

### **1.3 Objective of the study**

The study will be guided by the following objectives:

- 1) To investigate factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu City.
- 2) To analyze the role of ICT adoption in improving SMEs operations in CBD, Kisumu City.
- 3) To establish level of usage of ICT resources by SMEs in CBD, Kisumu City.

### **1.4 Research Questions**

- 1) What are the factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu City?
- 2) What is the role of ICT adoption in improving in SMEs operations in CBD, Kisumu City?
- 3) Do SMEs in CBD, Kisumu city use ICT resource at the same level as SMEs in other parts of the world?

### **1.5 Significance of the study**

Information generated from the study will be used to sensitize SMEs on the importance of adopting ICT, it will also be used in the formation of framework to guide SMEs on the selection and alignment of tool that fit their operations. The findings will be used to in the planning and implementation of policies regarding adoption of ICT in SMEs. In addition it will also be used as a base for future studies on the adoption of ICT by SMEs.

### **1.6 Scope and Limits of the study**

The study investigated the impact of ICT on the growth of SMEs in CBD, Kisumu city and focused on registered SMEs by City Council of Kisumu (CCK). The study only looked at a few variables which include factors influencing decision by SMEs managers to adoption of ICT by SMEs and the role of ICT in expanding SMEs. Limitations were mainly due to long time period that most of the SMEs took to respond to the questionnaire. Again some SMEs were not comfortable responding to some questions which were mainly related to tax and financial position, particularly turnover.

**FACTORS INFLUENCING DECISION BY SMALL AND MEDIUM  
ENTERPRISES MANAGERS TO ADOPT INFORMATION AND  
COMMUNICATION TECHNOLOGY IN CENTRAL BUSINESS DISTRICT,  
KISUMU CITY, KENYA.**

**BY**

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PLANNING AND MANAGEMENT**

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## ABSTRACT

Small and Medium Enterprises (SMEs) have been accepted as the engine of economic growth and for promoting equitable development. Information Communication Technology (ICT) is a major driving factor to change in many sectors of the economy including SMEs. There are a number of studies on adoption of ICT by SMEs, some of these studies have explored role of SMEs managers in ICT adoption and others have investigated factors influencing adoption of ICT. However none of these studies explored the fact that these factors influence decision by SMEs managers to adopt ICT. Moreover there is little empirical evidence on role of ICT adoption in improving SMEs operations and level of usage of ICT resources by SMEs in CBD, Kisumu city. It is on this background that the study was designed to explore factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu city. The study was guided by the following objectives; to investigate factors influencing decision by SMEs managers to adopt ICT, to analyze the role of ICT adoption in improving SMEs operations and to establish level of usage of ICT resources by SMEs. The study employed descriptive research design and targeted 400 formally registered SMEs. Systematic random sampling was used to select 195 managers from the target population and purposive sampling was used to select key informants. Primary data was collected through survey for the managers of sampled SMEs, interview schedule for the key informants and observation. Secondary data was collected through review of literature. Data was analyzed through cross tabulation, chi square, t-test and percentages. Results were presented using contingency tables. The study established that 100% of SMEs managers who do not adopt ICT can not use a computer and 75% of SMEs managers that adopt ICT expect benefit from adoption. The research found out the mean difference of communication after and before adoption of ICT is 47.76, with associated t statistics of 29.4378. The study further established that 88% of SMEs use desktop computers, 91% use application software, 84% use E mails and 81% use password. Ability of SMEs managers to use computers was found to influence decision by SMEs managers to adopt ICT, however, level of education does not influence decision by SMEs managers to adopt ICT. To increase the number of SMEs that adopt ICT, the study recommends that more SMEs managers to be trained on the usage of computer.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the study

Small and Medium Enterprises (SMEs) are independently owned and operated companies usually characterized by small number of employees and relatively low turnover. European Union (EU) member states categorizes companies with fewer than 50 employees and a turn over of less than 10 million Euros as "small", and those with fewer than 250 and a turnover of less than 50 million Euros as "medium" (European Commission, 2003; Shiels, McIvor & O'Reilly, 2006). In the United States SMEs refer to those businesses with fewer than 100 employees while medium-sized business often refers to those with fewer than 500 employees (Ravarini, Tagliavini, Pigni & Buonanno, 2001).

In Tanzania, businesses with between 10-49 employees are categorized as small while those with between 50-99 employees are categorized as medium (Wolf, 2001; Matambalya & Wolf, 2001). In Kenya SMEs are defined as formally registered business, with 5-100 employees and with annual turnover of between Kenya Shillings (Kshs) 6 million and Kshs 100 million (International Financial Corporation, 2004). Small Enterprises are firms employing up to 50 people with an investment of up to Kshs 2,000,000 (Okwara, 2004). In this study SMEs are defined as formally registered businesses, within CBD, Kisumu city. These businesses are characterized with 5-100 employees and with annual turnover of between Kshs 1 million and Kshs 10 million.

Sarosa & Zowghi (2003) describe Information and Communication Technology (ICT) as all the technologies used by an organization to collect, process, and disseminate information. In Oman ICT is described as range of computerized information and communication technologies, these technologies include products and services such as desktop computers, laptops, handheld devices, wired or wireless intranet, business productivity software such as text editor and spreadsheet, enterprise software, data storage and security, network security and others (Ashrafi & Murtaza, 2008). Laudon &

Laudon (2006) define ICT as technology that can be used for transmitting and processing information, they further highlight that ICT constantly creates and disseminates new information.

SMEs have been accepted as the engine of economic growth and for promoting equitable development. Globally SMEs account for 99% of businesses and 40% to 50% of Gross Domestic Product (GDP). In the United Kingdom (UK) SMEs contribute approximately 50% of GDP and provide employment to 70% of UK employees (Bocij, Chaffey, Greasley & Hickiel, 2006). The trend is the same in the United States of America (USA) and Germany (Sharma & Basotia, 2003).

SMEs comprise over 95% of the economy in the Asia-Pacific region (Kotelnikov & KimHak, 2007). In Oman it is estimated that there are 15,000 to 20,000 SMEs generating (Ashrafi & Murtaza, 2008). In South Africa, SMEs in the food processing sector employ about 183,000 people. In Tanzania and Kenya SMEs provide employment to more than 50% of all employed labour force and they are also accountable for over 50% of manufacturing GDP (Wolf, 2001; Matambalya & Wolf, 2001). SMEs play important in role in generation of GDP and creation of employment in most of the economies and it is therefore important to explore avenues on how SMEs can be promoted including use of technologies like ICT.

ICT is a major driving factor to change in many sectors of the economy including SMEs. It's beyond reason that success of many enterprises today rely on the integration of ICT (Shiels et al. 2003). Many developed nations have put into place proper ICT infrastructure for the success of SMEs (Government of India, 2006). According to Sahlfeld (2007) many African countries among them South Africa and Sudan are committed to implementation of ICT projects. Government of Kenya encourages self reliance and funding through supporting the growth of informal sector and SMEs. The government through Micro and Small Enterprise Training and Technology Project (MSETTP) empower SMEs by spreading ICT skills. The consequence of building ICT human capacity will lead to stimulation of growth, employment and poverty reduction

(Republic of Kenya, 2001). Despite the role played by ICT in success of many enterprises including SMEs and efforts by many governments including Government of Kenya to promote adoption of ICT by SMEs, there is little empirical evidence to explore factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu.

There are a number of studies on adoption of ICT by SMEs, some of this studies have explored role of SMEs managers in ICT adoption. Ashrafi & Murtaza (2008) found out that support by management is one of the key factors to ICT adoption. Kapurubandara & Lawson (2006) established that managers play an important role in decision making in SMEs. Kotelnikov & KimHak (2007) found out that managers determine the overall strategy of the firm, and they make the decision whether or not to adopt ICT.

Other studies have investigated factors influencing adoption of ICT. A number of researchers highlight firm size, firm characteristic, product, sector, access to ICT, policy changes and economic conditions as factor that influence the extent of adoption and exploitation of ICT by SMEs (Giovanni & Mario, 2003; McConville, 2008). Lack of interest/management support is viewed as factors that influence adoption of ICT (Bazini, Qarri & Ilia, 2011). Ghobakhloo, Sabouri, Hong & Zulkifli (2011) cite that business size definable by turnover is one of the most important determinants of ICT adoption.

Moreover, other studies have related perceived benefits of ICT adoption, cost of ICT resources, infrastructure, adoption by customer, access to finance, organizational culture, adoption by customers and in- house ICT expertise to be factors that influence ICT adoption (Dholakia & Kshetri, 2004; Frempong, 2007; Kutlu & Özturan, 2008; Premkumar & Roberts, 1998; Apulu & Latham, 2009; Corrocher & Fontana, 2006; Kyobe, 2004; Duncombe & Heeks, 2001; Utomo & Dodgson, (2001). The studies above have looked at the role of SMEs managers in ICT adoption and factors influencing adoption of ICT, however, none of these studies has related factors influencing adoption of ICT to decision by SMEs managers to adopt ICT.

According to Onyango (1994) expensive solutions, lack of competent staff, poor infrastructure, poor standard of software, management problem, equipment problem, security, cost of resource and government policy are factors that influence adoption of ICT in education sector in Kenya. Another study shows that perception that ICT is only for the advantage of large enterprises, license regime, government regulations, poor infrastructure and delayed implementations of ICT project are factors that influence adoption of ICT by SMEs in Kenya (Onyango, 2008). The main concern is that are these the factors that influence decision by SMEs managers to adopt ICT.

While there has been research on the role of ICT in improving business performance, some researchers assert a positive impact of ICT use on business performance; others consider it insignificant or even assume a negative impact (Ravarini et al. 2001). In Asia-Pacific region ICT is employed as a strategic tool for providing information for leather SMEs (Chirasirimongkol & Chutimaskul, 2005). In Oman ICT adoption help SMEs to provide better and faster customer service, stay ahead of competition, increased sales revenue, increased market share, improved performance and cut down on operational costs (Ashrafi & Murtaza, 2008).

In Tanzania enterprises using the different forms of ICT rate their effects mostly positive, computer applications are assumed to increase management efficiency by 88% and competitiveness by 76%, in addition ICTs can increase productivity through; efficient resource allocation and reduction in transaction costs, (Matambalya & Wolf, 2001; Wolf, 2001). However, little if in literature there is data to explore role of ICT adoption in improving SMEs operations in CBD, Kisumu city.

Several studies have been designed to establish the level of usage of ICT resources by SMEs, majority of these studies have established that level of usage of ICT by SMEs is moderate in basic resource but limited in advanced resources (Ashrafi and Murtaza, 2008). Kutlu & Özturan (2008) found out that in Turkey 85.6% use Office Software and 91.9% use Business Packages. A study to establish ICT Adoption and Use in UK SMEs found out that there was a very low take up of allied adoptions of a more strategic nature

such as Enterprise Resource Planning (ERP) systems (Harindranath, Dyerson, Barnes, 2008).

Usage of internet and Electronic mail (E mail) is high among SMEs (Luccehetti & Sterlaccini, 2004; McConville, 2008). However, usage of website is low among SMEs (Dholakia & Kshetri, 2004). Despite the effort by these studies to establish the level of usage of ICT resources by SMEs, there is little empirical evidence on the usage level of ICT resource by SMEs in the CBD, Kisumu city and for this reason, this study explored level of usage of ICT resource by SMEs in CBD, Kisumu city.

## **1.2 Statement of the Problem**

SMEs play important in role in generation of GDP and creation of employment in most of the economies and it is therefore important to explore avenues on how SMEs can be promoted including use of technologies like ICT. Despite the role played by ICT in success of many enterprises including SMEs and efforts by many governments including Government of Kenya to promote adoption of ICT by SMEs, there is little empirical evidence to explore factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu.

In CBD, Kisumu City many enterprises use ICT in various operations. The common notion is that ICT usage is associated with large companies. However, SMEs are also adopting ICT. Despite the fact that many researchers have explored role of SMEs managers in adoption of ICT and factors influencing adoption of ICT in SMEs, none of them has tried to relate these factors to decision by SMEs managers to adopt ICT. While there has been research on the role of ICT adoption in improving business performance and level of usage of ICT resource by SMEs. There is little empirical evidence on the role of ICT adoption in improving business performance and level of usage of ICT resource by SMEs in CBD, Kisumu city. Therefore the purpose of this study was to explore factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu City.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews the literature which is related to the study under the following themes: Small and Medium Enterprises (SMEs), Information and Communication Technology (ICT), factors influencing adoption of ICT by SMEs, role of ICT in improving business performance and level of usage of ICT resources by SMEs. The chapter ends with description of the Conceptual frame work that guided the study.

#### **2.2 Small and Medium Enterprises**

SMEs are independently owned and operated companies usually characterized by small number of employees and relatively low turnover, different factors including number of employees and turnover can be used in defining SME. European Union (EU) Member States categorizes companies with fewer than 50 employees and a turn over of less than 10 million Euros as "small", and those with fewer than 250 and a turnover of less than 50 million Euros as "medium" (European Commission, 2003). In the United States and Greece SMEs refer to those businesses with fewer than 100 employees while medium-sized business often refers to those with fewer than 500 employees (Shiels et al. 2006; Ravarini et al. 2001; Papastathopoulos & Beneki, 2010).

SMEs definition varies from country to country in the Asia-Pacific region but it is usually based on employment, assets, or a combination of the two. In Japan the definition is based on employment and assets, businesses with up to 100 employees or up to Yen 100 million assets are defined as SMEs. In Thailand SMEs are businesses with less than 200 employees or Baht 200 million assets (Kotelnikov & KimHak, 2007). In Indonesia SMEs are all business organization who posses assets less than US\$ 1 Million (excluding land and building) and have annual sales turnover less than US\$ 5 Million (Sarosa & Zowghi, 2003). In Oman SMEs are defined as businesses with between 10 and 50 employees as Small Enterprises, and between 50 to 250 employees as Medium sized enterprises (Ashrafi & Murtaza, 2008).

In Tanzania, number of employees is used as a factor to define SMEs, businesses with between 10-49 employees are categorized as small while those with between 50-99 employees are categorized as medium (Wolf, 2001; Matambalya & Wolf, 2001). In Kenya SMEs are defined as formally registered business, with 5-100 employees and with annual turnover of between Kenya Shillings (Kshs) 6 million and Kshs 100 million (International Financial Corporation, 2004). Small Enterprises are firms employing up to 50 people with an investment of up to Kshs 2,000,000 (Okwara, 2004). In this study SMEs are defined as formally registered businesses, within CBD, Kisumu city. These businesses are characterized with 5-100 employees and with annual turnover of between Kshs 1 million and Kshs 10 million.

The growth in SMEs is phenomenal, however, they are not only micro economics reasons driving the growth of small firms; the desire for independence or an innovative ideas leads to many people to start their own firms (Levy & Powell, 2004; Brown & Clow, 1997). Worldwide, SMEs have been accepted as the engine of economic growth and for promoting equitable development. In UK, USA and Germany SMEs contribute to the GDP and provide employment to more than 50% of employees (Bocij et al. 2006; Sharma & Basotia, 2003). SMEs are socially and economically important, since they represent 99 % of all enterprises in the European Union (EU) (International Financial Corporation, 2004; Shiels et al. 2006; Luccehetti & Sterlaccini, 2004; Ashrafi & Murtaza, 2008).

In Asia, SMEs sector plays a pivotal role in the overall industrial economy and contribute in development women entrepreneurs leading to increase gender equality by providing women with a source of income (Government of India, 2006; Kotelnikov & KimHak, 2007). According to an estimate of Middle East Bank there are only 15,000 to 20,000 SMEs in Oman (Ashrafi & Murtaza, 2008). The Thai leather business and industry is composed of 2,750 enterprises employing more than 300,000 workers, 90% of this sector is a small business (Chirasirimongkol & Chutimaskul, 2005).

advanced communication and advanced ICT (Kotelnikov and KimHak, 2007; Matambalya & Wolf, 2001; Wolf, 2001; McConville, 2008; Shiels et al. 2006). Internet is one of the major examples of ICTs that can be useful to SMEs. Access to internet can be through Fixed Line Option (cables and glass fiber) or Wireless Access Option, i.e., WiMAX (Worldwide Interoperability for Microwave Access), WiFi and satellite. Internet access includes a number of things such as access to electricity, high internet connection fee, hardware and software (Giovanni & Mario, 2003; Sahlfeld, 2007). The key concern is are SMEs in CBD, Kisumu city aware of the various classes of ICT resources and is there any evidence on adoption level of ICT resources by SMEs in CBD, Kisumu city.

#### **2.4 Factors influencing decision by SMEs managers to adopt ICT**

The existing literature has categorized factors influencing adoption of ICT in SMEs into drivers and barriers which may come from both internal and external sources (Ashrafi & Murtaza, 2008). Drivers are the positive influences for ICT adoption and barriers are negative influences for ICT adoption (Sarosa & Zowghi, 2003). A number of researchers highlight firm size, firm characteristic, product, sector, access to ICT, policy changes and economic conditions as factor that influence the extent of adoption & exploitation of ICTs by SMEs (Matambalya & Wolf, 2001; Wolf, 2001; Giovanni & Mario, 2003; Shiels et al. 2006; Kotelnikov & KimHak, 2007; McConville, 2008). While these studies explore the factors influencing the adoption of ICT by SMEs, little if in literature exists studies that relate these factors to influence decision by SMEs managers to adopt ICT.

Kapurubandara & Lawson (2006) highlight that manager characteristics affect the adoption ICT. Ashrafi & Murtaza (2008) found out that support by management is one of the key factors to ICT adoption, 82% of SMEs in Oman are of the view that support by management is a key driver to adoption of ICT by SMEs. Kotelnikov & KimHak (2007) suggest that to encourage SMEs adopt ICT, efforts first need to concentrate on convincing top management that implementing ICT can improve their business, this is because these managers determine the overall strategy of the firm, and they make the decision whether or not to adopt ICT. Despite the efforts by the researched to explore

In South Africa, SMEs in the food processing sector employ about 183,000 people (Wolf, 2001; Matambalya & Wolf, 2001). In the East African economies, SMEs are important especially with respect to employment and GDP. SMEs provide employment to more than 50% of all employed labour force in Tanzania and Kenya. SMEs are also accountable for over 50% of manufacturing GDP (Wolf, 2001; Matambalya & Wolf, 2001). There are an estimated 22,000 SMEs in Kenya, representing 66% of all formally registered private enterprises (International Financial Corporation, 2004).

In conclusion SMEs play an important role in the industrialization process of any country. Indeed SMEs are widely regarded as the engines of growth for developing countries as they provide the largest employment and tax revenue opportunity for developing countries and therefore should be given significant attention. It is important to explore any opportunities that can improve SMEs, on this background it is therefore important to explore avenues on how SMEs can be promoted including use of technologies like ICT. It is also

### **2.3 Information and Communication Technology**

Sarosa & Zowghi (2003) define ICT as all the technologies used by an organization to collect, process, and disseminate information. According to Ashrafi & Murtaza (2008) ICT refers to the wide range of computerized information and communication technologies. ICT can broadly be defined as technology that can be used for transmitting and processing information. ICT constantly creates and disseminates new information (Laudon & Laudon, 2006).

ICT has been categorized into various types by various authors, for example, Lucchetti & Sterlaccini (2004) categorize ICT into three: General-use ICTs, for example, email and Internet, Production-integrating ICTs which are expensive and require relevant technological skills and Market-oriented ICTs which are used to improve the firms' visibility and to provide detailed information on their products. Ashrafi & Murtaza (2008) divide ICT into two types: common technologies and sophisticated technologies. Other authors are of the view that ICT tools range from basic communication, basic ICT,

advanced communication and advanced ICT (Kotelnikov and KimHak, 2007; Matambalya & Wolf, 2001; Wolf, 2001; McConville, 2008; Shiels et al. 2006). Internet is one of the major examples of ICTs that can be useful to SMEs. Access to internet can be through Fixed Line Option (cables and glass fiber) or Wireless Access Option, i.e., WiMAX (Worldwide Interoperability for Microwave Access), WiFi and satellite. Internet access includes a number of things such as access to electricity, high internet connection fee, hardware and software (Giovanni & Mario, 2003; Sahlfeld, 2007). The key concern is are SMEs in CBD, Kisumu city aware of the various classes of ICT resources and is there any evidence on adoption level of ICT resources by SMEs in CBD, Kisumu city.

#### **2.4 Factors influencing decision by SMEs managers to adopt ICT**

The existing literature has categorized factors influencing adoption of ICT in SMEs into drivers and barriers which may come from both internal and external sources (Ashrafi & Murtaza, 2008). Drivers are the positive influences for ICT adoption and barriers are negative influences for ICT adoption (Sarosa & Zowghi, 2003). A number of researchers highlight firm size, firm characteristic, product, sector, access to ICT, policy changes and economic conditions as factor that influence the extent of adoption & exploitation of ICTs by SMEs (Matambalya & Wolf, 2001; Wolf, 2001; Giovanni & Mario, 2003; Shiels et al. 2006; Kotelnikov & KimHak, 2007; McConville, 2008). While these studies explore the factors influencing the adoption of ICT by SMEs, little if in literature exists studies that relate these factors to influence decision by SMEs managers to adopt ICT.

Kapurubandara & Lawson (2006) highlight that manager characteristics affect the adoption ICT. Ashrafi & Murtaza (2008) found out that support by management is one of the key factors to ICT adoption, 82% of SMEs in Oman are of the view that support by management is a key driver to adoption of ICT by SMEs. Kotelnikov & KimHak (2007) suggest that to encourage SMEs adopt ICT, efforts first need to concentrate on convincing top management that implementing ICT can improve their business, this is because these managers determine the overall strategy of the firm, and they make the decision whether or not to adopt ICT. Despite the efforts by the researched to explore

role of SMEs managers in ICT adoption, they have failed to address factors influencing decision by SMEs managers to adopt ICT.

In 2000 EU Member States launched an Action Plan termed e-Europe, which includes a specific programme to help European SMEs to Go-Digital (Luccehetti & Sterlaccini, 2004). In Thailand and Oman, government agencies and private sector support ICT adoption in SMEs (Chirasirimongkol & Chutimaskul, 2005; Ashrafi & Murtaza, 2008). However, other studies show that in Europe government assistance to SMEs, is not desirable due to the gap between what is really needed and what is provided by the government (Sarosa & Zowghi, 2003). African governments encourage adoption of ICT in various sectors of the economy including SMEs; according to Sahlfeld (2007) countries including South Africa and Sudan are committed to implementation of ICT projects, for example, "Broadband for Africa". The main concern is that do governments really understand what SMEs require and particularly on ICT adoption.

In Kenya the donor community plays major role in SMEs adoption of ICT, for example, through the IFC SME Solutions Center, the SME Toolkit Kenya offers free business management information and training for SMEs on IT and other areas (International Financial Corporation, 2004). Despite the efforts by the governments to implement programs to encourage SMEs adopt ICT. There is little if in literature evidence that these programs are designed to include SMEs managers who play important role in adoption of ICT. According to Onyango (1994) the drivers of ICT adoption in Kenya can be summarized as reduction and eliminations of import duty, low cost of resource, education and training and government policies, so can these intervention encourage SMEs manager to adopt ICT.

While other studies have explored the drivers of ICT adoption, there exists literature on the barriers of ICT adoption. A number of studies have related low annual budget to ICT investments, cultural deficiencies, lack of cooperation and trust between SMEs, lack of relevancy of adoption to the organization, small size of organization and design of many ICT solutions tend to favor large organization than SMEs are considered barriers in North

America, Britain, Italy, North Ireland and Netherlands (Lucehetti & Sterlaccini, 2004; Ravarini et al. 2001; Okwara, 2004; Onyango, 1994; McConville, 2008). The only challenge is that none of these studies has tried to relate these factors to influence decision by SMEs managers to adopt ICT

A study Investigating adoption of ICT in Nigerian SMEs, found out that one of the major factors inhibiting ICT diffusion and intensive utilization is poor physical infrastructure (Ashrafi & Murtaza, 2008), the trend is same in Botswana and many other African countries (Matambalya & Wolf, 2001; Wolf, 2001). Sahlfeld (2007) is of the view that in Kenya the use of physical infrastructure and frequencies is unfortunately often subject to a licensing regime. Braun (2004) relates access to ICT infrastructure to geographic location of SMEs. The fact that CBD, Kisumu city is located in urban area is it connected by ICT infrastructure and if so does accessibility, affordability and availability of ICT infrastructure influence decision by SMEs manager in CBD, Kisumu city to adopt ICT.

The barriers of ICT adoption in education sector in Kenya are expensive solutions, lack of competent staff, poor infrastructure, poor standard of software, management problem, equipment problem and security (Onyango, 1994). However, there little empirical evidence that these are the same factors that influence decision by SMEs managers in CBD, Kisumu city to adopt ICT. Sarosa & Zowghi (2003) conclude that knowing the drivers and barriers is not sufficient to adopt IT effectively and successfully. How to manage those drivers and barriers during IT adoption process is equally an important issue to study. SMEs need to evaluate the need for IT, organizational readiness for IT adoption, available and relevant IT solutions on the market and post adoption success. It is important that SMEs managers are informed on how to manager these factors.

The barriers can also be reduced by providing more training facilities in ICT for SMEs, measures to provide ICT products and services at an affordable cost (suitable policy mix), strategic alignment of ICT on business performance and availability of free professional advice, gradual introduction of ICT based solutions and online consultancy at reasonable

cost to SMEs (Ashrafi & Murtaza, 2008; Lucchetti & Sterlaccini, 2004; Giovanni & Mario, 2003; Ravarini et al. 2001 Kotelnikov & KimHak, 2007).

Onyango (1994) suggests that in Kenya the ICT policy area should include service, products, infrastructure, education and training, social aspect, constraints and state policy. Hence, national governments and stakeholders have to create a competitive business environment through the area of market liberalization and public/private of business incubators (Matambalya & Wolf, 2001; Wolf, 2001; Sahlfeld, 2007). SMEs on the other hand need to have a clear understanding and choice of approach that suits their ICT adoption needs which can be technical, operational, inter-organizational or strategic (Shiels et al. 2006). The main concern is how SMEs in CBD, Kisumu city will be informed of this solution and there is no evidence on the factors influencing decision by SMEs managers to adopt ICT.

### **2.5 Role of ICT in improving SMEs operations**

Some researchers assert a positive impact of ICT use on SMEs performance, in Turkey, Oman and Italy adoption of ICT by SMEs has contributed significant improvement in communication, customer satisfaction, competitive advantage and reduction of core costs (Kutlu & Özturan, 2008; Kotelnikov & KimHak, 2007; Ashrafi & Murtaza, 2008; Ravarini et al. 2001). Other studies have associated ICT adoption to improved processing time, improved firms' visibility, improved stock management and customer relationship management (Giovanni & Mario, 2003; Lucchetti & Sterlaccini, 2004; Sahlfeld, 2007; Shiels et al. 2006).

Among the reasons why SMEs adopt ICT is cost reduction and improved quality of communication (Sarosa & Zowghi, 2003). In the Asia Pacific ICT is employed as a strategic tool for providing information for leather SME development. The use of E commerce has created new channels for market expansion by eliminating geographical and time barriers, use of enterprise collaborative tools, such as email support technology transfer. Internet, and web technology help SMEs gain competitive advantage (Chirasirimongkol & Chutimaskul, 2005; Kotelnikov & KimHak, 2007).

In Tanzania and Kenya enterprises using the different forms of ICT rate their effects mostly positive, computer applications are assumed to increase management efficiency by 88% and competitiveness by 76%, in addition ICT contributes to increased productivity through; efficient resource allocation, reduction in core costs, and technical improvement (Matambalya & Wolf, 2001; Wolf, 2001).

ICT has also been most likely to have had a positive impact, by leading to performance in communication, financial management, technological research, making and receiving payments (McConville, 2008). It should, however, be noted that despite the role that ICT play on the growth of SMEs, many SMEs do not have quantifiable data demonstrating how they have achieved performance improvement by employing ICTs (Matambalya & Wolf, 2001; wolf, 2001; Shiels et al. 2006). Moreover, there is little if in literature empirical evidence on the role of ICT adoption in improving SMEs operation in CBD, Kisumu city.

## **2.6 Level of usage of ICT resources by SMEs**

Different SMEs have different ICT needs, smaller SMEs with little working capital rely mainly on informal information for these enterprises ICTs are of minor relevance. Bigger SMEs rely on more advanced ICTs (Matambalya & Wolf, 2001; Wolf, 2001). SME decide which type of ICT products to adopt based on the concrete benefits they can bring to its core business, the ICT capacity of its employees, and the financial resources available (Kotelnikov & KimHak, 2007). Corrocher & Fontana (2006) cite that users differ in their knowledge and skills with respect to a specific technology and may perceive different levels of complexity in its use. Use of and investment in ICT requires complementary investments in skills (Frempong 2007).

A number of studies have established that usage of ICT resource by SMEs vary from one part of the world to another, however, most of these studies have asserted that adoption of ICT resource by SMEs is moderate in basic resource but limited in advanced resource (Selamat, Jaffar & AbdKadir, 2011). In Oman 100% of the sampled SMEs use desktop computers and 45% use servers (Ashrafi & Murtaza, 2008). Allan, Annear, Beck &

Beveren (2003) found out that that only 5% of SMEs in the South East of England provide their employees with PDAs to allow them flexi working as compared to 46% who provide them with laptops for the same purpose. While these study show that SMEs use various hardware resources, there is little evidence in literature on usage level of hardware resource by SMEs in CBD, Kisumu city.

Kutlu & Özturan (2008) found out that 85.6% of SMEs in Turkey use Office Software and Kyobe (2004) found out that 69% of SMEs in the Eastern Free State Province South Africa use Word Processing and the same percentage use Spreadsheet. However, a study to establish ICT Adoption and Use in UK SMEs found out that there was a very low take up of allied adoptions of a more strategic nature such as ERP systems (Harindranath et al. 2008). These findings are consistent with the findings in Malaysia and South East England (Soraya, 2005; McConville, 2008). In their study, Sarshar & Isikdag, (2004) found out that only 10% of the surveyed companies use GIS.

While there is evidence on usage level of network and communication resource by SME in Oman, UK, Japan and Italy. Usage of internet and E mail resource is higher compared to network and websites, 45% of SMEs in Oman and 31% SMEs in South East England have network (Ashrafi & Murtaza, 2008; McConville, 2008). Giovanni and Mario (2003) established that 84% of SMEs in Italy use internet. In Ancona Province Central Italy 94.8% use Emails (Luccehetti & Sterlaccini, 2004) and 68% of SMEs in Japan use email (Vickery and Sakai, 2004). McConville, (2008) found out that in UK 41% of SMEs have websites. There is little if in literature empirical evidence on usage level of network and communication by SMEs in CBD, Kisumu city and therefore, this study is designed to establish if the usage level of network and communication resources by SMEs in CBD, Kisumu city is at the same level with other parts of the world.

Allan et al (2003) established that 83% of small businesses and 89% of medium sized in Australia use Anti virus. Bougaardt and Kyobe (2011) found out 59% of SMEs in South Africa use anti virus software. Despite this evidence no study has been conducted in CBD, Kisumu city to explore usage of security resources.

## 2.7 Literature gap

There are a number of studies on adoption of ICT by SMEs, some of these studies have explored the role of SMEs managers in ICT adoption (Ashrafi & Murtaza, 2008; Kapurubandara & Lawson, 2006; Kotelnikov & KimHak, 2007). While these studies have explored the role of SMEs managers in adoption of ICT by SMEs, other studies have looked at factors influencing adoption of ICT by SMEs.

A number of researchers highlight firm size, firm characteristic, product, sector, access to ICT, policy changes and economic conditions as factors that influence the extent of adoption & exploitation of ICTs by SMEs (Giovanni & Mario, 2003; McConville, 2008; Bazini et al. 2011; Ghobakhloo et al. 2011). Other studies have explored the role of government and donor community in adoption of ICT by SMEs. In EU, Thailand, Oman Member and even Kenya there is evidence in literature on support by the government and donor community in adoption of ICT by SMEs (Luccehetti & Sterlaccini, 2004; Chirasirimongkol & Chutimaskul, 2005; Ashrafi & Murtaza, 2008; Sarosa & Zowghi, 2003; Sahlfeld, 2007; International Financial Corporation, 2004).

Moreover, there are studies that have explored factors inhibiting adoption of ICT by SMEs: low annual budget for ICT investments, cultural deficiencies, lack of cooperation and trust between SMEs, lack of relevancy of adoption to the organization, small size of organization and design of many ICT solutions tend to favor large organizations. SMEs are considered barriers in North America, Britain, Italy, North Ireland and Netherlands (Luccehetti & Sterlaccini, 2004; Ravarini et al. 2001; Okwara, 2004; Onyango, 1994; McConville, 2008). Other studies associate low take up of ICT resources by SMEs to poor physical infrastructure and licensing regime (Ashrafi & Murtaza, 2008; Matambalya & Wolf, 2001; Wolf, 2001; Sahlfeld, 2007).

While these studies explore the factors influencing the adoption of ICT by SMEs and the role of SMEs managers in adoption of ICT, little in literature exists that relates these factors to influencing decision by SMEs managers to adopt ICT. Despite efforts by these studies to explore the role of government and donor community in encouraging adoption of

ICT by SMEs. There is a concern on if governments and donor community really understand what SMEs require and particularly on ICT adoption, given that there is little literature that relates these factors to decision by SMEs managers to adopt ICT.

Some researchers assert a positive impact of ICT use on SMEs performance, various studies attribute adoption of ICT by SMEs to significant improvement in communication, customer satisfaction, competitive advantage and reduction of core (Kutlu & Özturan, 2008; Kotelnikov & KimHak, 2007; Ashrafi & Murtaza, 2008; Ravarini et al. 2001). Other studies have associated ICT adoption to improved processing time, improved firms' visibility, improved stock management and customer relationship (Giovanni & Mario, 2003; Luccehetti & Sterlaccini, 2004; Sahlfeld, 2007; Shiels et al. 2006). Literature also shows adoption of ICT by SMEs has a direct impact on cost reduction, creation of new channels for market expansion, technology transfer and improved competitive advantage (Chirasirimongkol & Chutimaskul, 2005).

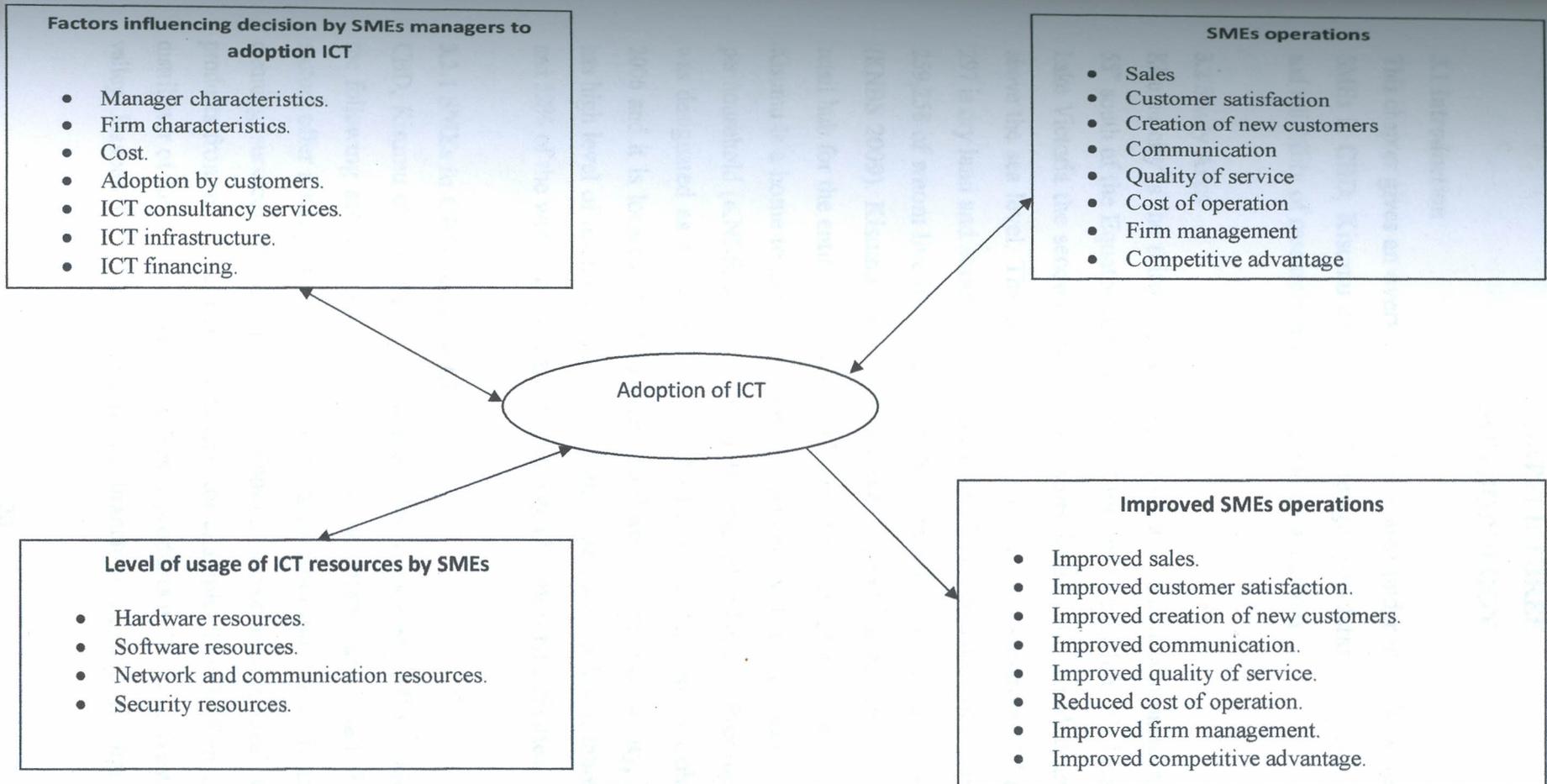
In addition, other studies assert a positive effect in management efficiency, competitiveness and increased productivity (Matambalya & Wolf, 2001; Wolf, 2001). ICT adoption has also been most likely to have had a positive impact, by leading to performance in financial management, technological research, making and receiving payments (McConville, 2008). It should, however, be noted that despite the role that ICT play on the growth of SMEs, many SMEs do not have quantifiable data demonstrating how they have achieved performance improvement by employing ICTs. Moreover, there is little empirical evidence on the role of ICT adoption in improving SMEs operation in CBD, Kisumu city.

Literature shows that different SMEs have different ICT needs, smaller SMEs with little working capital rely mainly on informal information for these enterprises ICTs are of minor relevance. Bigger SMEs rely on more advanced ICTs (Matambalya & Wolf, 2001; Wolf, 2001). SME decide which type of ICT products to adopt based on the concrete benefits they can bring to its core business, the ICT capacity of its employees, and the financial resources available (Kotelnikov & KimHak, 2007).

Other studies cite that users differ in their knowledge and skills with respect to a specific technology and may perceive different levels of complexity in its use. (Corrocher & Fontana, 2006; Frempong 2007). A number of studies show that SMEs adopt ICT resources, however most of this studies found out that adoption of ICT resources is moderate in basic ICT resources but limited in advanced resources (Selamat et al. 2011). While these study show that SMEs use various ICT resources, there is little if in literature to explore adoption level of ICT resources by SMEs in CBD, Kisumu. Moreover, there is little evidence on if the usage level of ICT resources by SMEs in CBD, Kisumu city is at the same level as other parts of the world.

## **2.8 Conceptual frame work**

This is the interplay between dependent and the independent variables. The research examines factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu City. Elements guiding this study is drawn from researchers own conceptualization. The framework is based on three main elements of ICT which include; factors influencing decision by SMEs managers to adopt ICT, role of ICT adoption in improving SMEs operations and level of usage of ICT resources by SMEs. Decision by SMEs to adopt ICT is independent variable and adoption of ICT is independent variable. In addition factors influencing decision by SMEs managers to adopt ICT is considered intervening variable as it led to different managers making different decisions to on adoption of ICT. Factors influencing decision by SMEs mangers to adopt ICT is characterized by three main elements which include; manager characteristic, firm characteristic and other factors like cost, adoption by customer, ICT infrastructure and ICT financing. Manager characteristic is defined by gender, level of education and ability of SMEs managers to use computers. Firm characteristic is defined by sector, number of employees, number of years that the business has been in existence, turnover and expected benefits of ICT adoption. Figure 1 show conceptual framework of this study.



**Figure 1: Conceptual Framework**

Source: *Researchers own conceptualization.*

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter gives an overview of the study area under the following themes: study area, SMEs in CBD, Kisumu city, research design, population of study, data, tools, validity and reliability of research instruments and data analysis.

#### **3.2 Study Area**

Kisumu city is the third largest city in Kenya. Kisumu is situated approximately 0° 04' 55" south of the Equator and 34° 47' 43" East of Greenwich. It's located on the shores of Lake Victoria the second largest fresh water lake in the world at an altitude of 1160 m above the sea level. The city covers an area of approximately 417 square km of which 297 is dry land and about 120 is under water. The population of stands at 968,909 people, 259,258 of whom live in the city and the population density is 4.3 people per household (KNBS 2009). Kisumu's economy revolves around agriculture and fishing and it is the retail hub for the entire Lake Victoria basin. According to the Central Bureau of Statistics Kisumu is a home to more than 968,909 persons with a population density of 4.3 people per household (KNBS, 2009). Kisumu, the capital of Nyanza Province in western Kenya, was designated as a Millennium City by the Earth Institute at Columbia University in 2006 and it is located 400 kilometers northwest of the capital city, Nairobi. The city is has high level of unemployment with both skilled and unskilled labour estimated at 30% and 52% of the working population is engaged in informal activities.

##### **3.2.1 SMEs in CBD, Kisumu City**

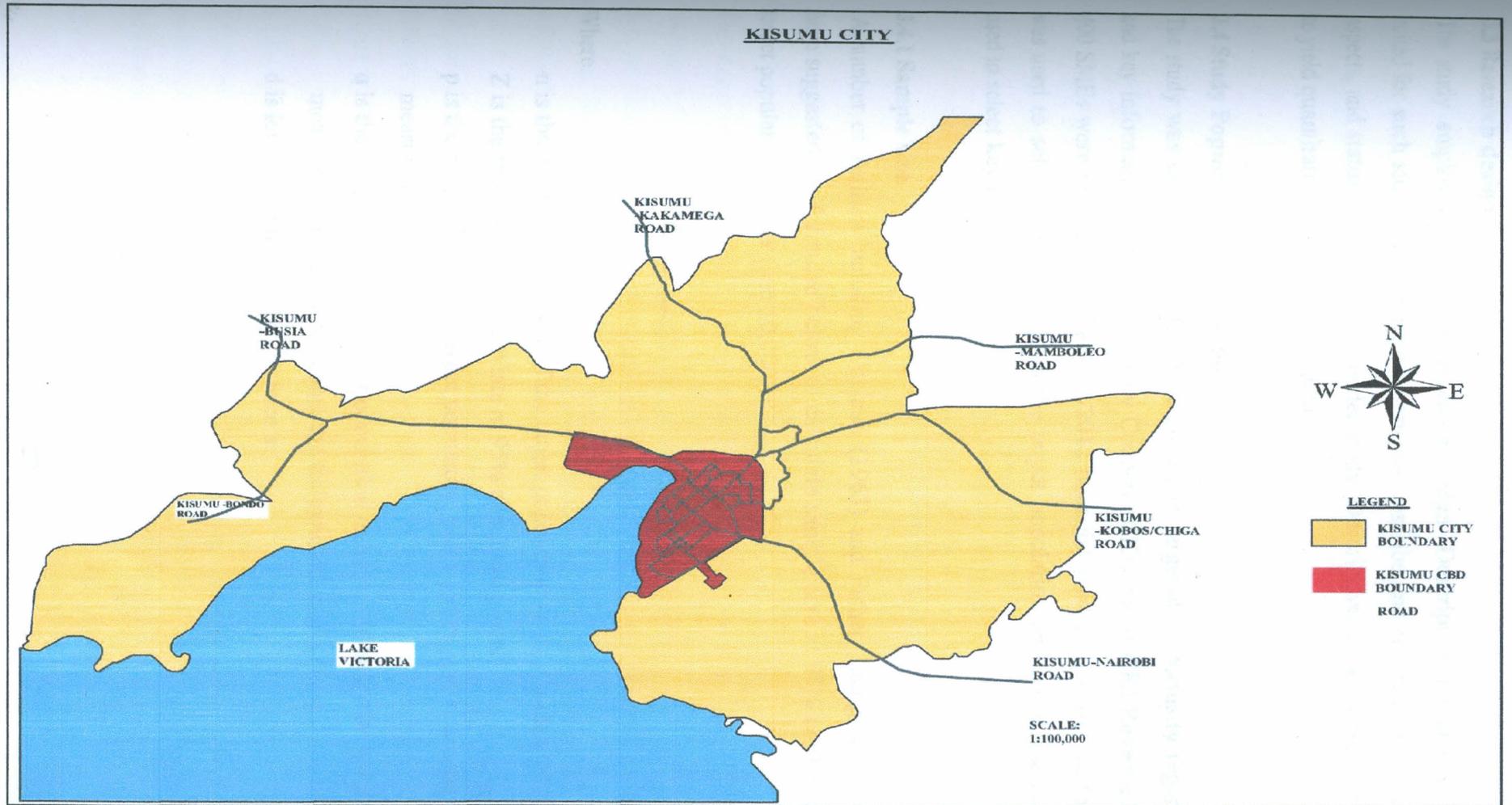
CBD, Kisumu city houses approximately 400 registered SMEs, which are derived from the following sectors: service, distribution, hospitality and retail. SMEs in the service sectors offer a number of services which range from tour travel, insurance, transport and cleaning services. SMEs in the distribution sector mainly deal with distribution of products from manufacturer to retailers, for example, Towfiq Kenya Limited is the key distributor of Reckitt Benckiser and Nestle products in Nyanza, Western and parts of Rift valley. Hasbah Kenya Limited Kisumu branch is the sole distributors for Procter and

Gamble International in Western Kenya region. SMEs in CBD, Kisumu City employ both skilled and unskilled employees, majority of the skilled employees serve in the managerial or clerical position. Figure 2 is the map of Kenya showing the position of Kisumu City in the national context. Figure 3 is the map of CBD, Kisumu city.



Figure 2: Map of Kenya Showing Kisumu.

Source: City Council of Kisumu Website <http://kisumumunicipalcouncil.org/>



**Figure 3: Map of Kisumu city showing the study area.**

Source: *City Council of Kisumu Planning Department*

### 3.3 Research design

The study employed descriptive research design. Descriptive research design is best suited for such study as it helps to determine, describe and report on the characteristics, aspects, and status of the variables under study. Descriptive research uses survey strategy to yield quantitative and qualitative data.

### 3.4 Study Population and Sampling

The study was carried out in CBD, Kisumu and targeted all formally registered SMEs and key informants. According to City Council of Kisumu (CCK) Revenue Department 400 SMEs were registered in the 2011/2012 financial year. Systematic random sampling was used to select 195 SMEs from the target population and purposive sampling was used to select key informants.

#### 3.4.1 Sample size

A number of authors including Cochran (1963) and Fisher, Laing & Stoeckel (1993) have suggested the formulae below to calculate sample size at 95% confidence level for target population greater than 10,000.

$$n = \frac{Z^2 pq}{d^2}$$

Where:

n is the desired sample size if the target population is greater than 10,000.

Z is the standard normal deviate at 95% confidence level.

p is the proportion in the target population estimated to have characteristics being measured.

q is the proportion in the target population estimated to lack characteristics being measured. It is calculated using the following formula (1-p).

d is level of statistical significance set.

$$n = \frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2} = 384$$

Since there are 400 registered SMEs the researcher modified the formula to facilitate sampling for a smaller population according to Cochran (1963) and Fisher et al (1993).

$$n_s = \frac{n}{1 + \frac{n}{N}}$$

Where:

$n_s$  is the number of SMEs managers to be sampled for the study.

$n$  is the desired sample when target population is greater than 10,000.

$N$  is the target population for the study.

$$n_s = \frac{384}{1 + \frac{384}{400}} = \frac{384}{1.96} = 195 \text{ managers of SMEs}$$

### 3.5 Data Collection

#### 3.5.1 Primary data

The study employed three data collection methods to collect primary: survey for the managers of sampled SMEs, interview schedule for the key informants and observation. Self administered structured questionnaire was used for survey of managers of the sampled SMEs, interview schedule was conducted through use of checklist for key informants and observation was conducted through use of thematic photography.

#### 3.5.2 Secondary

Secondary data was collected through review of publications, journals, dissertations, papers presented in forums, and surfing through the internet.

### 3.6 Data collection tools

The study employed three data collection tools; self administer structured questionnaire, checklist and thematic photography. Selection of the tools was guided by the nature of data that was to be collected, the time available as well as the objectives of the study. Self

administered structured questionnaire was prepared, pre-tested and delivered to the managers of the sampled SMEs by the researcher. Appendix A shows the questionnaire.

Interviews checklist was used to collect information from key informants, which gave in depth information and views on the factors influencing decision by SMEs managers to adopt ICT in CBD, Kisumu city. The key informants comprised of ICT service providers, vendors, web developers, representative of SMEs, representative of incubators and financial institution, for example, commercial bank and micro finance institutions. Information generated from the interview supplemented information obtained through questionnaire (see Appendix B). Thematic photography was used by the researcher to capture data on the theme of study.

### **3.7 Validity and Reliability of research instruments**

Data collection instruments were pre-tested to determine validity and reliability. Validity is necessary as it helps to determine the degree to which the results obtained from the analysis actually represent the variables under study. Content validity approach was used for the study. In content validity data instrument is tested to establish if it contains all possible items that should be used in measuring the concepts (Mugenda and Mugenda, 2003; Sekaran, 2006).

Reliability is a measure of the degree to which a research instrument yields consistent results after repeated trials. Reliability is the indication of stability and consistency with which data collection instrument measures the concept under study and helps to assess the goodness of the measure. Test-retest reliability was used in the study (Kerlinger, 1983).

Data collection instrument was administered by the researcher to 20 managers of SMEs to establish reliability of the items. The instruments were collected and after one week the tools were administered to the same managers by the researcher. The two set of completed data collection instruments was computed by the researchers and analyzed

using correlation. The correlation coefficient was (+ 0.8231), this implies that the tools yield consistent result after two trials and therefore it is reliable.

### 3.8 Data Analysis: Interpretation and presentation

Data was analyzed according to the nature of responses. Quantitative data was analyzed through cross tabulation, chi square, t-test and percentages. Completed questionnaire and interview schedules were coded for identification purpose and to distinguish between responses. Closed ended questions were coded such that a question requiring a response "YES" were coded as 1 and a response requiring a response "NO" were coded as 0. After coding the responses were transferred into a summary sheet for tabulation, this was tallied to establish cross tabulation, mean differences, frequencies and percentages. Qualitative data was analyzed by organizing data, creating patterns and themes, then evaluating the usefulness of the information to answer research questions. Results were presented using contingency tables.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter presents the findings of the study which have been discussed under key sub sections in line with the research objectives. The section starts with presentation and discussion of the factors influencing SMEs manager's decision to adopt ICT resources. It then presents findings on the role of ICT adoption in improving SMEs operations. The study then presents findings and discussion on the level of adoption of ICT resources used by SMEs in CBD, Kisumu city.

#### 4.2 Factors influencing decision by SMEs managers to adopt ICT

##### 4.2.1 Characteristic of manager and adoption of ICT

The study sought to establish influence of gender, level of education and ability to use a computer on decision by SMEs manager to adopt ICT. The researcher perceived that gender does not influence decision by SMEs managers to adopt ICT, level of education does not influence decision by SMEs managers to adopt ICT and ability to use a computer does not influence decision by SMEs managers to adopt ICT. Table 1 below illustrates distribution of ICT adoption by manager characteristic.

**Table 1: Distribution of ICT adoption by managers characteristic**

Gender	Adopt	Do not Adopt	$\chi^2 = 0.864$	df = 1
Male	82 (69%)	37 (31%)		
Female	47 (61%)	29 (38%)		
-----				
Level of Education	Adopt	Do not Adopt	$\chi^2 = 0.455$	df = 3
Secondary	27 (64%)	15 (36%)		
Diploma	58 (59%)	40 (41%)		
Degree	35 (78%)	10 (22%)		
Postgraduate	9 (90%)	1 (10%)		
-----				
Ability to use a computer	Adopt	Do not Adopt	$\chi^2 = 7.712$	df = 1
Use	129 (68%)	61 (32%)		
Do not Use	0 (0%)	5 (100%)		
-----				
<b><math>n_s = 195</math></b>				

The study established that 69% of SMEs managers who adopt ICT are male and 61% are female. Despite the fact that majority (69%) of SMEs managers are male, there is no significant variation in ICT adoption levels between male led and female led SMEs. The study also found out that calculated ( $\chi^2 = 0.864$ ) at 1 degree of freedom, this implies that there is no statistical significance between gender and adoption of ICT and therefore we accept researcher's perception that gender does not influence decision by SMEs managers to adopt ICT.

The study also established that 90% of SMEs managers who adopt ICT have attained post graduate studies, 78% have a degree, 59% have a diploma and 64% have attained secondary education. From the results it is clear that managers who have attained secondary school education adopt more than managers who have diploma and majority of the non adopters (41%) have diploma. In normal circumstance it would be expected that that manager who have diploma adopt more than managers who have attained secondary school education. The study established that the calculated ( $\chi^2 = 0.455$ ) at 3 degrees of freedom, this implies that there is no statistical significance between level of education and ICT adoption. The analysis confirms researcher's perception that level of education does not influence decision by SMEs managers to adopt ICT.

The research found out that all managers of SMEs that adopt ICT (68%) can use a computer and all the managers of SMEs that do not adopt ICT (100%) can not use a computer. This implies that managers who can use a computer tend to adopt more than managers who can not use a computer, however, it is worth to mention that 32% of managers who can use a computer do not adopt ICT. The study further established that the calculated ( $\chi^2 = 7.712$ ) at 1 degree of freedom and this indicates that there is statistical significance between ability of SMEs managers to use a computer and adoption of ICT and for this reason we fail to accept researcher's perception that ability of SMEs managers to use a computer does not influence ICT adoption.

#### 4.2.2 Firm characteristic and adoption of ICT

The study sought to establish influence of firm characteristics on decision by SMEs managers to adopt ICT. The researcher perceived that sector, number of employees, annual turnover, number of years in business and expected benefits does not influence decision by SMEs managers to adopt ICT. Table 2 below illustrates distribution of ICT adoption by firm characteristics.

Table 2: Distribution of ICT adoption by firm characteristic

Sector	Adopt	Do not Adopt	$\chi^2 = 3.18$	d.f. = 3
Service	48 (64%)	27 (36%)		
Distribution	37 (70%)	16 (30%)		
Hospitality	13 (54%)	11 (46%)		
Retail	31 (72%)	12 (28%)		
<hr/>				
Number of Employees	Adopt	Don't Adopt	$\chi^2 = 10.55$	d.f. = 3
Less than 10	93 (74%)	33 (26%)		
10 to 50	29 (50%)	29 (50%)		
51 to 100	5 (71%)	2 (29%)		
More than 100	2 (50%)	2 (50%)		
<hr/>				
Turnover	Adopt	Do not Adopt	$\chi^2 = 23.5$	d.f. = 4
Less than 1 Million	39 (53%)	35 (47%)		
1 to 5 Million	27 (55%)	22 (45%)		
6 to 10 Million	36 (90%)	4 (10%)		
More than 10 Million	19 (83%)	4 (17%)		
Non Respondents	8 (89%)	1 (11%)		
<hr/>				
Number of Years in Business	Adopt	Do not Adopt	$\chi^2 = 8.62$	d.f. = 2
Less than 5	56 (57%)	43 (43%)		
5 to 10	41 (80%)	10 (20%)		
More than 10	32 (71%)	13 (29%)		
<hr/>				
Expect Benefits	Adopt	Do not Adopt	$\chi^2 = 39.52$	d.f. = 2
Expect Benefits	121 (75%)	40 (61%)		
Do not expect Benefits	8 (27%)	22 (73%)		
Not Sure	0 (0%)	4 (100%)		
<hr/>				
<b><math>n_s = 195</math></b>				

The study established that 72% of SMEs managers in retail sector adopt ICT, 70% of SMEs managers in distribution sector adopt ICT and 64% of SMEs manager in service sector adopt ICT. The study also found that 46% of SMEs managers that do not adopt ICT are in hospitality sector. From the analysis it is evident that the calculated ( $\chi^2 = 3.18$ ) at 3 degrees of freedom and this shows that there is no statistical significance between sector and adoption of ICT. This implies that sector does not influence decision by SMEs managers to adopt ICT and therefore we accept researcher's perception that sector does not influence decision by SMEs managers to adopt ICT.

The results above show that 74% of SMEs managers that adopt ICT have less than 10 employees, 71% of SMEs managers that adopt ICT have 51 to 100 employees. The results also show that 50% of SMEs managers with 10 to 50 employees do not adopt ICT. The analysis further established that 50% of SMEs managers with more than 100 employees do not adopt. From the analysis it is evident that the calculated ( $\chi^2 = 10.55$ ) at 3 degrees of freedom and this means that there is statistical significance between number of employees and adoption of ICT. This implies that number of employees influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that number of employees does not influence decision by SMEs managers to adopt ICT.

The research found out that 53% of SMEs managers that adopt ICT have a turnover of less than Kshs 1 million, 55% of SMEs managers that adopt ICT have a turnover of Kshs 1 to 5 million and 90% of SMEs managers that adopt ICT have a turnover of Kshs 6 to 10 million. The research also established that 47% of SMEs managers with a turnover less than Kshs 1 million do not adopt ICT. The analysis further established that 10% of SMEs managers with a turnover of Kshs 6 to 10 million do not adopt ICT. This shows that the higher the turnover the higher the ICT adoption level. From the analysis it is evident that the calculated ( $\chi^2 = 23.5$ ) at 4 degrees of freedom and this shows that there is statistical significance between turnover and adoption of ICT. This implies that turnover influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that turnover does not influence decision by SMEs managers to adopt ICT.

The study established that 57% of SMEs managers adopt ICT have been in business for less than 5 years, 80% of SMEs managers that adopt ICT have been in business for 5 to 10 years and 70% of SMEs managers that adopt ICT have been in business for more than 10 years. The study also established that 43% of SMEs managers that do not adopt ICT have been in business for less than 5 years and 20% of SMEs managers that do not adopt ICT have been in business for 5 to 10 years. The findings above imply that the short the time that SMEs have been in business the lower the ICT adoption level. From the analysis it is evident that the calculated ( $\chi^2 = 8.62$ ) at 2 degrees of freedom and this shows that there is statistical significance between number of years in business and adoption of ICT. This implies that number of years in business influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that number of years in business does not influence decision by SMEs managers to adopt ICT.

The study established that 75% of SMEs managers that adopt ICT expect benefit from adoption of ICT and 27% of SMEs managers that adopt ICT do not expect benefits from adoption of ICT. The study also established that 61% of SMEs managers that do not adopt ICT expect benefits from adoption of ICT and 73% of SMEs managers that do not adopt ICT do not expect benefits from adoption of ICT. The findings above imply that the higher the expected benefits the higher the adoption of ICT. From the analysis it is evident that the calculated ( $\chi^2 = 39.52$ ) at 2 degrees of freedom and this shows that there is statistical significance between expect benefit and adoption of ICT. This implies that expect benefit influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that expect benefit does not influence decision by SMEs managers to adopt ICT.

#### **4.2.3 Cost of ICT resources and adoption of ICT**

The study sought to establish influence of cost of ICT resources on decision by SMEs to adopt ICT. The researcher perceived that cost of ICT resources does not influence decision by SMEs managers to adopt ICT. Table 3 illustrates distribution of ICT adoption by cost of ICT resources.

**Table 3: Distribution of ICT adoption by cost of resources**

Cost of ICT resources	Adopt	Do not Adopt	$\chi^2 = 12.75$	d.f. = 2
Expensive	84 (59%)	58 (41%)		
Average	14 (78%)	4 (22%)		
Not Expensive	31 (89%)	4 (11%)		
<b><math>n_s = 195</math></b>				

The study established that 59% of SMEs managers that adopt ICT are of the view that ICT resources are expensive and 89% of the SMEs that adopt ICT are of the view that ICT resource are not expensive. The study also established that 41% of SMEs managers that do not adopt ICT are of the view that ICT resources are expensive and 11% of SMEs that do not adopt ICT are of the view that ICT resources are not expensive. The findings above imply that the lower the cost of ICT resource the higher the adoption level. From the analysis it is evident that the calculated ( $\chi^2 = 12.75$ ) at 2 degrees of freedom and this shows that there is statistical significance between cost of ICT resources and adoption of ICT. This implies that cost of ICT resources influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that cost of ICT resources does not influence decision by SMEs mangers to adopt ICT.

#### 4.2.4 Adoption by customers and adoption of ICT by SMEs

The research sought to establish influence of adoption by SMEs customers on decision by SMEs managers to adopt ICT. The researcher perceived that adoption by customers does not influence decision by SMEs managers to adopt ICT. Table 4 below illustrates distribution of ICT adoption by adoption by customers.

**Table 4: Distribution of ICT adoption by adoption by customer**

Adoption by customers	Adopt	Do not Adopt	$\chi^2 = 56.43$	d.f. = 2
Adopt	99 (80%)	24 (20%)		
Do not Adopt	16 (28%)	42 (72%)		
Not Sure	14 (100%)	0 (0%)		
<b><math>n_s = 195</math></b>				

The findings above show that 80% of SMEs managers that adopt ICT are of the view that their customers adopt ICT and 28% of SMEs managers who adopt ICT are of the view

that their customers do not adopt. The findings also show that 20% of SMEs managers who do not adopt ICT are of the view that their customers adopt ICT and 72% of SMEs managers who do not adopt ICT are of the view that their customers do not adopt ICT. The findings above imply that the more the customers adopt, the higher the ICT adoption level by SMEs and the lower the customers adopt, the lower the ICT adoption level by SMEs. From the analysis it is evident that the calculated ( $\chi^2 = 56.43$ ) at 2 degrees of freedom and this shows that there is statistical significance between adoption by customers and adoption of ICT by SMEs. This implies that adoption by customers influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that adoption by customers does not influence decision by SMEs managers to adopt ICT.

#### 4.2.5 Availability of ICT consultancy service and adoption of ICT

The research sought to establish influence of availability of ICT consultancy service on decision by SMEs managers to adopt ICT. The researcher perceived that availability of ICT consultancy services does not influence decision by SMEs managers to adopt ICT. Table 5 below illustrates distribution of ICT adoption by availability of ICT consultancy service.

**Table 5: Distribution of ICT adoption by availability of ICT consultancy service**

Availability of ICT consultancy service	Adopt	Do not Adopt	$\chi^2 = 29.02$	d.f. = 2
Available	83 (81%)	20 (19%)		
Not available	46 (52%)	42 (48%)		
Do not Know	0 (0%)	4 (100%)		
<b><math>n_s = 195</math></b>				

The findings above show that 81% of SMEs managers who adopt ICT are of the view that ICT consultancy service is available and 52% of SMEs managers who adopt ICT are of the view that ICT consultancy service is not available. The findings also show that 19% of SMEs managers who do not adopt ICT are of the ICT consultancy service is available and 100% of SMEs managers who do not adopt ICT are not aware of the availability of ICT consultancy service. The findings above imply that the higher the availability of ICT consultancy service the higher the adoption level of ICT by SMEs and

the lower the availability of ICT consultancy services the lower the adoption level of ICT by SMEs. From the analysis it is evident that the calculated ( $\chi^2 = 29.02$ ) at 2 degrees of freedom and this shows that there is statistical significance between availability of ICT consultancy services and adoption of ICT by SMEs. This implies that availability of ICT consultancy service influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that availability of ICT consultancy services does not influence decision by SMEs managers to adopt ICT.

#### 4.2.6 ICT infrastructure and adoption of ICT

The research sought to establish influence of ICT infrastructure on SMEs managers' decision to adopt ICT. The researcher perceived that availability of ICT infrastructure does not influence decision by SMEs managers to adopt ICT, reliability of ICT infrastructure does not influence decision by SMEs managers to adopt ICT and affordability of ICT infrastructure does not influence decision by SMEs managers to adopt ICT. Table 6 below illustrates distribution of ICT adoption by ICT infrastructure.

Table 6: Distribution of ICT adoption by ICT infrastructure

Availability of ICT infrastructure	Adopt	Do not Adopt	$\chi^2 = 25.03$	d.f. = 1
Available	100 (78%)	28 (22%)		
Not available	29 (43%)	38 (57%)		
Reliability of ICT infrastructure				
Reliability of ICT infrastructure	Adopt	Do not Adopt	$\chi^2 = 19.12$	d.f. = 1
Reliable	95 (77%)	27 (33%)		
Not reliable	34 (47%)	39 (53%)		
Affordability of ICT infrastructure				
Affordability of ICT infrastructure	Adopt	Do not Adopt	$\chi^2 = 12.59$	d.f. = 1
Affordable	109 (73%)	40 (27%)		
Not Affordable	20 (43%)	26 (57%)		
<b><math>n_s = 195</math></b>				

The findings above show that 78% of SMEs managers who adopt ICT are of the view that ICT infrastructure is available and 43% of SMEs managers who adopt ICT are of the view that ICT infrastructure is not available. The findings also show that 22% of SMEs managers who do not adopt ICT are of the view that ICT infrastructure is available and 57% of SMEs managers who do not adopt ICT are of the view that ICT infrastructure is not

available. The findings above imply that the higher the availability of ICT infrastructure the higher the adoption level of ICT by SMEs and the lower the availability of ICT infrastructure the lower the adoption level of ICT by SMEs. From the analysis it is evident that the calculated ( $\chi^2 = 25.03$ ) at 1 degrees of freedom and this shows that there is statistical significance between availability of ICT infrastructure and adoption of ICT by SMEs. This implies that availability of ICT infrastructure influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that availability of ICT infrastructure influences does not influence decision by SMEs managers to adopt ICT.

The findings above show that 77% of SMEs managers who adopt ICT are of the view that ICT infrastructure is reliable and 47% of SMEs managers who adopt ICT are of the view that ICT infrastructure is not reliable. The findings also show that 33% of SMEs managers who do not adopt ICT are of the view that ICT infrastructure is reliable and 53% of SMEs managers who do not adopt ICT are of the view that ICT infrastructure is not reliable. The findings above imply that the higher the reliability of ICT infrastructure the higher the adoption level of ICT by SMEs and the lower the reliability of ICT infrastructure the lower the adoption level of ICT by SMEs. From the analysis it is evident that the calculated ( $\chi^2 = 19.12$ ) at 1 degrees of freedom and this shows that there is statistical significance between reliability of ICT infrastructure and adoption of ICT by SMEs. This implies that reliability of ICT infrastructure influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that reliability of ICT infrastructure influences does not influence decision by SMEs managers to adopt ICT.

The findings above show that 73% of SMEs managers who adopt ICT are of the view that ICT infrastructure is affordable and 43% of SMEs managers who adopt ICT are of the view that ICT infrastructure is not affordable. The findings also show that 27% of SMEs managers who do not adopt ICT are of the view that ICT infrastructure is affordable and 57% of SMEs managers who do not adopt ICT are of the view that ICT infrastructure is not affordable. The findings above imply that the higher the affordability

of ICT infrastructure the higher the adoption level of ICT by SMEs and the lower the affordability of ICT infrastructure the lower the adoption level of ICT by SMEs. From the analysis it is evident that the calculated ( $\chi^2 = 12.59$ ) at 1 degrees of freedom and this shows that there is statistical significance between affordability of ICT infrastructure and adoption of ICT by SMEs. This implies that affordability of ICT infrastructure influences decision by SMEs managers to adopt ICT and therefore we fail to accept researcher's perception that affordability of ICT infrastructure influences does not influence decision by SMEs managers to adopt ICT.

#### 4.2.7 Access to ICT financing and adoption of ICT

The research sought to establish influence of accessibility to ICT financing on decision by SMEs managers to adopt ICT. The researcher perceived that accessibility to ICT financing does not influence decision by SMEs managers to adopt ICT. Table 5 below illustrates distribution of ICT adoption by accessibility to financial resources.

Table 7: Distribution of ICT adoption by accessibility to ICT financing

Access to ICT financing	Adopt	Do not Adopt	$\chi^2 = 16.64$	d.f. = 2
Accessible	67 (81%)	16 (19%)		
Not Accessible	60 (55%)	50 (45%)		
Uncertain	2 (100%)	0 (0%)		
<b><math>n_s = 195</math></b>				

The results above show that 81% of SMEs managers who adopt ICT are of the view that ICT financing is accessible and 55% of SMEs managers who adopt ICT are of the view that ICT financing is not accessible. The results also show that 19% of SMEs managers who do not adopt ICT are of the view that ICT financing is available and 45% of SMEs managers who do not adopt ICT are of the view that ICT financing is not accessible. The findings above imply that the higher the accessibility of ICT financing the higher the adoption level of ICT by SMEs. From the analysis it is evident that the calculated ( $\chi^2 = 16.64$ ) at 2 degrees of freedom and this shows that there is statistical significance between accessibility to ICT financing and adoption of ICT by SMEs. This implies that accessibility to ICT financing influences decision by SMEs managers to adopt ICT and

therefore we fail to accept researcher's perception that accessibility to ICT financing does not influence decision by SMEs managers to adopt ICT.

Commercial banks offer a tight scheme for SMEs financing, for example, on average SMEs can borrow a minimum of 500,000 Kshs at a return rate of 18% and a grace period of six months. But from the analysis most of the SMEs have a turnover of less than 1 million Kshs. Micro financing is available at a rate of 1% but at times it is a requirement that SMEs access loans in groups of at least 10 members. Both commercial banks and micro finances do not have a dedicated scheme to finance purchase of ICT resources but rather general assets finance.

### 4.3 Role of ICT adoption in improving SMEs operations

The study sought to analyze the role of ICT adoption in improving operations of SMEs, the researcher perceived that ICT adoption does not contribute to improvement in operations of SMEs. Managers of SMEs that adopt ICT were required to measure performance of various operations on a rate of 0% to 100%, after and before adoption of ICT. The returned questionnaires were tabulated and analyzed using a two tailed paired t-test. The sub sections below present findings and discussion on the role of ICT adoption.

The study sought to analyze the role of ICT adoption in improving sales. The researcher perceived that ICT adoption does not improve sales. Table 8 below presents the findings on sales after and before adoption of ICT.

Table 8: Sales after and before adoption of ICT

Sales	n <sub>sa</sub>	Mean	StDev	SEM
After Adoption	129	62.05	18.75	1.65
Before Adoption	129	29.53	14.68	1.29
<b>Difference in sales</b>		<b>32.52</b>	<b>4.07</b>	<b>0.36</b>

95% CI for this difference: (29.74, 35.29), SE for this difference = 1.403,  $t = 23.1801$ ,  $p < 0.0001$

The findings above shows that the mean sale after ICT adoption and before ICT adoption is 62.05 and 29.53 in that order, the mean difference is 32.52. The 95% Confidence Interval (CI) of the above difference is 29.74 to 35.29 and this interval does not contain a

zero. The test gives a t-statistics of 23.1801 with an associated p- value of less than 0.0001, which is less than 0.05  $\alpha$ -level. The findings above show there is a statistical significance in sales after and before adoption of ICT. This implies that adoption of ICT has contributes to improved sales and therefore we fail to accept researchers' perception that ICT adoption does not improve sales.

The research sought to analyze the role of ICT adoption in improving customer satisfaction. The researcher perceived that ICT adoption does not contribute to improved customer satisfaction. Table 9 below presents the findings on customer satisfaction after and before adoption of ICT.

**Table 9: Customer satisfaction after and before adoption of ICT**

Customer satisfaction	n <sub>sa</sub>	Mean	StDev	SEM
After Adoption	129	70.78	19.91	1.75
Before Adoption	129	35.12	17.37	1.53
<b>Difference</b>		<b>35.66</b>	<b>2.54</b>	<b>0.22</b>

*95% CI for this difference: (32.77,38.55), SE for this difference = 1.459, t = 24.4336, p < 0.0001*

The table above shows that the mean customer satisfaction after ICT adoption and before ICT adoption is 70.78 and 35.12 in that order, the mean difference is 35.66. The 95% CI of the above difference is 32.77 to 38.55 and this interval does not contain a zero. The test gives a t-statistics of 24.4336 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level. The findings above show there is a statistical significance in customer satisfaction after and before adoption of ICT. This implies that adoption of ICT contributes to improved customer satisfaction and for this reason we fail to accept researchers' perception that ICT adoption does not improve customer satisfaction.

The study also sought to analyze the role of ICT adoption in improving creation of new customers. The researcher perceived that ICT adoption does not contribute to improved creation of new customers. Table 10 presents the findings on creation of new after and before adoption of ICT.

**Table 10: Creation of new after and before adoption of ICT**

Creation of new customers	<b>n<sub>sa</sub></b>	<b>Mean</b>	<b>StDev</b>	<b>SEM</b>
After Adoption	129	61.94	18.46	1.63
Before Adoption	129	26.43	14.88	1.31
<b>Difference</b>		<b>35.51</b>	<b>3.58</b>	<b>0.32</b>

*95% CI for this difference: (32.07 ,38.94), SE for this difference = 1.737, t = 20.4454, p < 0.0001*

The results above show that the mean creation of new customers after ICT adoption and before ICT adoption is 61.94 and 26.43 in that order, the mean difference is 35.51. The 95% CI of the above difference is 32.07 to 38.94 and this interval does not contain a zero. The test gives a t-statistics of 20.4454 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level.

The findings above show there is a statistical significance in creation of new customers after and before adoption of ICT. This implies that adoption of ICT has contributed to improved creation of new customers and therefore, we fail to accept researchers' perception that ICT adoption does not lead to creation of new customers. However, it is worth to mention that the lower mean difference is associated with low adoption level of websites which can be used for online advertisement. Table 16 shows that only 33% of SMEs that adopt ICT use websites.

The research was concerned with establishing the role of ICT adoption in improving communication. The researchers perceived that adoption of ICT does not contribute to improved communication. Table 11 presents the findings of communication after and before adoption of ICT.

**Table 11: Communication after and before adoption of ICT**

Communication	<b>n<sub>sa</sub></b>	<b>Mean</b>	<b>StDev</b>	<b>SEM</b>
After Adoption	129	75.12	14.42	1.27
Before Adoption	129	27.36	14	1.23
<b>Difference</b>		<b>47.76</b>	<b>0.42</b>	<b>0.04</b>

*95% CI for this difference: (44.54 ,50.96), SE for this difference = 1.622, t = 29.4378, p < 0.0001*

The results above show that the mean communication after ICT adoption and before ICT adoption is 75.12 and 27.63 in that order, the mean difference is 47.76. The 95% CI of the above difference is 50.96 to 44.54 and this interval does not contain a zero. The test gives a t-statistics of 29.4378 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level.

The findings above show there is a statistical significance in communication after and before adoption of ICT. This implies that adoption of ICT has contributed to improved communication, therefore, we fail to accept researchers' perception that adoption of ICT does not contribute to improved communication. However, it is worth to mention that the high mean difference is associated with high usage level of internet and Email. Table 16 shows that 78% SMEs that adopt ICT use internet and 84% use Email.

The study sought to analyze the role of ICT adoption in improving quality of service. The researchers perceived that adoption of ICT does not contribute to improved quality of service. Table 12 below presents the findings on quality of service after and before adoption of ICT.

**Table 12: Quality of service after and before adoption of ICT**

Quality of service	n <sub>sa</sub>	Mean	StDev	SEM
After Adoption	129	62.56	16.41	1.44
Before Adoption	129	30.47	16.29	1.43
<b>Difference</b>		<b>32.09</b>	<b>0.12</b>	<b>0.01</b>

*95% CI for this difference: (29.46, 34.72), SE for this difference = 1.328, t = 24.1604, p < 0.0001*

The findings above show that the mean quality of service after ICT adoption and before ICT adoption is 62.56 and 30.47 in that order, the mean difference is 32.09. The 95% CI of the above difference is 29.46 to 34.72 and this interval does not contain a zero. The test gives a t-statistics of 24.1604 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level. The findings above show there is a statistical significance in quality of service after and before adoption of ICT. This implies that adoption of ICT has contributed to improved quality of service, therefore, we fail to accept researchers' perception that ICT adoption does not contribute to improved quality of service.

The research was concerned with establishing the role of ICT adoption in reduction of cost of operation, the researcher perceived that adoption of ICT does not contribute to reduction of cost of operation. Table 13 below presents the findings of this section.

**Table 13: Cost of operation after and before adoption of ICT**

Cost of operation	n <sub>sa</sub>	Mean	StDev	SEM
After Adoption	129	59.15	19.37	1.71
Before Adoption	129	24.42	14.36	1.26
<b>Difference</b>	<b>129</b>	<b>34.73</b>	<b>5.01</b>	<b>0.45</b>

*95% CI for this difference: (31.48 ,37.97), SE for this difference = 1.640, t = 21.1749, p < 0.0001*

The findings above show that the mean cost of operation after ICT adoption and before ICT adoption is 59.15 and 24.42 in that order, the mean difference is 34.73. The 95% CI of the above difference is 31.48 to 37.97 and this interval does not contain a zero. The test gives a t-statistics of 21.1749 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level. The findings above show there is a statistical significance in core costs of operation after and before adoption of ICT. This implies that adoption of ICT has contributed to improved reduction in core costs of operation and therefore, we fail to accept researchers' perception that ICT adoption does not contribute to reduction in core costs of operations.

The research was concerned with establishing the role of ICT adoption in improving firm management. The researcher perceived that ICT adoption does not contribute to improved firm management. Table 14 presents the findings on firm management after and before adoption of ICT.

**Table 14: Firm management after and before adoption of ICT**

Firm management	n <sub>sa</sub>	Mean	StDev	SEM
After Adoption	129	65.81	20.26	1.78
Before Adoption	129	32.17	14.2	1.25
<b>Difference</b>	<b>129</b>	<b>33.64</b>	<b>6.06</b>	<b>0.53</b>

*95% CI for this difference: (30.66 ,36.63), SE for this difference = 1.509, t = 22.2986, p < 0.0001*

The results above show that the mean firm management after ICT adoption and before ICT adoption is 65.81 and 32.64 in that order, the mean difference is 33.64. The 95% CI

of the above difference is 30.66 to 36.63 and this interval does not contain a zero. The test gives a t-statistics of 22.2986 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level. The findings above show there is a statistical significance in firm management after and before adoption of ICT. This implies that adoption of ICT has contributed to improved firm management, for this reason we fail to accept researchers perception that adoption of ICT does not contribute to improved firm management.

The study sought to establish the role of ICT adoption in improving competitive advantage. The researcher perceived that ICT adoption does not contribute to improved competitive advantage. Table 15 below presents the findings on competitive advantage after and before adoption of ICT.

**Table 15: Competitive advantage after and before adoption of ICT**

Competitive advantage	n <sub>sa</sub>	Mean	StDev	SEM
After Adoption	129	63.02	18.14	1.6
Before Adoption	129	28.29	13	1.14
<b>Difference</b>	<b>129</b>	<b>34.73</b>	<b>5.14</b>	<b>0.46</b>

*95% CI for this difference: (30.86, 38.60), SE for this difference = 1.965, t = 17.6751, p < 0.0001*

The table above shows that the mean competitive advantage after ICT adoption and before ICT adoption is 63.02 and 28.29 in that order, the mean difference is 34.73. The 95% CI of the above difference is 30.86 to 38.60 and this interval does not contain a zero. The test gives a t-statistics of 17.6751 with an associated p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level. The findings above show there is a statistical significance in competitive advantage after and before adoption of ICT. This implies that adoption of ICT has contributed to improved competitive advantage, therefore we fail to accept researchers' perception that adoption of ICT does not contribute to improved competitive advantage.

The study sought to analyze the role of ICT adoption in improving operations of SMEs, the researcher perceived that ICT adoption does not contribute to improvement in operations of SMEs. From the above analysis it is evident the ICT adoption improve operation of SMEs and this implies that we fail to accept researchers' perception that adoption of ICT does not contribute improvement in operation of SMEs.

#### 4.4 Level of usage of ICT resources by SMEs

This section presents findings on level of usage of ICT resources by SMEs in CBD, Kisumu city. The perceived that the level of usage of ICT resources in CBD, Kisumu city like hardware resource, software resources, network and communication resources and security resources, is lower compared to other areas. Table 16 presents findings on level of usage of ICT resources.

**Table 16: Level of usage of ICT resources by SMEs**

<b>Hardware Resources</b>	<b>Use</b>
Desktop	113 (88%)
Printer	113 (88%)
Laptop	89 (69%)
Scanners	74 (57%)
Server	43 (33%)
PDA	12 (9%)
<b>Software Resources</b>	
	<b>Use</b>
Application Software	117 (91%)
Enterprise Software	38 (29%)
Advanced software	27 (21%)
<b>Network and Communication</b>	
	<b>Use</b>
Network	70 (54%)
Internet	100 (78%)
Email	109 (84%)
Website	42 (33%)
<b>Security Resources</b>	
	<b>Use</b>
Password	105 (81%)
CCTV	17 (13%)
Antivirus	97 (75%)
Uninterrupted Power Supply	69 (53%)
Backups	90 (70%)
<b>n<sub>sa</sub> = 129</b>	

The findings above show that 113 out of the 129 adopters use desktop computer, this corresponds to 88% of the adopters and it also established that 88% of the adopters use printers. The study further found out that that 69% of the adopters use laptop computers,

74 and 43 out of the 129 of the respondent use scanners and server, this corresponds to 57% and 33% in that order. The results also show that 9% of SMEs that adopt ICT use Personal Digital Assistants (PDA).

The findings above imply that SMEs use desktop computers and printers at the same level. The findings also imply that many SMEs do not link their ICT resources via a Local Area Network, for example, only 33% of SMEs the adopt ICT use servers. The results also mean telecommuting is not common compared to processing from the office, 69% of SMEs use laptop computer and only 9% of SMEs provide their employees with PDA compared to 88% of SMEs which use desktop computers. The study established that usage of hardware resource by SMEs in CBD, Kisumu city is at the same level with other areas, for example, Muscat (Ashrafi & Murtaza, 2008) and South East of England (Allan et al. 2003)

The study established that 117 out of the 129 SMEs that adopt ICT use application software like Document Processing Software (Microsoft Word) and Spread Sheet Software (Microsoft Excel) and this represents 91% of the respondents. The study also established that 38 out of 129 SMEs that adopt ICT use enterprise software Enterprise Resource Planning software (ERP), 27 out of 129 SMEs that adopt ICT use advanced software like Geographical Information Systems and this corresponds to 29% and 21% that order. The results above imply that usage of application software is higher as compared to other types of software, 91% of SMEs use application software and only 21% of SMEs use advanced software.

Cost of ICT resources could be the factor that hinder high adoption level of Enterprise and advanced software, or it could be the fact that computers are pre installed with application software. According to Kurjeet a manager at SUMO computers computer software is expensive and some times it is required that buyers acquire license which is additional cost, however, most computers are pre installed with basic software like Microsoft office. The findings above imply that level of usage of software among SMEs

in CBD, Kisumu city is at the same level with other areas (Kutlu & Özturan, 2008; Kyobe, 2004; Soraya, 2005; Harindranath et al. 2008; Sarshar & Isikdag, 2004).

The research found out that 70 out of the 129 SMEs that adopters use network, 100 out of the 129 use internet, 109 out of 129 use E mail and 42 out of 129 use websites. This corresponds to 54%, 78%, 84% and 33% in that order. The findings above imply that SMEs in CBD, Kisumu city use electronic communication more than they use Electronic commerce. This is explained by the fact that majority (84%) of SMEs use Email, 78% are connected to internet and only 33% use websites.

High usage level of internet can be associated with the fact that CBD, Kisumu city is in urban area and therefore, it connected to ICT infrastructure. Table 6 show that 78% of SMEs that use ICT are of the view that ICT infrastructure is available. The other reason that can be associated with high adoption level is the availability of Internet Service Providers (ISP) like Safaricom, Telecom Kenya, Zain and Yu. It could also be associated with the fact that ISP provide services at reasonable costs, for example, one of the SMEs managers commented that they bundle 2 Mega Bytes (MB) of data for Kshs 1,500 and this can help them access internet for one month.

Low usage level of website can be associated with high cost, according to the Chief Executive Officer (CEO) of Concepts Limited a local company which deals with on line marketing, designing a website costs Kshs 25,000 for 5 pages, Kshs 35,000 for 15 pages and Kshs 45,000 for 20 pages. He also comments that this is not inclusive of webhosting charges which cost between Kshs 5,000 and Kshs 10,000 per year. He further comments that SMEs still fear online transaction because of security reason; on the other hand customers transact through already established mobile money transfer services as like Mpesa compared to firms website.

The findings show that usage level of network and communication resources by SMEs in CBD, Kisumu city is at the same level with other areas. In Ancona Province Central Italy 92.2% SMEs to internet (Lucehetti & Sterlaccini, 2004). Giovanni & Mario (2003)

established that 84% of SMEs in Italy are connected to internet. Dholakia & Kshetri (2004) report that only 15% of SMEs in New England use commercial websites. McConville (2008) found out that in UK 41% of SMEs. Vickery and Sakai (2004) highlight 68% of SMEs in Japan use email to communicate with clients

The results also show that 105 out of 129 SMEs that adopt ICT use password, 17 out of the 129 SMEs that adopt ICT use Closed Circuit Television (CCTV), 97 out of 129 SMEs that adopt ICT use Antivirus software, 69 out of the 129 use Uninterrupted Power Supply (UPS) and 90 out of 129 SMEs that adopt ICT use back up. This corresponds to 81%, 13% 75% and 70% of the adopters use backup. The results imply that most of the SMEs in CBD, Kisumu city use baseline security resource compared to advanced security resources. The high usage level of baseline security can be associated with nature of business and ICT resources used, for example, 78% of SMEs that adopt ICT use internet and this means that they can download Antivirus software which is available free of charge as freeware software.

The low usage level of advance security resources is associated with the high cost of installing security resource. According to operations manager at JRS Security Company, on average installation CCTV costs between Kshs 10,000 and 15,000 for analog camera and twice the amount for the modern Internet Protocol (IP) camera. The results above show that usage of security resources by SMEs in CBD, Kisumu city is at the same level as other areas. Allan et al (2003) established that 83% of small businesses and 89% of medium sized in Australia use Anti virus. Bougaardt & Kyobe (2011) found out 59% of SMEs in South Africa use anti virus software.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This section presents a summary of the findings of the study, conclusions, and recommendations in line with the specific objectives of the study, which include factors influencing decision by SMEs managers to adopt ICT, role of ICT adoption in improving SMEs operations and level of usage of ICT resources by SMEs in CBD, Kisumu city. Finally it gives suggestions on the areas for further research.

#### 5.2 Summary

The study established that 69% of SMEs managers who adopt ICT are male, 90% of the have attained post graduate studies and 100% of SMEs managers who do not adopt ICT can not use a computer. The research also found out that 72% of SMEs managers that adopt ICT are in retail sector, 74% have less than 10 employees, 90% have a turnover of between Kshs 6 to 10 million and 80% have been in business for 5 to 10 years. The study further established that 75% of SMEs managers that adopt ICT expect benefit from adoption and 73% of SMEs managers that do not adopt ICT do not expect benefits from adoption. It was also established that 100% of SMEs managers who do not adopt ICT are not aware of the availability of ICT consultancy service, 78% of the SMEs managers who adopt ICT are of the view that ICT infrastructure is available and 81% of the managers who adopt ICT are of the view that ICT financing is available.

The research found out the mean difference of communication after and before adoption of ICT is 47.76, with associated t statistics of 29.4378, the study also found out that the mean difference of customer satisfaction after and before adoption of ICT is 35.66, with associated t statistics of 24.4336. The research also established that the mean difference of sales after and before adoption of ICT is 32.52, with associated t statistics of 23.1801. The research also found out that the mean quality of service after and before adoption of ICT is 32.09, with associated t statistics of 24.1604. It was also established that all SMEs operations had a p-value of less than 0.0001, which is less than 0.05  $\alpha$ -level.

The study established that 88% of SMEs the adopters use desktop computers, 88% use printers, 69% use laptop computers, 57% use scanners, 33% use server and only 9% use PDA. The study also found out that 91% of the adopters use application software like Ms Word, 29% use enterprise software like ERP and 21% use advanced software. The study also established that 84% of the adopters use E mail, 78% use internet, 54% use network and 33% use website. The study further established that 81% of the SMEs that adopt ICT use passwords, 75% use antivirus software, 70% use backups, 53% use UPS and 13% use CCTV.

### **5.3 Conclusion**

The study established that ability of SMEs managers to use a computer, expected benefits of ICT adoption, adoption by customers, availability of ICT consultancy service and ICT infrastructure influence decision by SMEs managers to adopt ICT. SMEs managers who use computers adopt more than SMEs managers who can not use computers. SMEs managers, who expect benefits from ICT adoption, adopt more than managers who do not expect benefits from adoption. The higher the availability of ICT consultancy service the higher the adoption of ICT by SMEs and the higher the adoption of ICT by customers the higher the adoption level by SMEs. The higher the availability, affordability and accessibility of ICT infrastructure, the higher the adoption of ICT by SMEs. However, it is worth to mention that gender, level of education and sector does not influence decision by SMEs managers to adopt ICT in CBD, Kisumu city.

The study also found out that ICT adoption contributes to improvement in all SMEs operations. However, communication is the most improved SMEs operation compared to other operations, for example, sales, customer satisfaction, creation of new customers, quality of service, cost of operation, firm management and competitive advantage..

SMEs in CBD, Kisumu city adopt ICT resources at the same level with SMEs in other parts of the world. However, the resources adopted determine the types of processing employed by SMEs in CBD, Kisumu city. Usage of telecommuting by SMEs is lower compared to processing from the office. Usage of application software by SMEs is higher

compared to usage of enterprise and advanced software resources. Usage of internet and E mail is high among SMEs as compared to usage of website. Usage of password, antivirus software, and backup is high among SMEs in CBD, Kisumu city. However usage of CCTV is not very common among SMEs in CBD, Kisumu city.

#### **5.4 Recommendation**

This section gives recommendations of the study in line with the key findings of the study.

1. To increase the number of SMEs that adopt ICT, the study recommends that more SMEs managers to be trained on the usage of computer and in addition programs should be tailored to enlighten SMEs managers on the benefits associated with adoption of ICT.
2. The study also suggests that ICT policy area should include improvement in accessibility, availability and affordability of ICT infrastructure. The government and other stockholders should create policies oriented towards lowering cost of ICT infrastructure.
3. The research recommends that financial institution create special lending packages which allow SMEs that want to adopt ICT, access financing at reduced lending rates and extended period to payback.
4. To improve usage of website by SMEs, the study recommends that website designers create common websites which allow SMEs to advertise and sale there products on line on subscription basis. This will help SMEs cut down on the cost of implementing websites and subsequent cost of hosting the websites.

#### **Areas for further research**

The study suggests that future studies can be conducted to explore the following areas of ICT adoption by SMEs;

1. Role of ICT training in improving adoption of ICT by SMEs.
2. Relationship between expected benefits of ICT adoption and cost of ICT resources and its influence on adoption of ICT by SMEs.
3. Role of e communities in improving usage of E commerce by SMEs.

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