statistics

Statement	N	Minimum	Maximum	Mean	Std. Deviation
Capital	87	5000	800000	244080.5	227509.63
Labour	87	1	10	5.84	2.811
ICT Tools	87	0	2	0.48	0.568
Innovation	87	0	30	8.75	8.781
Training	87	0	10	4.39	3.349
Average Mean	**87**			**48819.98**	**45505.028**

The study indicated that capital highly influenced productivity of SMEs in Kisii County as indicated by a mean of 244080.5. The analysis indicated that most of SMEs lacked adequate capital to invest in ICT and thus influenced the productivity of SMEs in Kisii County. Adequate capital in SMEs would facilitate easier processing of transaction through adoption of new technology and acquiring of goods.

Innovation has been shown to influence productivity of SMEs in Kisii County as indicated by a mean of 8.75. SMEs in Kisii county experienced challenges when introducing new products in the market due lack of modern ICT. The study also indicated that due to lack of adequate capital, SMEs failed to carry due process when introducing new products in the market.

The analysis also revealed that labour influenced productivity of SMEs in Kisii County bases on a mean of 5.84. SMEs in Kisii County had not employed the right number of employees and thus affecting the level of production in a negative manner. For SMEs to be productive they should ensure they have adequate number of employees to achieve their goals within the stipulated time.

Training influenced productivity of SMEs in Kisii County as indicated by a mean of 4.39. The analysis indicated that for employees to be productive they should attend trainings which will improve their skills. Seminars and workshop should be organized on regular basis.

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The study revealed that ICT tools influenced productivity of SMEs in Kisii County as indicated by a mean of 0.48. Though most of SMEs had adopted ICT tools which included laptops and computers majority of them experienced challenges when using them. The study revealed that SMEs in Kisii County should invest more capital to acquire modern technology which would facilitate fast processing of information.

4.9 Diagnostic Tests

The study adopted Shapiro -Wilk's W test of Normality in testing the normality of the dependent variable.

Table 4. 17: Shapiro -Wilk's W test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Productivity	.249	87	.068	.825	87	.068

a. Lilliefors Significance Correction

The researcher did not reject H0 on the grounds that the Shapiro-Wilk test of normality for SME productivity yielded a significance value (p = 0.068) exceeding the 0.05 threshold, indicating that the data do not exhibit any deviation from a normal distribution. The interpretation was conducted in accordance with established principles, as outlined by Shapiro and Wilk (1965) and Razali and Wah (2011).

Table 4. 18: Durbin Watson Test for Auto Correlation

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.992[a]	.983	.982	.106	1.930

a. Predictors: (Constant), Capital, labour, training, ICT tools and Innovation.
b. Dependent variable: Productivity

The lack of first-order linear autocorrelation in the multiple linear regression data was hypothesized by the researcher using the Durbin-Watson statistic from the model summary. This statistic suggests that the value of d = 1.930 is contained within the interval between 1.5 and 2.5. This was established by the conventional wisdom of Durbin and Watson (1971).

Table 4. 19: Test for Multi Collinearity Using Tolerance and VIF

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Capital	0.126	7.93
	Labour	0.175	5.71
	Training	0.147	6.82
	ICT Tools	0.159	6.95
	Innovation	0.168	7.89
a.	Dependent Variable: Productivity		

Source: Researcher

Predictors that have extremely small values are considered redundant, as stated by Liu, Kuang, Gong, and Hou (2003). According to this those that are lower than 0.1 signal the need for further investigation. The Variance Inflation Factor, abbreviated VIF, falls below the threshold value of 10 set as the highest possible. This suggests that the researcher came to a conclusion about the data set did not have multicollinearity.

5.0 Inferential Analysis

By employing correlation and regression analysis, we successfully ascertained the characteristics of the association between the variables. Regression analysis was employed to ascertain the nature of the relationship between the investigated variables, whereas correlation analysis was utilized to ascertain the association between the variables. By employing inferential analysis, this study has ascertained the presence or absence of a relationship between an intervention and an outcome, in addition to assessing the magnitude of this relationship's influence.

5.1.1 Correlation Analysis

By examining the correlation between the variables utilized in the study, the results of the analysis were determined. Kothari (2004) defines the correlation coefficient as an indicator of the degree of linearity in the relationship between two variables. Constantly, the correlation coefficient ranges in value from -1 to +1. Two variables are perfectly related in a positive linear sense when the correlation coefficient is +1; conversely, a negative linear sense when the correlation coefficient is -1 indicates that the variables are perfectly related. A value of 0 signifies the absence of any linear association between the two variables.

Table 4. 20: Correlation Analysis

		Capital	Labour	Training	ICT Tools	Innovation	Productivity
Capital	Pearson Correlation	1.00					
	Sig. (2-tailed)						
Labour	Pearson Correlation	.88	1.00				
	Sig. (2-tailed)	.000					
Training	Pearson Correlation	.81	.89	1.00			
	Sig. (2-tailed)	.000	.000				
ICT Tools	Pearson Correlation	.81	.88	.97	1.00		
	Sig. (2-tailed)	.000	.000	.000			
Innovation	Pearson Correlation	.82	.91	.90	.88	1.00	
	Sig. (2-tailed)	.000	.000	.000	.000		
Productivity	Pearson Correlation	.75	.73	.81	.83	.76	1.00
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	87	87	87	87	87	87

The findings of the correlation suggest that there was a positive association between the independent factors and the variable that was being studied (the dependent variable). At a confidence level of 95%, each and every one of them was significant. Productivity was shown to

have a strong and positive correlation coefficient of 0.75, with a p-value that was less than 0.05, according to the analysis of correlation. This demonstrates that an increase in capital leads to a significant boost in the productivity of small and medium-sized enterprises (SMEs). In terms of the correlation coefficient, labour had a positive value of 0.73, and its p-value was lower than 0.05. The connection coefficients for education and training, information and communication technology tools, and innovation were all positive, with respective p-values of less than 0.05. The coefficients were 0.81, 0.83, and 0.76. According to the findings of the study, there is a significant positive connection between information and communication technology (ICT) and the productivity of SMEs in Kisii County

5.1.2 Regression Analysis

5.1.3 Coefficient of Determination

The metric utilized to assess the precision with which a statistical model can forecast future events is referred to as the coefficient of determination, also known as the correlation index. The computation of the coefficient of determination involves squaring the sample correlation coefficient between the predicted and actual values, as stated by Golberg and Hokwon (2010). Alternatively stated, it ascertains the proportion of the dependent variable's variation that can be accounted for by changes in the independent variables.

Table 4. 21: Coefficient of Determination

Model	R	R Square	Adjusted R Squared	Std. Error of the Estimate
1	0.889	0.790	0.736	0.32561

The coefficient of determination that illustrates the variation in the dependent variable due to differences in the independent variable is adjusted R squared. The study yielded an adjusted R-squared value of 0.736, which suggests that changes in the independent variables had a 73.6 percent impact on the productivity of small and medium-sized enterprises (SMEs) in the Kisii municipality. This conclusion is supported by a 95% confidence interval. This suggests that 73.6% of changes in SME productivity could be attributed to innovations, labor education and training, changes in ICT instruments, and capital. These findings suggest that the productivity of small and medium enterprises in the Kisii municipality is significantly influenced by the four factors mentioned.

Table 4. 22: ANOVA Analysis

Model		Sum of Squares	d.f	Mean Square	f	Sig.
1	Regression	8.884	4	2.221	22.210	0.000
	Residual	4.615	82	0.100		
	Total	**13.499**	**86**			

As determined by the ANOVA, the significance level of 0.000 is below 0.05. This suggests that the model accurately predicted the extent to which capital, labor education and training, ICT tools, and innovation affected the productivity of small and medium enterprises in Kisii municipality in a statistically significant manner.

5.2 Multiple Regression Analysis

The statistical package for social sciences (SPSS V 21.0) was utilized to code, input, and calculate the multiple regression measurements. Specifically, the regression equation reads:

$$\ln(Y) = \beta_0 + \beta_1 \ln(X_1) + \beta_2 \ln(X_2) + \beta_3 \ln(X_3) + \beta_4 \ln(X_4) + \beta_5 \ln(X_5) + \varepsilon$$

= Productivity of SMEs = Out per worker = (Sales /Number of employees)

X_1 = Capital = Capital invested in ICT

X_2 = Labour = Number of employees in the firm

X_3 = Training = Number of training programs attended

X_4 = ICT tools used = Number of computers/laptops used

X_5 = Innovation = Number of products introduced in the market

Q_0 = Constant

Q_1- Q_5 = Regression coefficients

s = Error Term

The result of regression analysis is shown in Table 4.22 below.

Table 4. 23: Model Coefficients

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.352	.113		3.109	.003
Capital	.395	.285	.390	1.386	.000
Labour	.011	.230	.010	.047	.000
Training	.038	.171	.035	.223	.000
ICT Tools	.417	.223	.411	1.875	.065
Innovation	.027	.100	.034	.268	.000

a. Dependent Variable: Productivity

The regression equation that was derived from the computed data was as follows;

$Y = 0.352 + 0.395 X_1 + 0.011 X_2 + 0.038 X_3 + 0.417 X_4 + 0.027 X_5$

Based on regression analysis conducted, capital has significance and positive influence on productivity of SMEs in Kisii County as shown by $Q_1 = 0.395$, p=0.000. The study indicated that increase in one unit of capital invested would result to increase in productivity by 0.395. The analysis indicated the productivity of SMEs in Kisii County depends on the capital invested in ICT. The more the capital invested in ICT the higher the productivity. The respondents indicated that most SMEs experienced challenges when acquiring credit facilities from financial institutionsdue to lack of collateral. Capital is an important element in running a business so that the businesscan develop and generate added value for business actors. The statement concurs with Gandiadhi and Pen (2020), who stated that, the capital aspect is to be able to improve the business culture so,that to improve business productivity.

The analysis revealed that labour has significant and positive influence on productivity of SMEs. One unit increase in labour would result to increase in productivity by 0.11. The study indicated that for SMEs to be productive they need to have adequate manpower to perform their day to day activities. The respondent indicated that SMEs experienced high labour turnover due to lower remuneration and lack of benefits for employees. According to Shah and Burke (2003), a labor shortage occurs when the demand for workers in a specific occupation is higher than the supply

of individuals who are qualified, available, and willing to work given the conditions of the current market. Quantitative labor shortages (not enough numbers) and qualitative labor shortages (not required qualities) are two types of labor shortages.

Training has indicated to have a significance and positive relation on productivity of SMEs in Kisii County. One increase unit in number of training of employees would result to increase in productivity by 0.038. The study indicated that employees need to attend various training to improve their skills to perform their duties. The research conducted by Pareek and Rao (1992) demonstrated that it is essential for businesses to offer their staff training and development programs that are both comprehensive and comprehensive in nature. This is due to the fact that individuals are involved in each and every area and activity of a company. A manager in a company will not be successful until he has subordinates beneath him who are well equipped with skills, talent, and knowledge. This is a prerequisite for success.

Innovation has been shown to have a significance influence on productivity of SMEs. One unit increase in innovation would result to increase in productivity by 0.27. The study indicated that innovation had led to introduction of new products in the market. The respondents indicated that most SMEs were not financially stable to launch new products in the market. Tajeddini (2010) indicated that organizational productivity and service quality increases in firms that use technology and create innovation. Innovation affects organizational productivity.

Finally, there existed a positive relationship between ICT tools and productivity of SMEs. One unit increase in ICT tools would result to increase in productivity by 0.417. The analysis indicated that most SMEs in Kisii County had acquired computers which improved processing of transactions. The respondents indicated that most employees lacked adequate computers training skills and thus experienced the challenges when using computers. ICTs offer SMEs the opportunity to improve their day to day activities. Apalu & Latham (2010), ICT tools generates higher market through reduction of input costs and allows firms to produce more products which in turns lead to improved sales volumes, improve productivity and higher profits for SMEs.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter offers a thorough summary of the research findings derived from the analysis of data in alignment with the research questions. Furthermore, it incorporates the study's conclusions and recommendations.

5.2 Summary of the Findings

With regards to ICT Tools, SMEs have adopted computers and laptops to facilitate their day to day activities. Most business use computers for external and internal communications. The computers are used for data storage, tracking of orders and conducting internet banking. The study indicated that adoption of modern technology improves the productivity of SMEs in Kisii County. Capital invested affects productivity of SMEs in Kisii County. The study indicated that increase in capital was crucial to increase in sales and number of employees. Adequate capital ensured that SMEs acquired modern ICT tools to run their activities in an efficient and effective manner. Based on labour, there exists a significance relationship between labour and productivity of SMEs in Kisii County. Lack of adequate labour prohibited SMEs from achieving their level of productivity. Adequate labour ensured that the business achieved their goals within the stipulated period. With regards to innovation, the study indicated that it was crucial in ensuring that SMEs achieved their productivity. Through adequate training of employees, the SMEs ensured that they came up with new products in the market. The study also indicated that adequate capital was significance in ensuring the workers attended training which improved their skills. Innovation of new products ensures the firms are competitive in the market. Small and medium-sized enterprises (SMEs) should integrate information and communication technologies into their production and transaction processes, such as when they sell items or acquire resources

5.3 Conclusions

The conclusion of the study indicates that, capital and labour played a pivotal role in determining the productivity of SMEs. SMEs should invest more in ICT and employ more people in their day to day operations. The more SMEs invest in ICT the higher the returns they will achieve hence increasing productivity. Similarly, small and medium-sized enterprises (SMEs) possess the potential to reap the benefits of economies of scale, hence enhancing their productivity.

The research also highlighted the crucial significance of training inside small and medium-sized enterprises (SMEs), as it plays a pivotal role in developing the skills and knowledge of the staff of these organizations. All of the employees who had undergone training and had a high level of education performed far better than their coworkers who did not have a high level of education.

Furthermore, the adoption of ICT tools within SMEs fosters an environment conducive to innovation, resulting in the introduction of novel products into the market. This innovation, in turn, enhances their competitiveness and ultimately leads to higher levels of productivity. In light of these findings, it is clear that SMEs should actively embrace ICT tools, training, and innovation as crucial components of their operational strategy to drive productivity and thrive in the competitive marketplace.

5.4 Recommendations

The study recommendations are as follows;

SMEs in Kisii County should invest in modern technology to help improve their business management practices. Employees should attend computer training courses to equip themselves with skills. Adequate capital should be budgeted which should be used to acquire modern ICT tools. SMEs should recruit employees who are competent to perform their duties. The firms should higher the right number of employees based on prevailing labour regulations. The SMEs should organize training which should include seminars and workshop for the employees. This will ensure they have adequate skills to perform their duties and thus improve productivity. SMEs should set up research and development centers which would facilitate innovation of new products.

5.5 Suggestions for Further Studies

This study looked at SMEs in Kisii Municipality. It therefore recommends that further comparative studies should be carried out focusing on areas not covered in this study such as covering the entire Kisii County. More interesting is a study that would cover general ICT adoption by all type of businesses and not SMEs only. This is likely to give stakeholders like the government a good feel of the situation nationally. The study should also be conducted to other counties with different independent variables and compare the findings.

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