UNIVERSITY OF KWAZULU-NATAL

The Suitability of Wireless Technologies for Implementing an eBusiness Infrastructure in Kenyan Micro and Small Enterprises

By

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Dedication

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Abstract

This thesis interrogates the suitability of wireless technologies to implement an eBusiness infrastructure in Micro and Small Enterprises (MSEs) in developing countries, particularly in Kenya. A research model was developed based on literature and information obtained from a pilot study. The proposed model extended Task-Technology Fit with two core constructs from the Unified Theory of Acceptance and Use of Technology. A preliminary study was conducted to refine the proposed model and inclusion of any variables limiting the suitability of wireless technologies as MSEs' eBusiness infrastructure. The proposed model was empirically tested using data collected using a survey questionnaire and five descriptive case studies on MSEs in Kenya. A proportionate stratified random sampling method within well defined geographic clusters was used to collect data from 570 MSEs. The constructs were assessed for reliability, validity and exploratory factor analysis using SPSS and validated via a confirmatory factor analysis using Structural Equation Modeling with AMOS maximum likelihood method.

Most Kenyans live in rural areas of the country with no access to mainstream technologies and a considerable digital divide exists, particularly between the urban and rural areas. This necessitated an intra-country comparison of access and use of wireless technologies in rural and urban MSEs in implementing an eBusiness infrastructure. The results of the intra-country comparisons indicate that while there are indisputable similarities in usage and perception of barriers and benefits of using wireless technologies to implement eBusiness infrastructure between the rural areas and urban centers in Kenya, there are also considerable differences. The relationships among the research model constructs were different depending on whether the sample was rural or urban. However, the differences between rural and urban MSEs' ratings of the proposed research model constructs were not statistically significant.

The study finds that there are evident positive performance impacts on MSEs that use wireless technologies for their eBusiness infrastructure and that the research model fit well with the data collected. The results also indicate that Task-Technology Fit and Usage directly and significantly affect organizational performance while Performance Expectance, Social Influence and Task-Technology Fit were significant determinants of Usage. Among the three proposed barriers of Security Risks, Affordability and Performance Risks, only Performance Risks had a significant negative effect on Usage. Finally, the study's results, theoretical, managerial and policy implications are discussed and recommendations for future research given.

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List of Abbreviations

1G	First Generation
2G	Second Generation
3G	Third Generation
4G	Fourth Generation
ATMs	Automatic Teller Machines
B2B	Business-to-Business
B2C	Business-to-Consumer
C2B	Customer-to-Business
C2C	Customer-to-Customer
CCK	Communications Commission of Kenya
CDMA	Code Division Multiple Access
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factor Analysis
EVDO	Evolution-Data Optimized or Evolution-Data only
GDP	Gross Domestic Product
GPRS	General Pocket Radio Service
GSM	Global System for Mobile
HSDPA	High Speed Downlink Packet Access
HTML	Hypertext Markup Language
HW	Hardware
IaaS	Infrastructure as a Service
ICTs	Information and Communications Technologies
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IT	Information Technology
ITU	International Telecommunication Union
KCA	Kenya Communications Act
KNBS	Kenya National Bureau of Statistics
KShs	Kenya Shillings
LAN	Local Area Network
M-PAN	Mobile Personal Area Network
MBWA	Mobile Broadband Wireless Access

MSEs	Micro and Small Enterprises
PaaS	Platform as a Service
PC	Personal Computer
PDAs	Personal Digital Assistants
PSTN	Public Switched Telephone Network
SaaS	Software as a Service
SMEs	Small and Medium Enterprises
SMS	Short Message Service
SW	Software
TTF	Task-Technology Fit
UMTS	Universal Mobile Communication System
USD	United States Dollars
UTAUT	Unified Theory of Acceptance and Use of Technology
VOIP	Voice over Internet Protocol
WAN	Wide Area Network
WAP	Wireless Application Protocol
Wi-Fi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network
WMAN	Wireless Metropolitan Area Network
WML	Wireless Mark-up Language
WWW	World Wide Web

Chapter 1: Introduction

1.1 Background to the Study

There is no doubt that the explosive growth of cellular networks has an enormous impact on the livelihood of many Kenyans. To illustrate this, according to statistics from CCK (CCK, 2009) there were more than 19 million mobile telephone users in Kenya by the end of 2009, as compared to under 15,000 in 1999. This increase in the number of users has been supported by the expansion of cellular networks which impact positively on economic growth through emergence of new services and applications for mobile cellular services. For years, most Kenyans were "digitally underserved" as telephone and Internet services never managed to reach most parts of the country and where available, they were too expensive. By 1997, a landline was a privilege reserved for the wealthy, government offices, huge organizations and multinationals. People were forced to walk long distances or take bus rides to get to townships to use a telephone booth that were operated by the now defunct Kenya Posts and Telecommunications. The individual would be lucky to find the telephone working if not vandalized or dysfunctional. Kenya Posts and Telecommunications services were characterized by poor service, limited choices and high costs of installation and use. Even today, Kenya still has a low fixed telephone penetration rate with only 243,656 fixed lines (CCK, 2010) serving a population of about forty million people and out of this number only 7,439 subscribers are in the rural areas. According to statistics from CCK, the penetration rate of mobile service had risen to 49.7 per 100 inhabitants at the end of the second quarter of 2009/2010 while the population under mobile coverage was reported at 84.5 per cent with land coverage of 34 per cent (CCK, 2010). This makes mobile telephony the first and the only accessible telecommunication infrastructure available and affordable to most of the Kenyan population both at home and in businesses, particularly the Micro and Small Enterprises (MSEs). Mobile telephone networks provide wireless voice and data services, contributing significantly to economic development through creation of new business opportunities, access to services and increased access to information. Mobile telephones traditionally offer voice communication but have continued to evolve to become all purpose tools. With the diverse mobile telephone services available today, MSEs are now using mobile telephone in many ways other than voice calls. These value added services include mobile money transfers, mobile banking, Internet and data services all which enhance the way MSEs conduct their business operations. Mobile telephones are also cheaper and more portable than computers which make their adoption much easier. This has successively

reduced social-economic disparities within Kenyan MSEs as well as closing the existing digital divide between the rural and urban MSEs. Most MSEs' entrepreneurs had to travel or use public transport systems to send and exchange documents, access banking facilities or even transact their payments. This is not the case today, now they can e-mail the documents, pay for goods and services through mobile money transfers, use mobile banking and if one has a technologically advanced telephone, it is now possible to carry out the required tasks at any time and at any place. Statistics show that mobile network coverage is predominantly urban with data from Communications Commission of Kenya (CCK, 2010) indicating that cellular networks have a national coverage of about 84.5% of the population and only about 34% of geographic area coverage. This may require government intervention in expansion of the cellular networks to underserved areas which are usually regarded as not commercially viable by profit oriented mobile telephone service providers. Kenya being a predominantly agricultural country, most farmers require to communicate with their prospective buyers and suppliers of farm implements. Availing reliable and affordable cellular networks to the farmers could easily transform the way they market their agricultural produce. Mobile telephones and related services have created new livelihoods through creation of professional and none professional jobs. Statistics form the Kenya National Bureau of Statistics (KNBS) indicate that most Kenyans, about 67.7% (KNBS, 2010) live in rural and remote areas of the country while only 32.3% live in urban areas. Most of the rural population have no access to mainstream technologies and considerable digital divide exists particularly between the urban and rural areas. There is also low access to conventional technologies by most of the urban poor who live in underserved areas. For the last few years, only a small fraction of the rural people had access to telephones before the cellular network coverage was expanded making mobile telephone the first and only accessible telecommunication infrastructure available to many rural folks. Today, most rural areas have mobile telephone networks which come with a number of developmental benefits in terms of employment creation, access to services and increased access to information, hence contributing significantly to economic growth. A fast, reliable and affordable wireless communication service in both rural areas and urban centers is vital to their social and economic development. Mobile telephone networks avails both voice and high speed broadband data communication services, tremendously paving the way for the diffusion of the Internet thus narrowing the digital divide. Mobile telephones and related services increases access to information and services while creating investment and employment opportunities. This study seeks to identify the key determinants of wireless technologies usage in Kenyan MSEs to create new livelihoods as well as to facilitate business processes and transactions. This will be achieved by

developing a theoretical model that extends Task Technology Fit (TTF) by Goodhue and Thompson (1995), with constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh *et al*., (2003) through a pilot study and using the extended model to investigate factors influencing adoption and use of wireless technologies to implement an eBusiness infrastructure in Kenyan rural and urban MSEs. The proposed model is empirically tested using data collected from a survey of Micro and Small Enterprises in Kenya using proportionate stratified sampling method within well defined geographic clusters and augmented by descriptive case studies. The study also does an intra-country comparison of access and use of wireless technologies in rural and urban MSEs in implementing an eBusiness infrastructure.

1.2 Importance of eBusiness Infrastructure to MSEs

Over the years, uses of eBusiness applications in Micro and Small Enterprises (MSEs) have become increasingly important as it improves the speed of conducting business by changing the way business transactions are normally conducted. The major handicap however, has been the availability of appropriate, acceptable and affordable technology. With the increasing proliferation of wireless technologies and eBusiness applications, organizations have continued to invest heavily in computers and telecommunications technology within the organizations and externally to suppliers and customers. Most organizations are now extending their businesses to mobile devices for greater mobility and improved efficiency through access to real time transactions, information access and faster communication. By using mobile devices and the underlying technologies organizations hope to improve on their organizational performance through better operational performance that would result to high productivity and financial profitability.

Wireless technologies present a unique opportunity for MSEs to overcome their institutional impediments to Internet access and e-payments by providing new services and technical capabilities such as effective and highly available voice communication, Internet access and e-payments transactions. Availability of these technologies is only an enabling factor. To positively impact an organization’s performance, these technologies must appropriately match its eBusiness infrastructure requirements. However, appropriateness alone does not guarantee use. Venkatesh *et al*., (2003) proposed that Perceived Expectance, Social Influence and an enabling business environment are critical to successful implementation of any new technology.

In this study, eBusiness is defined as "all electronically mediated information exchanges, both within an organization and with external stakeholders supporting the range of business processes", (Chaffey, 2007). This includes automation of internal business processes, procurement and supply chain management and marketing and sales processes. This means that it is not just buying and selling of goods and services but also conducting electronic transactions within the MSE, servicing customers as well as handling supplier relationships. Turban *et al.*, (2002) defines eBusiness as "eBusiness refers to a broader definition of e-commerce, not just buying and selling of goods, and services but also servicing customers, collaboration with business partners, and conducting electronic transactions within an organization". Papazoglou and Ribbers (2006) also defines eBusiness as the conduct of automated business transactions by means of electronic communication networks via the Internet and possibly private networks end-to-end (automated business processes and information systems of different MSEs). These eBusiness activities include business-to-business (B2B), business-to-consumer (B2C) and Intra-business transactions. Sharing enterprise information and computing resources among employees internally within the enterprise is what is referred to intra-business activities such as the Enterprise Application Integrations (EAI) and use of Enterprise Resource Planning (ERP). To manage and improve inter-enterprise relationships and partnerships such as Supply Chain Management (SCM) and Collaborative Commerce (CC) are the business-to-business activities while Customer Relationship Management (CRM) is an example of business-to-consumer activity. For the purpose of this research, the scope of eBusiness activities is illustrated by the following definition:

> "eBusiness can be defined as publishing information and performing different types of transactions, or chains of them, electronically over Intranets, Extranets, and the Internet. This may be within organizations, or between them, and with involvement of individual customers", (Bakry and Bakry, 2001).

The main focus of this study is the use of wireless technologies in Kenyan MSEs as their enterprise wide eBusiness infrastructure to automate all or most of their internal business transactions and inter-enterprise business processes. These are the technical aspects of eBusiness, which includes hardware, software, and networks that are needed to connect MSEs and allow them to share business information effectively. Norris and West (2001)

states that eBusiness offers genuine advantages in terms of speed, flexibility and the savings in process costs from supply chain, as well as being a key to competitive advantage.

Normally, eBusiness infrastructure is made up of multiple technologies and facilitated by multiple service providers. For this study, eBusiness infrastructure is defined as the collection of platforms, networks, products, applications, databases and the business rules governing the flow of data and work among them, both internally and to external systems[1]. For successive eBusiness usage, there is need for co-adoption by two or more MSEs such that the partner MSEs are jointly using the necessary equivalent technologies. Wireless technologies avails a wider choice of tools for the MSEs to choose from. This enables the MSEs to transact business either directly or indirectly using mobile devices. Wireless technologies move eBusiness to the next level of mobile technology driven business processes to what is referred to as mobile business (M-business). Mobile business is made possible by salient features of mobile technologies that include portability, mobility and ability to access services and data ubiquitously.

1.3 Problem Definition and Research Objectives

Michael Porter states that if companies wanted to stay competitive, the key question is not whether to deploy Internet technology but how to deploy it (Porter, 2001). Wireless technologies avail the desired Internet and related technologies to the Kenyan MSEs. This raises the question of whether the Kenyan rural and urban MSEs are using wireless technologies in their business processes so as to help them overcome their institutional impediments to Internet access and electronic payments. If by any chance the MSEs are using these wireless technologies, which of these technologies have they deployed and how are they using them as part of their eBusiness infrastructure? What are they being used for? What are the benefits of using these technologies? What are the challenges in deploying these technologies? These are the underlying questions that form the foundation of this study.

There have been no research to the knowledge of the researcher on the role and impacts of new and emerging wireless technologies on use of eBusiness solutions in Kenyan MSEs. The use of eBusiness solutions among MSEs in Kenya has also not been investigated.

[1] http://www.duncangp.com/Glossary/glossary.html

Although research suggest that MSEs lack capacity to identify, seek and use appropriate technology (ACEG, 2005), this study seeks to investigate the suitability of wireless technologies for implementing an eBusiness infrastructure in MSEs, by evaluating whether the wireless technologies meet MSEs' eBusiness infrastructure requirements and the barriers therein. The main objective of this study is to investigate appropriateness and user acceptance of wireless technologies for implementing an eBusiness infrastructure in Kenyan MSEs. The secondary objectives of the research are:

- To investigate the status of eBusiness applications among MSEs in Kenya;
- To investigate the role of geographic area (city or rural) in the use of wireless technologies in the Kenyan MSEs;
- To develop a theoretical hybrid model to be used in evaluating how wireless technologies and related applications best fit MSEs' eBusiness infrastructure requirements, their acceptance, usage and impacts on the enterprise wide performance among Kenyan MSEs.

1.4 Research Questions

The aim of this study is to determine how appropriate wireless technologies are, for implementing an eBusiness infrastructure in MSEs by evaluating whether the wireless technologies meets MSEs' eBusiness infrastructure requirements. The research objectives can be translated into the following set of research questions to help guide the study:

1. How does task-technology fit influence utilization of wireless technology in implementing an eBusiness infrastructure?
2. Does task-technology fit influence MSE performance?
3. What is the impact of various UTAUT variables on acceptance and use of wireless technologies for implementing an eBusiness infrastructure?
4. What are some of the current eBusiness initiatives in Kenyan MSEs?
5. Does the geographic location of the MSE necessitate implementation of an eBusiness infrastructure using wireless technologies?
6. Does utilization of wireless technology in implementing an eBusiness infrastructure result to higher MSE performance?
7. What are the barriers to utilizing wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs?

1.5 Motivation of the Study

Since early ninety's, Kenya has witnessed phenomenal growth in use and applications of wireless technologies as there were more than 19 million mobile telephone subscribers by the end of 2009, as compared to under 5 million in 2004 (CCK,2009). This has greatly improved information exchange and access in Kenyan business and social spheres that have paved way for the diffusion of Mobile commerce concepts into the general public. This research was motivated by looking at the significant benefits mobile telephones and related services have brought to disparate and even geographically remote population in Kenya. This creates a need to explore how this expanding mobile telephone network and related wireless technologies and services could be harnessed to support enterprise-wide business operations. Mobile telephones have also become a tool of daily life for most Kenyans who use it to individually address their specific needs. There is also a need to determine how appropriate wireless technologies and services are, for implementing an eBusiness infrastructure in MSEs, as there has been no evaluation of how well this technology could meet MSEs' eBusiness infrastructure requirements. This study could be useful in helping Kenyan MSEs to evaluate their eBusiness infrastructure initiatives and to guide government policy initiatives as research in this area has not been conducted. The study seeks to develop a conceptual model that could increase the level of eBusiness applications adoption and diffusion among MSEs.

1.6 Significant and Potential Value of the Research

The outcomes and results of this research will be of value to researchers, the wireless technology industry (service providers, manufactures and marketers of wireless devices) and for policy related development. The study provides useful insights on how user acceptance, task-technology fit and the barriers present may influence usage of wireless technologies to facilitate business processes in MSEs.

The results of this study will also provide key country-level information that is presently not available as demonstrated by the literature review in chapter two as well as filling any other relevant existing research gaps relating to wireless technologies and use of eBusiness solutions in Kenyan MSEs by extending the understanding of factors acting as drivers or inhibitors to the use of wireless technologies to implement an eBusiness infrastructure.

The study aims to collect data on a broad range of wireless technologies currently in use in Kenyan MSEs to obtain a relatively complete picture of how wireless technologies are being used in MSEs' business processes. These business processes include internal business processes, business-to-business (B2B), and business-to -consumer (B2C).

Finally, the study will make a contribution towards development of a theory on the suitability of wireless technologies in implementing an eBusiness infrastructure that encompasses task technology fit, user acceptance and organization performance.

1.7 Organization of the Thesis

The thesis consists of ten chapters structured and presented as follows:

Chapter 1: Introduction

This chapter provides the introduction to the background of the study. It provides the research objectives and related questions along with the discussion of the importance and value of the study. In addition, an overview of eBusiness infrastructure and motivation to conduct this study are discussed.

Chapter 2: Literature review

This chapter presents a review of the literature related to this study with focus on wireless technologies, the Task-Technology Fit (TTF) model, the Unified Theory of Acceptance and Use of Technology (UTAUT) and Kenyan MSEs. It presents a comprehensive critical review of studies on Kenyan MSEs and Information Technology related research revealing the knowledge gaps that the study intends to address.

Chapter 3: Research methodology

This chapter outlines the research process including the methodology, data collection and the research instruments used in this study. In addition the research model is developed.

Chapter 4: Research findings and data analysis results

This chapter presents the research findings and empirical results of data analysis. In addition, the research model validation including reliability and validity of the research survey instrument. Furthermore, a detailed assessment of the measurement model and the evaluation of structural model are presented.

Chapter 5: Intra-Country comparison

This chapter presents a detailed comparison of the data from the two different geographic locations within Kenya including the implications of geographical location of MSE in use of wireless technologies for implementing an eBusiness infrastructure are discussed. Moreover, a detailed comparison of the results of the structural model analysis for each location is presented and discussed.

Chapter 6: Case studies results

This chapter presents the results of the case studies and related findings used to support the research model and to give more insights on research construct measurement items.

Chapter 7: Interpretation and discussion of results and findings

This chapter presents an interpretation of the research findings based on the results of the survey, case studies and intra-country comparisons from chapters 4, 5 and 6 in conjunction with the literature review in chapter 2.

Chapter 8: Theoretical, managerial and policy implications

This chapter highlights the theoretical, managerial and policy implications derived from the research results.

Chapter 9: Conclusion and recommendations

This chapter gives the concluding remarks of the study and recommendations based on the research findings.

Chapter 10: Limitations and future research directions

This chapter discus the limitations of the study and the directions for future research work.

1.8 Chapter Summary

This first chapter of this thesis presents the background of this research, problem definition, research objectives and questions, the study motivation as well as its significance. The next chapter will present a review of the literature relating to core concepts and elements of this study.

Chapter 2: Literature Review

2.1 Introduction

The literature review is divided into three main parts. The first section presents the scope of wireless technologies in this research and a review of the direction research on wireless technologies use in the MSEs has taken over the last few years in Kenya. The second section presents a discussion on different information systems theories which is relevant to this study. In particular the theory of Task Technology Fit (TTF) proposed by Goodhue and Thompson (1995) and the Unified Theory of Acceptance and use of Technology (UTAUT) proposed by Venkatesh *et al.,* (2003). The final section gives an overview of Kenyan MSEs.

2.2 Wireless technologies, statistics and past research directions

Several research studies relating to the use of wireless technologies and mobile devices have been conducted in several countries. Some of these studies include, Calrsson *et al.,* (2006) studied the adoption of wireless mobile communication in Europe; Heidi and Mathiassen (2010) studied adoption of iPhone; Park *et al*., (2007) studied the adoption of Mobile Technologies for Chinese Consumers; Andersson and Hedman (2007) studied diffusion of advanced mobile Services in large Swedish firms; and a study on cross-country adoption of mobile services in Finland, Germany and Greece by Frank (2001). Balacco *et al.,* (2009) did a study that focused on the factors which affect the adoption of mobile Internet amongst Small and Medium Enterprises (SMEs) in Italy.

2.2.1 Wireless technologies

Wireless technologies represent a rapidly emerging area of growth and importance for providing ubiquitous access to Internet, enterprise data and mobile payments. There are two main types of wireless technologies which include the wireless mobile devices and wireless data and voice networks (NASCIO, 2004). Wireless mobile devices include mobile telephones, laptops and Personal Digital Assistants (PDAs). In addition Wireless voice and data networks can be categorized as Fixed Wireless Networks or Mobile Wireless Networks. Fixed Wireless Networks is where both communicating end to end system have a fixed location such as Worldwide Interoperability for Microwave Access (WiMAX) (NASCIO, 2004) and Satellites while Mobile Wireless Networks is where one or more of the

communicating end systems may change location such as when connected using Bluetooth or the General Pocket Radio Service (GPRS).

2.2.1.1 Wireless Mobile Devices

Mobile devices, usually referred as portable devices give users the freedom of working and communicating from anywhere and at any time keeping employees always connected to the essential enterprise data. Today, many wireless mobile devices are readily available in the Kenyan Market. These include mobile telephones, laptops and Personal Digital Assistants.

Mobile telephones traditionally offer voice communication, but with the availability of numerous value added services, MSEs are now using mobile telephone in many ways other than voice calls. These value added services include mobile money transfers, mobile banking, and wireless Internet and data services. These value added services enhance the way MSEs conduct their businesses by addressing enterprises' specialized information and technological needs. The availability of these technologies to majority of Kenyan MSEs and population makes it possible to successively reduce social and economic disparities within Kenyan MSEs as well as crossing the digital divide between the rural and urban areas (Kanyi, 2009; Kanyi and Maharaj, 2009). Most Mobile telephones have advanced features that make them great business management devices. These features include calendars, contact management, e-mail and schedulers. Wireless Mobile devices applications that are geared towards ubiquitous access to the enterprise data are increasing steadily in the Kenyan market. Advanced mobile telephone features such as Wi-Fi (Wireless Fidelity), Bluetooth and Infrared technologies that enable users to connect mobile telephones with other compatible devices or connect to a Local Area Network (LAN) are now readily available in most mobile telephones sold locally. The two most common advanced mobile telephone platforms include Smartphone and PDA. These two devices that allow the users to install and run multitasking operating system, can run advanced applications, a web browser and an integrated Wi-Fi among other innovative features. They also come with huge internal memory and an expandable removable storage.

2.2.1.1(a) Mobile telephone technology options in Kenya

Mobile telephones have become a part of everyday Kenyan's life mostly due to their portability, availability, affordability and network coverage. The numbers of mobile telephone subscriptions were at 19.5 million by March 2010 (CCK, 2010). Mobile telephones provide convenient services to Kenyan population such as voice communication,

entertainment, business tools and most valued data services. Several technologies have been deployed to support voice and data services in rural and urban areas of Kenya. Global System for Mobile (GSM) services and Code Division Multiple Access (CDMA) are the available global standards for mobile telephony that are available in use in Kenya today. They provide both voice and mobile data communication services. Kenyan market has four mobile telephone services providers with one dominant service provider who has a market share of more than 78% (CCK, 2010). To achieve widespread national coverage, three of these mobile telephone services providers offer GSM services while the fourth mobile telephone services provider offers both GSM and CDMA based services. Apart from voice communications and sending messages, the mobile telephone service providers also offer value added services such as the mobile money transfers, mobile banking, Internet and mobile wireless data services. These services are offered on postpaid and prepaid bases and the market is characterized by price wars.

2.2.1.1(b) Regulation

The Kenya Communications Act of 1998 (KCA, 1998) saw the end of the then sole telecommunications operator in the country and the creation of three different organizations: Communications Commission of Kenya (CCK) as the sector regulator; Telkom Kenya as a national telecommunications service provider, and Posta Kenya to offer postal and related services. CCK being the national regulator is responsible for creating a favorable regulatory environment through licensing and signing of interconnection agreements. Communications Commission of Kenya as the primary industry regulator of the telecommunications industry formulates regulations, do the monitoring, solve any disputes and above all protect the interests of all users of telecommunication services in Kenya with respect to the pricing, quality and variety of available services. Under the leadership of CCK, wireless technologies have had a tremendous impact on the Kenyan social and economic development through increased network coverage and connectivity (CCK, 2008).

2.2.1.1(c) Mobile Computing Devices

There are various mobile computing devices available today in the Kenyan market. These include Laptops, Notebooks, Netbooks and Smartbooks, which combines features typically found in desktop computers with features of Smartphones. Their features include small screen, a pointing device and QWERTY keyboard, all-day battery life and sometimes high-speed data connectivity such as 3G for Internet access. Most of these mobile devices also come with one or more network connectivity services such as Wi-Fi, Bluetooth and Infrared.

They are lightweight, inexpensive, and small devices that are suitable for general computing as well as accessing web based applications. Most of these mobile computing devices are usually optimized for low weight, low cost and a longer battery life. The use of a rechargeable battery and good power management allows these mobile devices to have power for a longer period of time. For the Kenyan market however, these devices are still way above the reach of many people hence the need to avail cheaper brands of these devices. The devices are designed to fit sit on a person's lap or smaller and lighter enough to fit on a person's palm while in use.

2.2.1.2 Wireless Voice and Data Networks

A wireless voice and data network is a local or wide area network offering voice, Internet access and related services. Wireless voice and data technologies identified for this study include:

- Internet telephony commonly referred to as Voice Over Internet Protocol (VoIP)
- Monetary transactions such as Mobile payments (M-Payments) and Mobile banking (M-banking)
- Wireless Internet access
- Wireless Local Area Network (WLAN)
- Wireless Metropolitan Area Network (WMAN)
- Mobile Personal Area Network (M-PAN)

(Bedell, 2002; Chae and Kim 2003; Costello and Lassman, 2004; Duncombe, 2009; Duncombe, and Boateng, 2009; and NASCIO, 2004)

The above technologies which are meant to facilitate mobility and wireless communication are discussed in the following section. But to understand mobile data and voice networks, there is a need to discuss the evolution of wireless voice and the data networks development first.

2.2.1.2(a) Evolution of Wireless Networks and Services

The first generations of mobile telephones were not ideal for data communication as they could only handle voice transmission. They included First generation (1G) and Second generation (2G) mobile telephones (Elliott and Phillips, 2004). First generation mobile telephones could only transfer voice at a speed of about 9.6Kbps, had poor sound quality and did not support encryption. First generation and Second generations of mobile telephones only supported sound communications and the only difference between these two

generations was that 1G used analog signaling while 2G used digital signaling and allowed SMS messaging (Elliott and Phillips, 2004). The release of 2.5G or the Global Packet Radio Service (GPRS) as an enhancement of the GSM theoretically allowed data transfer rates of between 115Kbps and 160Kbps. 2.75G or the Enhanced Data Rates for GSM Evolution (EDGE) offers theoretical speed of 400Kbps (Bedell, 2002; Lehr and McKnight, 2002). The third generation (3G) of mobile technologies is an entirely packet switched network offering fast Internet access on a very high bandwidth. 3G offers data rates of 144kbps for mobile users using fast vehicles, 384kbps for pedestrians as they walk and over 2Mbps on fixed locations. 3G is designed to simultaneously carry voice, video and data. 3G is also known as Universal Mobile Communication System (UMTS) which has been developed to become High Speed Downlink Packet Access (HSDPA). Fourth generation (4G) of mobile technology adds multimedia capabilities on its high speed data capabilities to even allow video conferencing (Lehr and McKnight, 2002). 4G will allow data transmission speeds of 100Mbps to 1Gbps (Weber *et al.*, 2004). In Kenya today there are two mobile telephone service providers licensed to offer the GSM based 3G services. These are the Safaricom (http://www.safaricom.co.ke), which has already started testing 4G technologies, and Zain (http://www.ke.zain.com). It is only Safaricom that is currently providing 3G services, offering theoretical speeds of about 6Mbps while Zain is yet to launch its 3G services. However, in practice the 3G services offered by Safaricom provides a speed of about 3.6Mbps and such high data rates are only available in Nairobi and its environs. When the services are used outside Nairobi the data rate averages less than 1Mbps. Orange mobile (http://www.orange.co.ke) in partnership with Telkom Kenya (http://www.telkom.co.ke) offers advanced high speed Internet services based EVDO (Evolution Data Optimized or Evolution Data) 3G+ technology. EVDO is a 3G mobile broadband technology. The EVDO 3G+ technology has a theoretical speed of about 2.4Mbps but the one provided by Orange mobile in partnership with Telkom Kenya in practice provides speeds of about 1.8Mbps.

2.2.1.2(b) Internet telephony- Voice over Internet protocol (VoIP)

Voice over Internet protocol (VoIP) is a set of facilities used to manage the delivery of voice information over the Internet. Internet telephony provides voice communications over a data network using Internet protocol (IP) especially the Internet. VoIP has become popular because of the cost advantages to consumers over traditional telephone networks. VoIP and IP telephony are used interchangeably. VoIP comprises of several forms of IP packetized voice transmission over privately managed IP-based networks, the Internet, and PC-to-PC, PC-to-phone, phone-to-phone and peer-to-peer communications (Costello and Lassman,

2004). IP telephony involves the transmission of voice conversation (phone-to-phone) and the delivery of telephony applications and other telephony features, over packet-switched IP data networks, such as private enterprise LANs, WANs, intranets and the Internet. It is a viable alternative technology or complement to Public-Switched Telephone Network (PSTN). In terms of adoption, VoIP is currently a fast growing technology in Kenya. All the Kenyan mobile and fixed telephone service providers offer this service to their customers and run regular advertisements about the availability and advantages of this service. It has become increasingly popular, particularly for long distance and international calls where prices on the Public Switched Telephone Network (PSTN) or regular mobile telephone service are relatively high. The services can also be accessed through telecentres where the services are offered as cheap international call services. In Kenyan rural areas the VoIP services are provided mostly over wireless and satellite technologies because of low fixed line penetrations.

2.2.1.2(c) Mobile payments (M-Payments)

Mobile telephones are mostly used for voice and short message services. The capacity to offer additional advanced services such as money transfers, managing bank accounts, paying utility bills, receiving special promotions and getting stock quotations as well as initiating purchase or sales transactions has increased the level of mobile telephone usage. M-Payment is the transfer of money using mobile devices such as a cellular telephone from a registered mobile money transfer service subscriber to the other. This service allows people to pay for goods and services as well as download their money to their bank accounts. In Kenya these services were introduced for the first time on 6th March 2007 through M-Pesa by Safaricom. Today, the services of mobile money transfer are offered through Safaricom's Mpesa services (http://www.Safaricom.co.ke), Zain's Zap services (htpp://www.ke.zain.com) and Essar Telecom's YuCash (www.yu.co.ke). These services offer the users the advantages of making faster payments and money exchange while allowing the users of the services to walk with less cash reducing the risks of losing money through robberies. Table 2.1 gives the financial transactions and related services offered by the three Mobile Money Transfer services. The data is compiled from the respective mobile telephone service providers as at August 2010. These are http://www.ke.zain.com, http://www.safaricom.co.ke, and http://www.yu.co.ke. These services have been offered since 2007 and allow users to convert their money to e-cash.

Services and benefits	Zain (Zap services)	Safaricom (M-Pesa services)	Yu (YuCash services)
Depositing money	✓	✓	✓
Sending money	✓	✓	✓
Withdrawing Cash	✓	✓	✓
Buying Airtime	✓	✓	✓
ATM Withdrawal	✓	✓	×
Manage the Account	✓	✓	✓
Pay Bills	✓	✓	×
Number of Pay Bills Partners	5	339	0
Download money from the mobile account to a Bank account	✓	✓	×
Top up the mobile account from a bank	✓	✓	×
International Money Transfer	✓	✓	✓

Table 2.1: Mobile Money Transfer Service offering

2.2.1.2(d) Wireless Internet

Chae and Kim (2003) described mobile Internet as the wireless access to the digitized contents of the Internet via mobile telephones. Wireless Internet could be accessed through a mobile device, such as a cellular telephone or a Personal Digital Assistant which is equipped with a web browser, public hotspots or desktop systems connected to a wireless Internet access device such as a fixed wireless desktop telephone or a wireless data modem. Stafford and Gillenson (2004) indicate that one of the main drivers of wireless Internet adoption is convenience provided by using wireless Internet at any place and at anytime. For mobile telephones, the Wireless Application Protocol (WAP) group (http://www.openmobilealliance.org) has continued to develop standards for web access over wireless terminals. WAP compliant devices use a specialized Wireless Mark-up Language (WML) to view a special kind of content or via a proxy translation from HTML to WML on a micro-browser to access World Wide Web (WWW) and other IP based applications on a wireless terminal or a mobile telephone. Wireless Internet payments plans available locally include per minute online, prepaid data bundles and monthly unlimited prepaid or postpaid Internet data rates. There are also other offers available such as the one week unlimited Internet access which is offered by Orange and Safaricom while Zain offers 10, 20, and 30 days unlimited Internet. With data bundles (volume based billing), mobile telephone service

providers reset the unused Mega Bytes (MB) upon the expiry of the period (bundles are usually valid for a number of days which on average ranges from 30 to 60) unless the customer subscribes to a new bundle before the validity expires and the MB from the previous bundle will be added to the new bundle and validity renewed. The price ranges from one Kenya shilling (KShs) per MB to about 8 Kenya Shillings per MB approximately United States Dollars (USD) 0.01 to about USD 0.20. With per minute billing the charges ranges from 1.00 Kenya Shilling billing per minute to about 1.75 KShs per minute which is about USD 0.02. Table 2.2 gives a list of current wireless Internet access services available in Kenya including theoretical speeds, technology used and payments as at August 2010. The data is compiled from the respective service providers. These are http://www.ke.zain.com, http://www.safaricom.co.ke, http://www.orange.co.ke, http://www.telkom.co.ke, http://www.zuku.co.ke/broadband, http://www.get2net.co.ke and http://www.yu.co.ke, http://www.accesskenya.com.

Mobile Telephone Operator	**Technology**	**Speed Mbps**	**Cost of Modem in Kenya Shillings**	**Bundle rate per MB in Kenya Shillings**
Zain	2G (EDGE)	0.24 Mbps	2010	4.00 – 7.00 Per MB
Safaricom	2G (EDGE)	0.24 Mbps	Mobile telephone based	1.37 – 8.00 Per MB
	3G (HSDPA)	7.2 Mbps	1999	1.37 – 8.00 Per MB
Orange	2G (EDGE)	0.24 Mbps	1499	1.00 – 7.00 Per MB
	3G+ (CDMA) EVDO	1.8 Mbps	1999	1.10 – 7.00 Per MB
Telkom	Telkom fixed plus (CDMA)	153.6Kbps	Wireless desktop telephone	Per minute billing at 1 shilling per minute
Yu	2G (EDGE)	0.24 Mbps	1799	1.50 – 3.00 Per MB
Get2net	MF-TDMA	256Kbps – 1024Kbps	Satellite Internet service	From 4540 per month
Zuku	WiMAX	256Kbps – 1024Kbps	Satellite Internet service	From 1,499 – 14,999 per month
Access Kenya	WiMAX	32/64Kbps – 512/1.3Mbps	VSAT Satellite Internet service	From 4640 - 14,999 per month

Table 2.2: Theoretical maximum Internet speeds offered by operators in Kenya

Note: The modem prices range between USD 19 to USD 26, Satellite Internet access costs range between USD 57 and USD 188 per month and cellular Internet costs between USD 0.02 and USD 0.20 per MB.

2.2.1.2(e) Wireless Local Area Network (WLAN)

WLAN refers to a technology that enables two or more computers to communicate using standard network protocols, but without network cabling. WLAN allows users to transmit and receive information within a range of 30-50 meters. Based on 802.11 standards of technologies implemented by the Institute of Electrical and Electronics Engineers (IEEE), WLAN enable data transmission at 1 and 2 Million bits per second (Mbps). The 802.11b enable data transmission at 11Mbps while 802.11a and 802.11g has a data transmission rate of up to 54Mbps as indicated in table 2.3. Most organizations are adopting WLAN due to its flexibility, convenience and increased reliability. With the absence of cables, there is increased mobility, reduced installation time and cost savings when performing installation in difficult-to-wire areas. WLAN allows information to be quickly accessed and transmitted within the enterprises hence increased productivity. WLAN such as 802.11b can be operated as either an ad-hoc network of neighboring workstations or as an "infrastructure network" connecting to a wired network (Bedell, 2002). Ad-hoc WLAN consists of a number of computers each equipped with a wireless networking Interface card and which can communicate directly with all of the other wireless enabled computers. Infrastructure network uses an access point, or base station. This access point acts like a hub, providing connectivity for the wireless computers and it can be used to connect wireless LAN to a wired LAN, allowing wireless computer access to LAN resources (Bedell, 2002). Table 2.3 gives a list of the approved IEEE 802.11 WLAN standards while table 2.4 lists the IEEE 802.11 near-future proposed standards. The 2.4GHz 802.11b WLAN standard is commonly referred to as Wi-Fi or Wireless Fidelity.

Wireless Standard	Release Date	Frequency	Data Rate
802.11	1997	2.4 GHz	1Mbps - 2Mbps
802.11b	1999	2.4 GHz	6.5 Mbps - 11 Mbps
802.11a	1999	5 GHz	25 Mbps - 54 Mbps
802.11g	2003	2.4 GHz	25 Mbps - 54 Mbps
802.11n	2007	2.4 GHz	200 Mbps - 540 Mbps

Table 2.3 IEEE 802.11 WLAN standards

Source: http://www.intel.com/standards/case/case_802_11.htm

Near-future Proposed 802.11 Standards	
802.11d	International roaming — automatically configures devices to meet local RF regulations
802.11e	Addresses quality of service requirements for all IEEE WLAN radio interfaces.
802.11f	Defines inter-access point communications to facilitate multiple vendor-distributed WLAN networks.
802.11h	Defines the spectrum management of the 5 GHz band.
802.11k	Defines and exposes radio and network information to facilitate radio resource management of a mobile Wireless LAN.
802.11s	Defines how wireless devices can interconnect to create an ad-hoc (mesh) network.
802.11r	Provides fast (<50 millisecond), secure and QoS-enabled inter-access point roaming protocol for clients.
802.11u	Adds features to improve interworking with external (non-802) networks where the user is not pre-authorized for access.
802.11v	Enhances client manageability, infrastructure assisted roaming management, and filtering services.
802.11z	Creates tunnel direct link setup between clients to improve peer-peer video throughput.
802.11aa	Robust video transport streaming

Table 2.4: IEEE 802.11 Proposed Standards

Source: http://www.intel.com/standards/case/case_802_11.htm

2.2.1.2(f) Wireless Metropolitan Area Network (WMAN)

WMAN aim to provide mobile broadband wireless access networks that meets the needs of business and residential requirements within a metropolitan environment. Most WMANs are built using technologies based on the IEEE 802.16 and IEEE 802.20 standards. Worldwide Interoperability for Microwave Access (WiMAX) technology that is based on IEEE 802.16 standards provides ubiquitous computing with broadband access within a metropolitan for wireless data, voice and video at a higher speed ranging between 256Kbps and 75Mbps. IEEE 802.16 specifies point-to-multipoint broadband wireless systems while IEEE 802.16a specifies non-line-of-sight broadband wireless systems. IEEE 802.16e allows people to communicate while walking or riding in cars and provides high-speed data and mobile Voice over Internet Protocol (VOIP). Mobile Broadband Wireless Access (MBWA) technology based on IEEE 802.20 supports high-speed data services while at the same time supporting

full user mobility within a metropolitan. MBWA as a standard allows delivery of voice, video and data services to portable computers and other mobile devices.

2.2.1.2(g) Personal Area Network

Personal Area Network is a connection of personal electronics autonomously in a relatively small area within a radius of ten meters to allow voice and data communications. Bluetooth technology is one of the common known applications for this kind of networks. Based on IEEE 802.15 standard, the technology aims at connecting devices within personal workspaces. Blue tooth channel format channel include three voice channels and it is a proposed method for transmitting e-wallet information to point of sale terminal and currently operates within a range of 30 feet (Bedell, 2002). Bluetooth does not require a direct line of sight and can connect up to eight Bluetooth-enabled devices.

2.3 Current wireless technologies statistics for Kenya

Statistics given by International Telecommunication Union (ITU, 2007) regarding access to Information and Communications Technologies (ICTs) indicated that Africa had the least broadband subscriber base with only one million broadband subscribers. This was a meager 0.4 percent of the 281 million subscribers in the world by the end of 2006. But the figures have increased to about 12 million subscribers (ITU, 2010) as more people access mobile broadband. By the end of the third quarter of 2010, Africa had more than 500 million mobile telephone users and more than 110 million Internet users (ITU, 2010) which is more than double the 2007 figures when Africa had about 265 million mobile telephone users and 50 million Internet users (ITU, 2007). Mobile cellular technology has a higher coverage rate in Africa than any other telecommunication technology. Cheaper infrastructure and larger regional penetration, cheaper handsets, competitive markets and business models oriented to the needs of the poorer segments of the population, such as affordable prepaid cards, have resulted in a mobile boom in Africa during the last decade (ITU, 2007). Data released by Communications Commission of Kenya (CCK, 2010) in March 2010 indicate that mobile telephone networks have a national coverage of about 84.5% of the Kenyan population and 34% geographic coverage. This 34% geographic coverage implies that large portions of Kenyan land mass are not covered by mobile telephone networks especially in the arid and semi arid areas. CCK also estimates Internet usage at about 4% of the population and an estimated population that had access to Internet services during the same period as 10.2%. But with high mobile phone networks penetration, Internet access could increase

dramatically. Figure 2.1 below shows mobile network coverage by 2008, which was at 77% of the population and 22% of the Kenyan land mass.

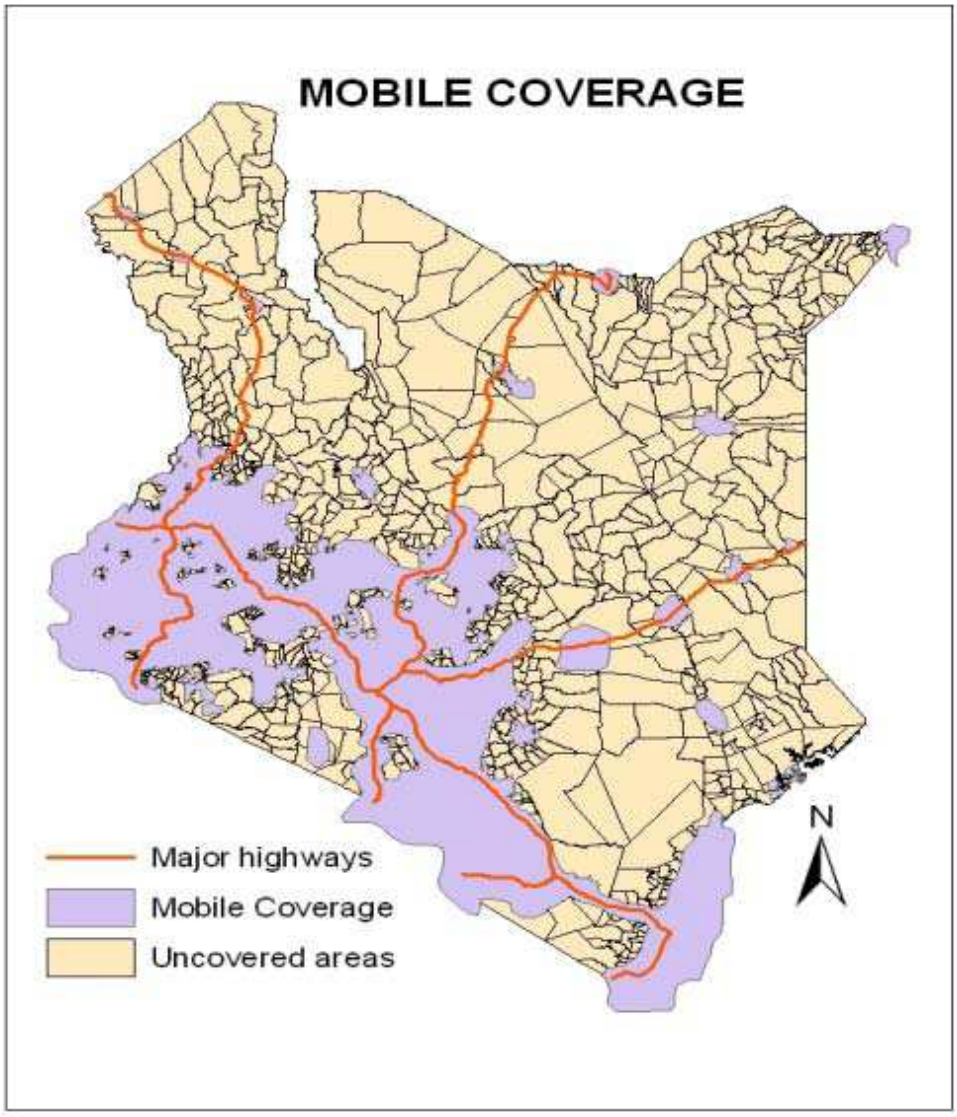

Figure 2.1: A map of mobile telephone network coverage in Kenya by 2008
Source: Communications Commission of Kenya Statistics Report (CCK, 2008)

CCK sector statistics indicate a penetration rate of mobile service as 51 per 100 inhabitants which compares favorably with the developing world's penetration of 49.5 per 100 inhabitants (ITU, 2009).

2.4 Research on wireless technologies and MSEs

A number of commentaries on the use of mobile telephones in business in Kenya have been written in newspapers and magazines. Despite the exponential growth in the use of mobile telephones in East Africa, the literature review indicates that only one research study on the impact of using mobile telephones in microenterprises in East Africa has been done within the last five years. A survey conducted in Kigali, Rwanda by Donner (2007), found that mobile telephones had an impact on microenterprises since entrepreneurs developed new business contacts and expanded their Social and Business Networks. Regarding the use of eBusiness, the status of e-commerce in Kenya has been studied by Mureithi (2000), Kiiru (2002), Mureithi (2005) and Muganda *et al*., (2008). These studies highlight the use of Internet and e-commerce in Kenyan microenterprises for the last decade. Muganda *et al*., (2008) highlighted that by the year 2008, only less than 10% of the Kenyan population was accessing Internet and that it was mainly in urban areas. They noted that the national Internet connectivity infrastructure is skewed in favor of urban centers. Their study also found that only a few sophisticated Internet applications were in use. Mureithi (2000) found that B2B and business-to-government (B2G) were very low while B2C was experiencing very slow growth and only in urban areas. He attributed this to limited Internet access locally, low awareness and lack of distribution infrastructure. From the study, Internet access was reported to be very low, with only 17 people being able to access Internet for every ten thousand (10,000) people while telephone lines and credit cards access was at 1% and 0.2% respectively. Another challenge to e-commerce usage in Kenya that was cited by Mureithi (2000) was inadequate legal framework.

A further review of published literature shows that, to date, a number of studies conducted on MSE mainly focus on the sector's contribution to the economy in terms of employment, income, and gross domestic product (CBS, ICEG, K-REP, 1999) while other studies focus on access to credit (Aketon, 2007), and government policy and strategy frameworks (ACEG, 2006; Ronge *et al.*, 2002). There is also significant research relating to the use of Information Technology such as Information and Communication Technologies (ICT) usage in Micro Small and Medium Enterprises (MSMEs) (Kanyi, 2007), and Internet usage in MSEs (Mureithi, 2005). On Internet usage in MSEs (Mureithi, 2005) found that none of the MSEs at Kariobangi Light Industries had a website and only 7.8% had an email address. The Kenya country e-preparedness report (Atac, 2003) is also an example of the direction research has taken in the last few years; it has focused on ICT access and usage. There has been no known research, to the knowledge of the researcher that have studied the adoption

and impact of wireless networks on eBusiness usage in Kenya and their impact on the organizational performance. This study seeks to fill this void in research on business applications of new and emerging wireless technologies on use, adoption and diffusion of eBusiness in Kenyan MSEs.

On mobile technologies and financial transactions, Duncombe (2009) analysis on mobile device-based payments in Africa indicated that use of mobile payments is conditioned by non-market factors related to financial and technical literacy. William Jack of Georgetown University and Tavneet Suri (Suri *et al.,* 2010) of Massachusetts Institute of Technology surveyed Kenyan households in December 2009 and found that Mobile Money Transfer Services (in particular M-PESA) is reaching a majority of Kenya's poor, unbanked, and rural populations. This implies that the use of Mobile Money Transfer Services in Kenya defies Duncombe, and Boateng (2009) argument that the overall level and pace of adoption of m-finance services in developing countries is relatively low and confined to more affluent users. Most Kenyan poor and unbanked fully embraced the use of Mobile Money Transfer Services to store money and make payments. This is mainly because Mobile Money Transfer Services offers cheaper and secure alternative to the existing informal money transfer channels. Most Kenyans also find it appropriate to use Mobile Money Transfer Services in their everyday transactions. This necessitates the use of user level IT acceptance and usage models such as the TTF and UTAUT to investigate mobile technologies usage and impact in Kenyan MSEs. Most Kenyan MSEs are also managed by their owners and hence most technology adoption decisions are based on individuals and not organizations.

2.5 Information systems theories in the study

To address the research objective and to answer the research questions, an initial research model based on two key information systems theories was proposed. The proposed research model was based on the Task-Technology Fit Model (Goodhue and Thompson, 1995) and constructs from the Unified Theory of Acceptance and Use of Technology (Venkatesh *et al*., 2003). Three other constructs relating to use context which emerged in course of the preliminary study were also added to the proposed research model. The initial model is based on the extended Task-Technology Fit theory with two constructs from Unified Theory of Acceptance and Use of Technology and the three barriers to usage derived from pilot study.

2.5.1 Task-Technology Fit (TTF) Model

Goodhue and Thompson (1995) defined TTF as “the degree to which a technology assists an individual in performing his or her portfolio of task”. With any choice and implementation of any technology, the question of choosing the right technology at the right time always arises. With the introduction of any technology within an organization to support business processes, TTF can be used to measure the correspondence between the user’s characteristics, technology‘s own functionalities, and the task requirements. The main aim of the Task-Technology Fit (TTF) model by Goodhue and Thompson (1995) is to match the capabilities of the technology to the demands of a particular task. TTF is defined as the degree to which features of a technology match the requirements of the task and the abilities of the individuals performing the task. TTF suggests that information systems will have a positive impact on individual or organizational performance only when technology functionality is appropriately matched to user task requirements. The task-technology fit (TTF) model originated from the Cognitive Fit Theory by Vessey (1991). The Cognitive Fit Theory is based on the proposition that a cognitive fit between the problem solving aids and the problem solving task can reduce the complexity of the task and improve the problem solving effectiveness. Goodhue and Thompson (1995) specified the TTF construct as consisting of the following eight variables: data quality, locatability of data, authorization to access data, data compatibility between systems, training and ease of use, production timeliness, systems reliability, and information systems relationship with the user. Goodhue (1995) argued that an Information Technology (IT) system will be used if the functions available to the user support the activities of the user, implying that, a system that does not offer sufficient support to users’ tasks will not be used. The major features of the Task Technology Fit are the concepts of technologies, task, individual, utilization and TTF. Task Technology Fit is the relationship between task requirements, technology functionality, technology experiences and task knowledge (Benford and Hunton, 2000). Goodhue (1995, 1998) developed and empirically tested a modified instrument useful in measuring TTF. This modified and comprehensive instrument was extended to have extra dimensions to evaluate an organization’s overall information systems and services. The modified instrument had the following twelve dimensions: Lack of confusion, Level of detail, Meaning, Locatability, Accessibility, Assistance, Ease of Use (HW/SW), System’s Reliability, Accuracy, Compatibility, Currency and Presentation.

Dishaw and Strong (1998) investigated the TTF model using software maintenance tools and concluded that task functionality drive usage of information technology. The subjects in their

study were professional computer programmers, working in aerospace, insurance and financial services companies, supporting maintenance of both software and data. They found that the tool functionality had a positive significant relationship with TTF while task requirements had a significant negative relationship with TTF and actual use of the tool. They concluded that task requirements together with the fit between the task requirements and the technology functionality drive the usage of information technology.

Bilén *et al*., (2008), showed how TTF is important to the extent of Tablet Personal Computer (PC) use in classrooms through a study aimed at evaluating the influence of Task–Technology Fit and Social Influence on the extent of Tablet PC use and learning. The subjects in their study were a variety of undergraduate and graduate classes from four technology and engineering disciplines at the Pennsylvania State University. The study results provided empirical evidence to suggest that Task–Technology Fit is important to the extent of Tablet PC use in classrooms and that Tablet PC use enhances students' learning experience. The results also indicated that the students' classmates (Social Influence) are helpful resources in their learning to use Tablet PCs. This suggests that TTF and Social influence seems to influence students' use of Tablet PCs.

Mathieson and Keil (1998) investigated the relationship between Task-Technology Fit and Perceived Ease of Use. The subjects in their study were undergraduate business students enrolled in an IT course who took part in a laboratory experiment and had to create database queries to answer question to a given problem domain using two different systems. Through a laboratory-based experimental study, Mathieson and Keil (1998) showed that perceived ease of use was a function of TTF.

Benslimane *et al.*, (2002) tested TTF on World Wide Web (WWW) based procurement from 110 corporate buyers from over 100 organizations operating in a wide range of industries in Canada. The study suggested that a better fit between the tasks required during the procurement process and Internet websites' functionalities leads to a higher level of WWW usage, which then leads to an improved performance for users.

Gagnon *et al.*, (2004) evaluated TTF of administrative support systems within higher education. The TTF showed reasonably good fit for the task and individuals providing an empirical explanation for the utilization of administrative support systems in a university setting.

Zigurs *et al*., (1998) defined a TTF framework that matched the features of group support systems with the requirements of group tasks and later Zigurs *et al*., showed how a poor fit between a Group Support System (GSS) and the group's task affected the group's performance (Zigurs *et al*., 1999).

Norzaidi and Intan Salwani (2008) carried out a study on Intranet usage in Malaysia to test whether Task-Technology Fit predicts usage. The findings showed that Task-Technology Fit could significantly predict usage if task and technology were fit.

Staples and Seddon (2004) when testing the Technology-to-performance Chain Model using a study on 250 librarians and 600 students, they did find out that TTF could explain performance in both mandatory and voluntary use. However, the relationships among the constructs in the model are dependent on whether the users have a choice to use the system or not.

All the above studies indicated that the TTF instrument is a good measure of the extent to which a particular task can be performed effectively and efficiently using a particular technology.

Based on his study, Goodhue (1998) argued that the dimension of fit applies to any Information Technology (IT) system, including hardware, software and data and that the correspondence between information systems functionality and task requirements leads to positive user evaluations, and positive performance impacts. The TTF model is also suitable for both mandatory and voluntary use situations and can also be extended by introducing new factors. D'Ambra and Wilson (2004) introduced uncertainty factor in the TTF to investigate the adoption of the World Wide Web for international travel. Additionally, some researchers have attempted to integrate TTF with the TAM by suggesting that the two models complement each other. Not all dimensions of TTF are appropriate for evaluating the use of wireless technologies in implementing an eBusiness infrastructure necessary to MSEs in Kenya. However, seven dimensions could perhaps provide a good basis for this study. This would fulfill Goodhue and Thompson (1995) recommendation that significant positive links must exist between at least some of the eight TTF factors and utilization while TTF and usage must be significant predictors of performance impact. Junglas and Watson (2006) suggests that the concept of task-technology fit promises to help identify aspects that are critical to support a given business task. This study aims to investigate the fit between

eBusiness applications on wireless technologies infrastructure and how they could support eBusiness functions in Kenyan MSEs. To the knowledge of the researcher TTF has not been tested in the context of IT adoption in Kenya and proposes that the model may be suitable for investigating the appropriateness and use of wireless technologies in implementing an eBusiness infrastructure in Kenyan MSEs.

Figure 2.2 shows the Task-to-Performance Chain Model (TPC) by Goodhue and Thompson (1995) while figure 2.3 shows the subset of the Task-to-Performance Chain Model that Goodhue and Thompson (1995) empirically tested based on Task characteristics, Technology characteristics, TTF, utilization and performance. This subset of the TPC model is what this research seeks to extend with constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) and use the extended model to test the suitability of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs. After implementation, the technologies must be used to carry out the desired tasks. Goodhue and Thompson (1995) defined tasks as “the actions carried out by individuals in turning inputs to output”. Therefore, wireless technologies in this study are the tools or the technologies used by individuals in MSEs to perform their work related duties. Higher TTF and a Higher Usage will increase Organizational Performance. High performance is a mix of improved efficiency, improved effectiveness and probably a reduction in transaction costs.

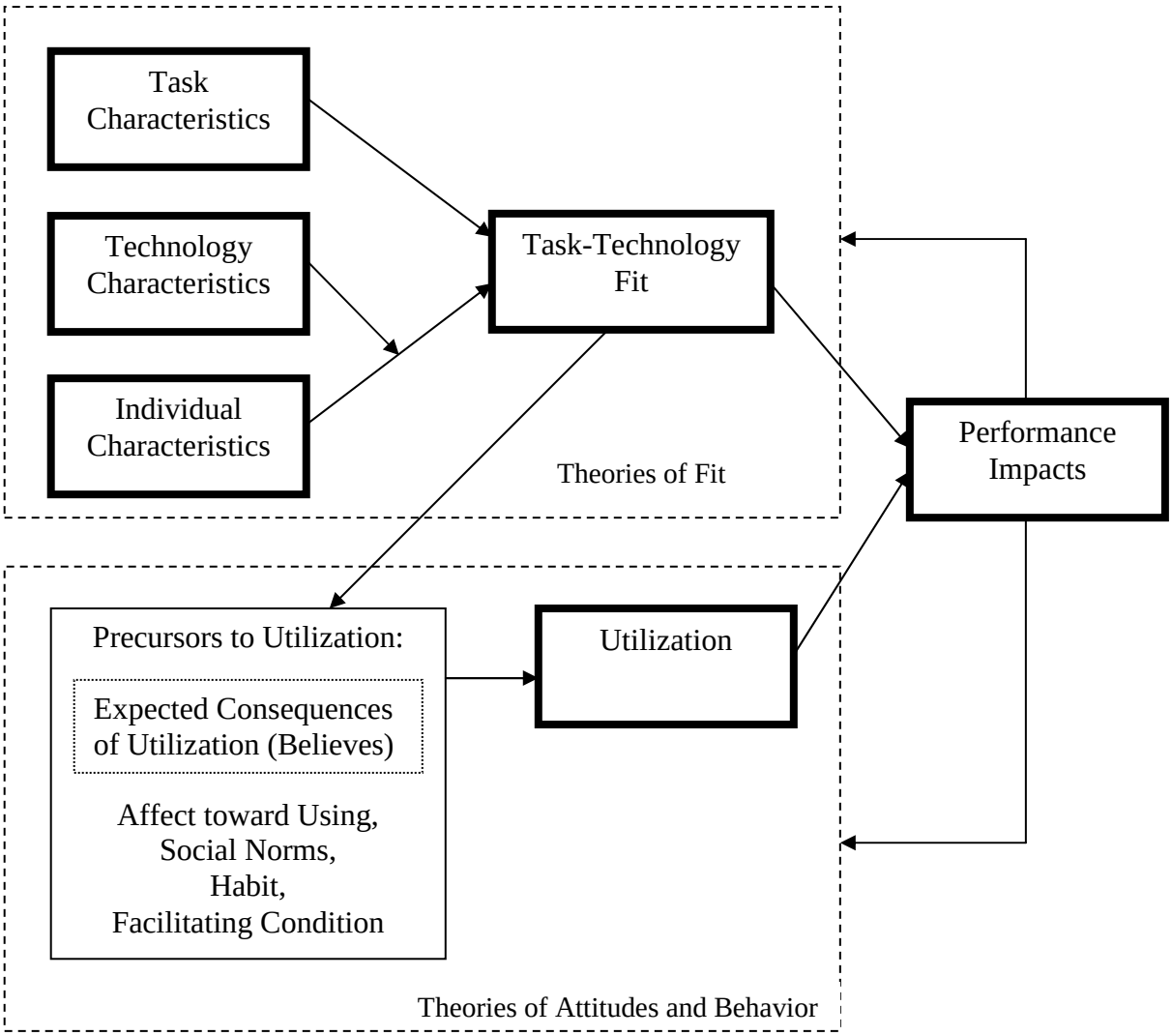

Figure 2.2: The Task-to-Performance Chain Model, (Goodhue and Thompson, 1995)

TPC has two fundamental streams of research: TTF as a predictor of Performance and Utilization as a predictor of Performance implying that performance is jointly determined by TTF and Usage. TTF also positively affect the Utilization.

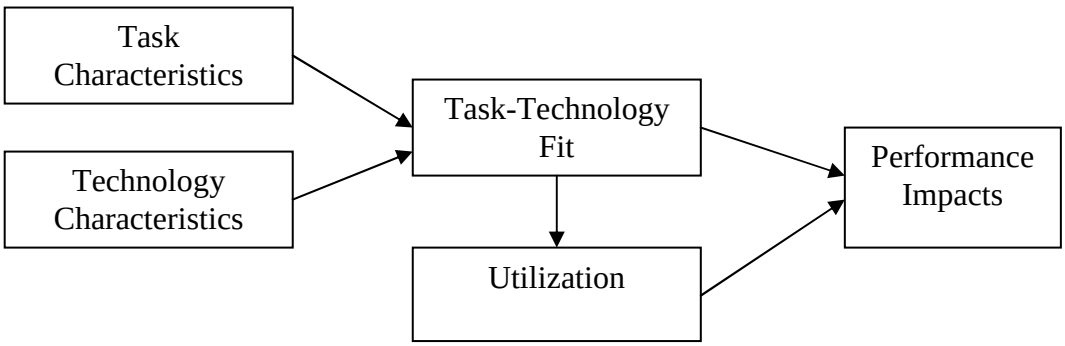

Figure 2.3: The subset of the TPC Model that Goodhue and Thompson (1995) tested

The subset of the TPC Model in figure 2.3 is the theoretical foundation for this research and forms a base for examining the factors that influence organizational performance upon using wireless technologies to facilitate business processes. Goodhue and Thompson (1995) believed that if a fit existed between task requirements and technology functionalities, then this would lead to improved performance.

2.5.2 The Unified Theory of Acceptance and use of Technology (UTAUT)

Van (1986) suggests that organizations will not realize their desired organizational level impacts from IT without the use of IT by individuals in the organization. This makes user acceptance a key component of successive implementation and use of any technology. Using the technology to accomplish organizational tasks is an indication of User Acceptance. Goodhue and Thompson (1995) suggest that utilization should ideally be measured as the proportion of times users choose to use systems. The Unified Theory of Acceptance and use of Technology (UTAUT) proposed by Venkatesh, Morris, Davis and Davis (2003) is a combination of eight user acceptance models. Unlike other user acceptance models UTAUT takes into consideration the fact that some systems are mandatory and others are voluntary. UTAUT as formulated by Venkatesh *et al*., (2003) has four core constructs. These are Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. These four constructs are the independent variables influencing the dependent variables of Behavioral Intention and Use Behaviour. Gender, Age, Experience with the system and Voluntariness Use of the system have indirect influence on the dependent variables through the four core constructs hence they are four moderators of the model's key relationships. UTAUT was tested with the original data and outperformed the other eight individual models by explaining 69% of the variance in user intention to use information technology, Venkatesh *et al*., (2003) further tests using data from two new organizations confirmed the validity of UTAUT model when it was able to explain 70% of the variance in user intention to use information technology.

UTAUT as proposed by Venkatesh *et al*., (2003) integrate elements from eight competing user technology acceptance models and their extensions. Before integrating these models, Venkatesh *et al*., (2003), compared the eight models empirically in terms of their core constructs, beliefs, moderators and percentage of variance explained. They found that the eight models explained between 17% and 53% of the variance in user intention to use information technology. The UTAUT model is empirically validated and is designed to further develop the area of user acceptance by merging the most respected and cited

academic models in the area of user technology acceptance. UTAUT focuses on individual user acceptance of IT and it is based on over twenty years of research and eight different acceptance models. Figure 2.4 shows the UTAUT model by Venkatesh *et al*., (2003).

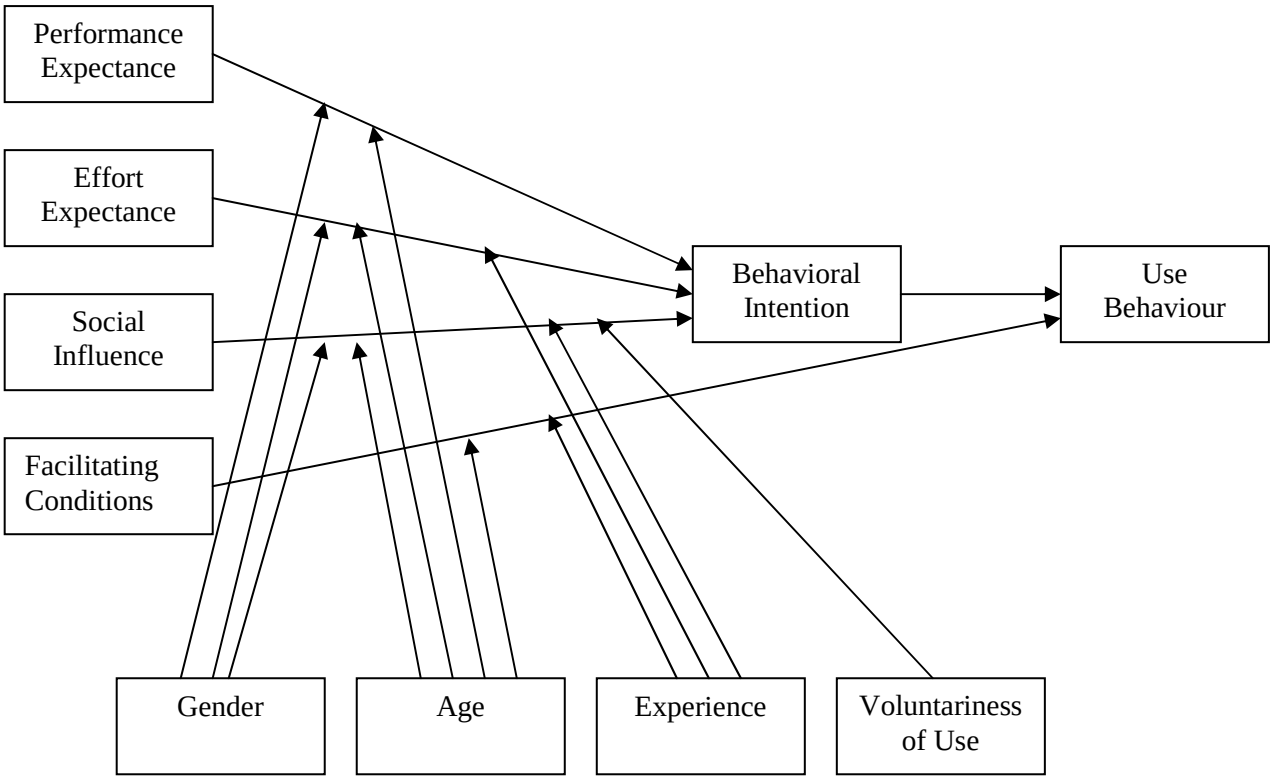

Figure 2.4: A graphical overview of the UTAUT Model, (Venkatesh *et al.*, 2003).

The following are the models that were evaluated and integrated to make UTAUT by Venkatesh, Morris, Davis and Davis in 2003.

i. Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975),

This model is drawn from social psychology and serves as a foundation for explaining and predicting human behaviors. Its two core constructs are attitudes toward behavior and subjective norm. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 36%.

ii. Technology Acceptance Model (TAM) (Davis, 1989),

This model emphasizes that user's behavioral intention to use a technology is affected by their perceived usefulness and perceived ease of use of the

technology. Its two core constructs are perceived usefulness and perceived ease of use. When studying intention to use technology in mandatory settings, Venkatesh and Davis (2000) developed Technology Acceptance Model 2 (TAM2) by extending TAM to include subjective norm as an additional predictor of intention to use technology in the case of mandatory settings. The highest variance in user intention to use information technology that TAM2 model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 53% while TAM is able to explain up to 40% of the variance in usage intentions and 30% in system usage (Meister and Compeau, 2002).

iii. Motivational Model (MM) (Davis *et al.,* 1992),

This model demonstrates the general motivation theory as an explanation for behavior to use. Its two core constructs are extrinsic and intrinsic motivation. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 38%.

iv. Theory of Planned Behavior (TPB) (Ajzen, 1991),

This model built on TRA by adding the construct of perceived behavioral control. Its core two constructs are Attitude toward Behavior, and Subjective Norm. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 47%.

v. Combined TAM and TPB (C-TAM-TPB) (Taylor and Todd, 1995),

This is a hybrid model which combines the constructs of TPB with Perceived Usefulness from TAM. Its core constructs are Attitude toward behavior, and Subjective Norm, Perceived Behavioral Control and Perceived Usefulness. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 39%.

vi. Model of PC Utilization (MPCU) (Thompson *et al*., 1991),

This model was introduced to predict PC utilization. Its core constructs are job-fit, complexity, long-term consequences, affect towards use, social factor and facilitating conditions. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 47%.

vii. Innovation Diffusion Theory (IDT) (Rogers, 1995; Moore and Benbasat, 1991),

This model is based on five factors that impact technology adoption. The factors are relative advantage, compatibility, complexity, trialability, and observability. Moore and Benbasat (1991) adapted these factors and developed seven core constructs for individual technology acceptance. The seven constructs are relative advantage, ease of use, image, visibility, compatibility, results demonstrability, and voluntariness of use. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 40%.

viii. Social Cognitive Theory (SCT) (Bandura, 1986; Compeau and Higgins, 1995; Compeau *et al*., 1999).

This model has five core constructs of outcome expectations-performance, outcome expectations-personal, self-efficacy, affect, and anxiety. The highest variance in user intention to use information technology the model was able to explain across all the three different time periods tested by Venkatesh *et al*., (2003) was 38%.

Each of the above technology acceptance models has different sets of adoption determinants and UTAUT captures the essential elements of the eight models. This study examines entrepreneurs' acceptance of wireless technologies for implementing an eBusiness infrastructure in Kenyan MSEs using two key constructs from UTAUT (Venkatesh *et al.*, 2003) and hence contributing to UTAUT model theoretical validity and empirical applicability. The two constructs are Performance Expectance and Social Influence.

2.6 Micro and Small Enterprises (MSEs) in Kenya

MSEs play an important role in the Kenyan economy by creating employment, contributing to the Gross Domestic Product (GDP) and promoting local innovation. In Kenya, MSEs are defined as enterprises in both formal and informal sectors employing between 1 and 50 workers (CBS, ICEG, K-REP, 1999, Government of Kenya, 2005). Micro-enterprises are those that employ 10 or fewer workers and small enterprises are those that employ 11-50 workers. Government statistics indicates that 74.8% of all businesses in Kenya fall within the MSEs (Government of Kenya, 2007) while Kenya Association of Manufacturers figures reveals that 47% of all manufacturing firms in Kenya are MSEs (KAM, 2006). The business activities of MSEs include manufacturing, trade and service provision. These enterprises cut across all sectors of the Kenyan economy and provide one of the most prolific sources of employment creation, income generation and poverty reduction (Government of Kenya, 2005). The National Baseline Survey of 1999 revealed that there were 1.3 million MSEs in Kenya by 1999 compared to 910,000 in 1993, reflecting a 7% increase per year (CBS, ICEG, K-REP, 1999). The survey also revealed that; 66% of the enterprises are located in rural areas. In terms of operations, the survey established that 13.4% of the enterprises are in manufacturing; 64.3% of the enterprises are engaged in trade while 14.8% of the enterprises are in services provision. In 1999, MSEs employed 2.4 million people (CBS, ICEG, K-REP, 1999) compared to 7.9 million people in 2008 (Government of Kenya, 2009). MSEs accounted for 85% of the total number of employees in the manufacturing sector in the year 2005 (KAM, 2006) and it absorbs about 77% of the total number of employees in Kenya (Government of Kenya, 2007). Figure 2.5 shows the number of employees in Kenyan MSEs during the last eleven years. In the year 1999 MSEs contributed 18% to GDP (CBS, ICEG, K-REP, 1999) while the Economic Survey of 2003 (Government of Kenya, 2003) shows that the MSEs contributed 18.4% in the year 2002. This could only imply that, with the help of appropriate technologies and technical support services, MSEs can contribute immensely to the growth of the Kenyan economy.

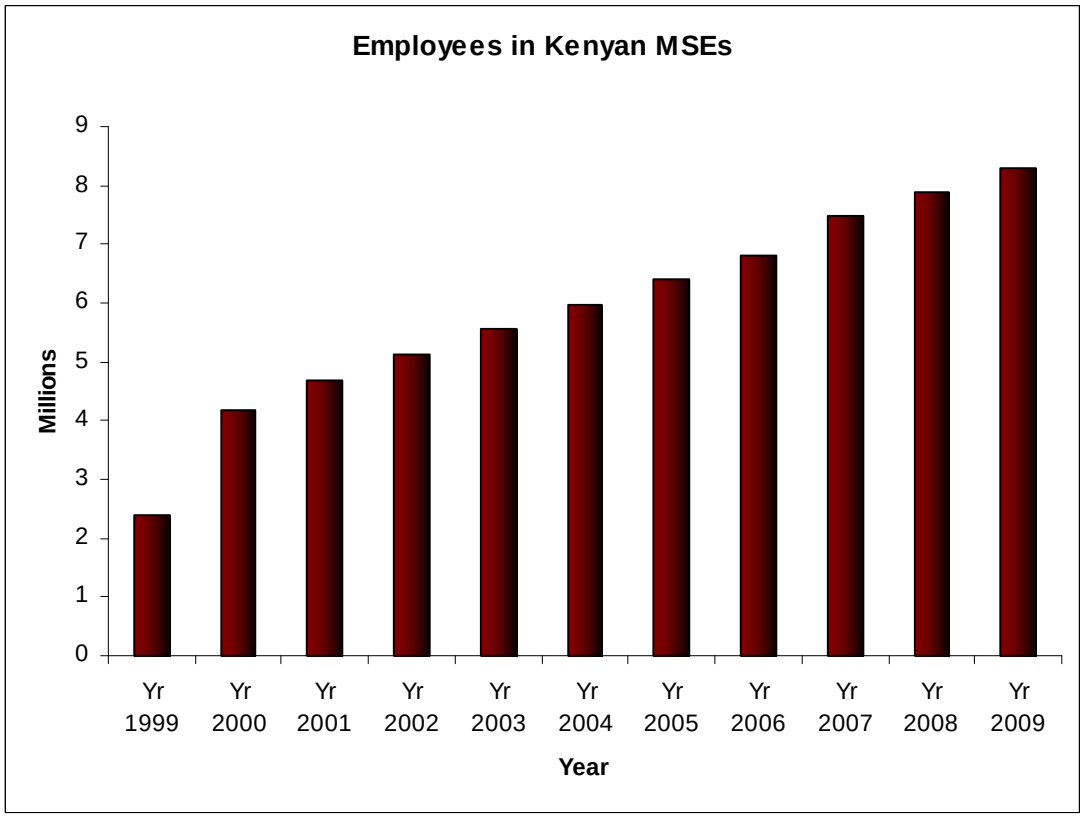

Figure 2.5: Number of employees in Kenyan MSEs in the last 11 years

2.7 Chapter Summary

In this chapter, a review of selected literature relevant to the study was done. The literature reviewed relates to Wireless technologies, MSEs in Kenya, and information systems theories in the study. The literature reviewed in this chapter provides a theoretical foundation for developing this research study. Chapter three follows from these observations and discusses the research methodology aimed at investigating the use of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs.

Chapter 3: Research Methodology

3.1 Introduction

In order to successfully achieve the stated research objectives in this study, a research methodology was chosen. This methodology involved the development of a conceptual model by a review of relevant literature and a pilot study. The conceptual model was tested and validated using instruments designed to measure suitability of wireless technologies for implementing an eBusiness infrastructure in Kenyan MSEs in three distinct phases. In the first phase, semi structured interviews were used to assess the constructs proposed from literature review and also to gather necessary information relating to barriers in use of wireless technologies for implementing an eBusiness infrastructure in Kenyan MSEs. In the second phase a questionnaire was developed, pre-tested and used for field survey. The survey data was analyzed using exploratory factor analysis (EFA) with SPSS version 17, Confirmatory Factor Analysis (CFA) as a Structural Equation Modeling technique was used to evaluate the measurement model with AMOS version 5 maximum likelihood method, while demographics tabulation and analysis was done using Microsoft Excel 2003. In the third phase the study was done via descriptive case studies using a multiple case design as described by Miles and Huberman (1994), and Yin (2003). Therefore, the study used a combined qualitative and quantitative research approach for its data collection.

Leedy (2008) defines research methodology as an operational framework within which facts are placed so that meaning may be seen more clearly. According to Mutai (2000), research methodology is a specific plan for studying the research problem and it constitutes the blueprint for the proposed collection, measurement and analysis of data. Research methodology is therefore dictated by the nature of the data required to answer the research questions. In respect to this, the research methodology in this study sequentially covers study design, target population, the sampling method, data collection methods, pre-test of data collection instruments, data collection and data analysis. The proposed research methodology is discussed here below, while figure 3.1 depicts the steps followed in the study.

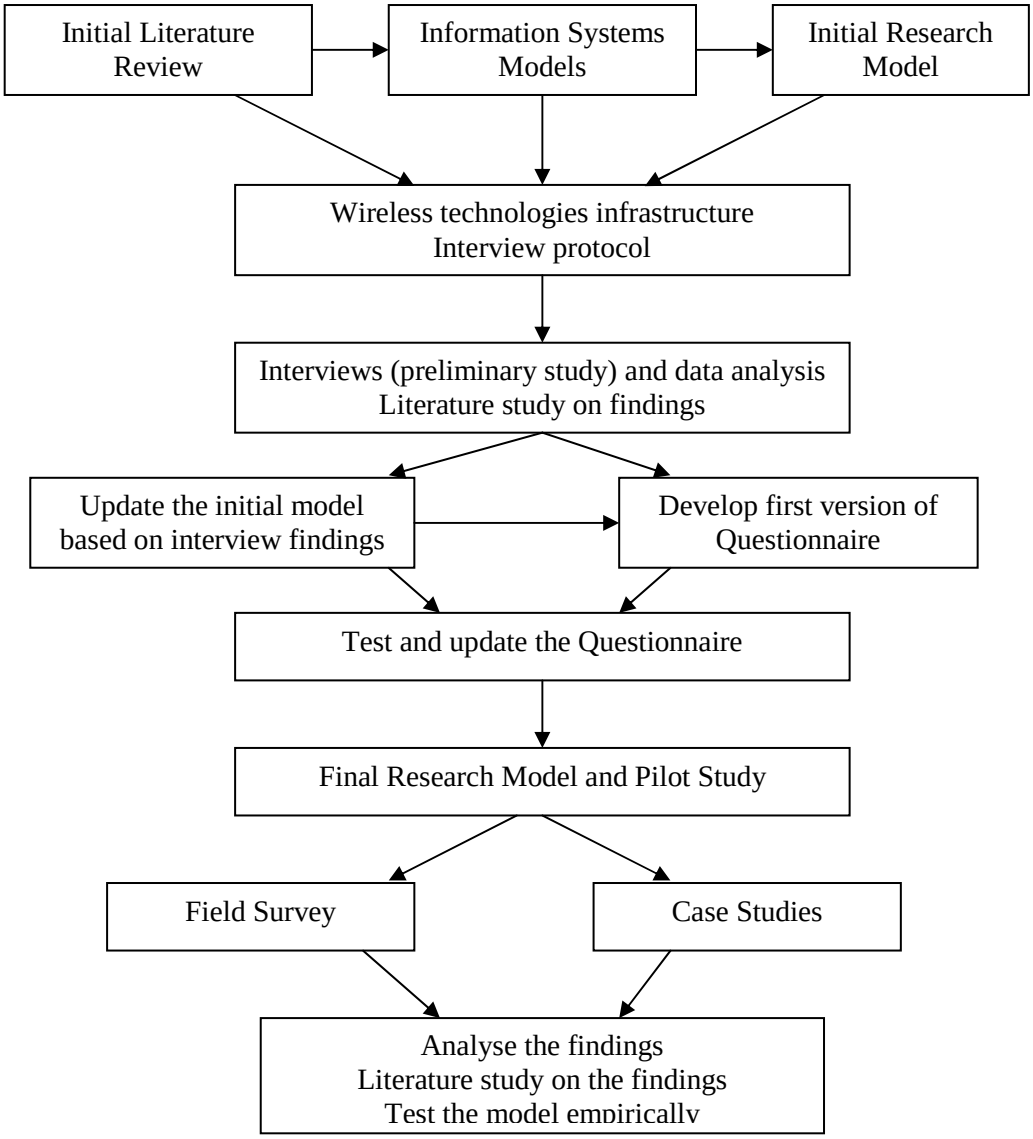

Figure 3.1: Study Approach

3.1.1 Defining the research focus

The core goal of the study was to identify specific factors that influence the use of wireless technologies in Kenyan MSEs' business processes and examine the impact of their use on the organizational-wide performance. These factors were identified using literature review on; wireless technologies, information systems theories and an interview based preliminary survey. These factors were then tested using a survey to identify how they are perceived by the participants and how they affect the participants' decision to use or not to use wireless technologies in running their businesses. In the final phase of the study, five descriptive case studies were done to help the researcher gain an in-depth understanding of the use of wireless eBusiness infrastructure and to strengthen the research model results.

3.2 Preliminary Study

The preliminary study was used to fine tune the findings of the pilot study. The preliminary study began by interviewing the entrepreneurs in the Kenyan MSEs sub-sector. The main data collection tool was semi-structured in-depth interview using the research protocol (appendix B). An interview is defined as an oral administration of questions with an intention to obtain in-depth enquiry about a certain study so as to meet certain objectives (Kothari, 2009). This is what this phase of the study intended to do. The researcher wanted to get a profound understanding of the specific factors influencing the use of wireless technologies in MSEs' business processes based on users' perceptions. Choosing to use interviews was ideal, as interviews are considered as a very good way of accessing people's perceptions, meanings, and definitions of situations and constructions of reality (Punch, 2005). Since the information is not quantifiable, the interview research method is usually described as qualitative. Interviews are particularly useful for getting the story behind participant's experience and interpretations. This is what made it the researcher's preferred method of data collection at this stage. Despite the said advantages, in-depth interviews are known to have the disadvantage of respondents not willing to open up which makes the method expensive in terms of time required (Mugenda and Mugenda, 2003).The researcher did overcome this by continuing to interview extra people in the target group until substantial information was obtained.

3.2.1 Selecting the participants: Kenyan MSEs

The context of the study was the Kenyan MSEs. The motivation for this research was drawn from a look at the significant benefits mobile telephones have brought to disparate and geographically remote population in Kenya and sought to explore how this expanding mobile telephone based infrastructure can be harnessed to support an enterprise-wide eBusiness infrastructure. This could benefit Kenyan MSEs by facilitating use of eBusiness applications through provision of new services and technical capabilities. This study seeks to evaluate whether wireless technologies meet MSEs' eBusiness infrastructure requirements. MSEs employ many people (figure 2.6) and contribute greatly to the Kenya's Gross Domestic Product. With the help of appropriate technologies and technical support services, MSEs could even contribute immensely to the growth of the Kenyan economy. For most Kenyan MSEs, mobile telephones are the first and only accessible telecommunication infrastructure available to them. Mobile telephone networks bring both voice and data communication, contributing significantly to economic development through creation of new

business opportunities, access to services and increased access to information. Data was collected using a survey questionnaire and five descriptive case studies on MSEs in Kenya and the sample was selected using proportionate stratified sampling method with well defined geographic clusters targeting respondents from forty eight MSEs (table 3.1) in Kenya.

3.2.2 Conducting the interviews

Forty four enterprises were interviewed at this preliminary stage using the interview protocol presented in appendix C. The enterprises were selected directly from the study population. This phase allowed the researcher to gain an overall understanding of the factors influencing use of wireless technologies in Kenyan MSEs and the application of eBusiness. Using in-depth interviews, data was collected by the researcher over a period of two and a half months between October and December 2009. The researcher took about one hour with the lead interviewee and few minutes with the other employees who were the users of one of the wireless technologies based infrastructure and eBusiness applications. The interviews formed the bases for understanding the way wireless technologies are used in the MSEs' business processes. The preliminary study targeted forty eight respondents, but only forty four were interviewed as indicated in Table 3.1 below. This was 91.67% of the targeted population.

Type of enterprise	**Size**	**Targeted**	**Achieved**	**Percentage**
Tourist related business	Micro	6	4	66.7%
Tourist related business	Small	6	8	133.3%
ICT services	Micro	6	10	166.67%
ICT services	Small	6	4	66.7%
Manufacturing	Micro	6	0	0%
Manufacturing	Small	6	6	100%
Trade	Micro	6	6	100%
Trade	Small	6	6	100%
Total		**48**	**44**	
Response rate		**91.67%**		

Table 3.1: Interviewees

From the list of the respondents, information was gathered on use of wireless technologies, use of eBusiness applications, enterprises' ICT infrastructure and demographics about enterprises and the respondents.

3.2.3 Preliminary Study Results

The preliminary study findings helped in the theoretical development of the research model discussed below by highlighting factors favoring use of wireless technologies to implement an eBusiness infrastructure as well as the barriers to the actual usage of wireless technologies in MSEs' business processes. Task-Technology Fit, Usefulness and Social Influence were identified as core factors positively influencing the use of wireless technology. The interviewees also gave affordability, Security Risks and Performance risks as factors limiting the use of different wireless technologies. Table 3.2 shows the final constructs and the number of their measurement items as derived from the preliminary study.

Model Construct (Items)	**Measures**	**Originally adapted from**
Appropriateness (6)	Quality of data, accessibility of data, Ease of use, System reliability, Assistance	TTF (Goodhue and Thompson, 1995)
	Mobility: employees can access same services from any where	Use context (preliminary study)
Acceptance (7)	Perceived usefulness, Social influence (Enabling Business Environment)	UTAUT (Venkatesh *et al.*, 2003)
Moderators (7)	Perceived risk factors (Security Risks and Performance Risks), Cost factors (Affordable prices) of using wireless eBusiness infrastructure	Barriers to use (preliminary study)
Utilization (4)	Use and frequency of using wireless technologies	TTF (Goodhue and Thompson, 1995)
Performance impacts (4)	Improved productivity and efficiency, reduced operation costs, improved communication and coordination, improve effectiveness	TTF (Goodhue and Thompson, 1995)

Table 3.2: Constructs derived from preliminary study

3.3 Developing the research model

The available models that are used to analyze adoption and performance impacts of IT use in organizations were developed before the availability and the onset of using wireless technologies in Kenyan MSEs. This necessitates development of new models or enlarging the existing ones in order to encapsulate the relevant variables that can comprehensively explain the use and impacts of using wireless technologies to implement an eBusiness infrastructure in MSEs. This is because wireless technologies exhibit some unique characteristics such as mobility and a number of peculiar services such as mobile money transfer, m-banking and short message service. To address these issues and answer the research questions, an initial model (Figure 3.2) concerning relationships among constructs was developed based on Task-Technology Fit (TTF) model by Goodhue (1998) and the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh, Morris, Davis and Davis (2003). The initial model had a construct to measure barriers to the use of wireless technologies in business processes as well as the determinants of user acceptance and appropriateness of using mobile technologies for implementing an eBusiness infrastructure in Kenyan MSEs.

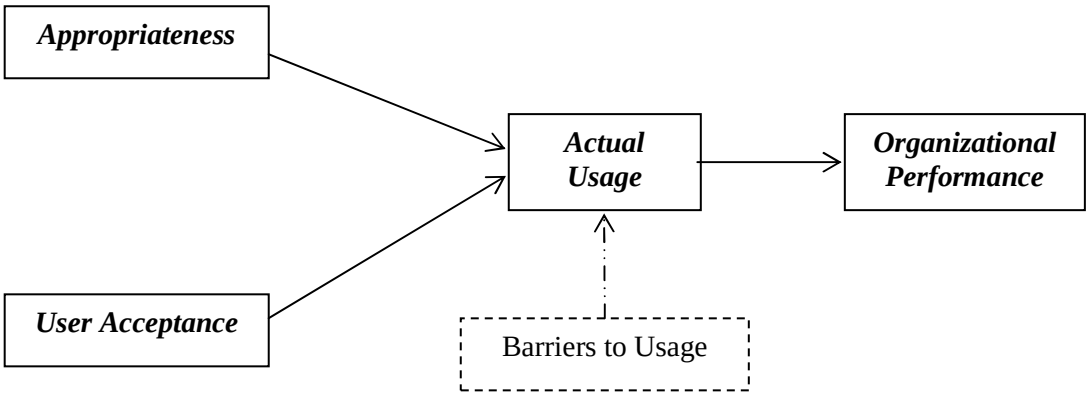

Figure 3.2: Initial research model: Researcher's illustration

The preliminary study was conducted to identify the factors influencing the use of wireless technologies in MSEs' business processes and to gain further understanding on the adoption of eBusiness in Kenyan MSEs. The essence of the preliminary study and the literature review was to ensure that the study constructs were well represented by a comprehensive list of measures. After the completion of the preliminary study, it was found that the initial research model could not fully describe all the possible constructs. The model was developed

further to include new measurement items. The final constructs are discussed in the following section and represented in figure 3.3.

The research model is made up of five constructs and each construct was measured using multiple measurement items adapted from existing literature but modified to reflect the research context of using wireless technologies to implement an eBusiness infrastructure.

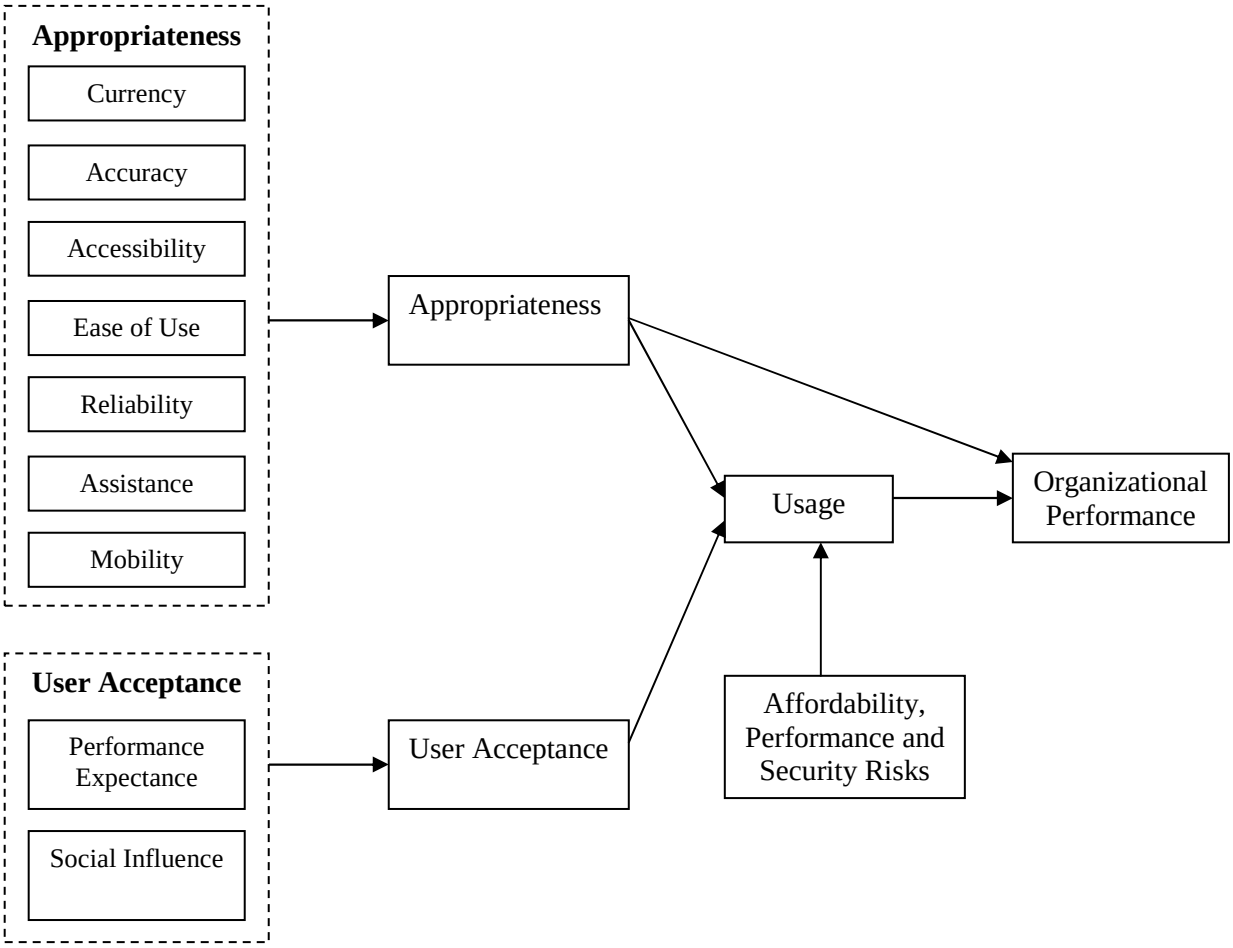

Figure 3.3: Proposed Research Model Source: Researcher's own illustration

The model specifically proposes the following relationships for empirical considerations:

i. Appropriateness (Task-Technology Fit) will have a direct positive effect on MSEs' use of wireless technologies to implement an eBusiness infrastructure.

ii. User Acceptance (Performance Expectance and Social Influence) will have a direct positive effect on MSEs' use of wireless technologies to implement an eBusiness infrastructure.

iii. Barriers (Affordability, Security risks and Performance Risks) will have a direct negative effect on MSEs' use of wireless technologies to implement an eBusiness infrastructure.

iv. Appropriateness (Task-Technology Fit) of wireless technologies in implementing an eBusiness infrastructure will have a direct positive effect on the MSEs' organizational performance.

v. Using wireless Internet as to implement an eBusiness infrastructure will have a direct positive effect on the MSEs' organizational performance.

The model also proposes the following mediations:

i. Use of wireless technologies to implement an eBusiness infrastructure mediates the relationship between the Appropriateness (Task-Technology Fit) of wireless technologies to implement an eBusiness infrastructure and the organizational Performance

ii. Use of wireless technologies to implement an eBusiness infrastructure mediates the relationship between the User Acceptance (Performance Expectance and Social Influence) of using wireless technologies to implement an eBusiness infrastructure and the organizational Performance

iii. Use of wireless technologies to implement an eBusiness infrastructure mediates the relationship between the barriers (Affordability, Security Risks and Performance Risks) and the organizational Performance.

3.3.1 Appropriateness or the Task-Technology Fit

Appropriateness implies Task-Technology Fit which is defined as the degree to which a technology assists an individual in performing his or her portfolio of tasks. TTF can also be defined as the degree to which the capabilities of the technology match the demands of the task (Goodhue and Thompson, 1995). This implies that any technology will be used if and only if, the functionalities it avails to the user support the accomplishment of the tasks that the user is expected to perform. In this case the tasks refer to any automated business activity which involves us of wireless technologies. With appropriateness, wireless technologies are expected to be "fit for the purpose" as articulated by Goodhue (1988, 1995, and 1998) and Goodhue and Thompson (1995) in the study of Task-Technology Fit. This means that the technologies should meet the requirements for use in MSEs' business operations and processes. When it comes to technology use and implementation, the question of choosing

the right technology always arises. The main aim of the Task-technology Fit (TTF) model by Goodhue (1998) is to match the capabilities of the technology to the demands of the particular task. It is from this model that the appropriateness construct's measurement items were derived from and tested during the preliminary study. Some of the dimensions that were not well supported during the pilot study were removed while a new construct, mobility, which is specific to the wireless technologies use context was added. Therefore, the appropriateness construct investigates whether wireless technologies meet the organizational eBusiness infrastructure needs. D'Ambra and Wilson (2004) states that there must be some degree of fit between the task and the technology chosen to accomplish it. It is only when there is fit between the task and the technology that the MSE will experience better performance by allowing the users of the technology to achieve more with less time and resources. This implies that TTF will have a direct positive effect on both usage and organizational performance. The dimensions of TTF used in this study were derived from literature and supported by the preliminary study. In this study, TTF is the degree to which wireless technologies can be used as eBusiness infrastructure to assist in automation of MSEs' business processes and assist the users to successfully accomplish their assigned tasks with ease and in time. Goodhue and Thompson (1995) recommended that there should be significant links between at least some of the eight TTF factors and utilization. This study's initial model had seven measurement items on the questionnaire to measure the Appropriateness construct adapted from Goodhue and Thompson (1995), Goodhue (1998), Goodhue (1995) and preliminary study findings. To measure Appropriateness construct items, data were collected using five-point Likert-type scale, where 1 indicated strong disagreement; 2 showed some extent of disagreement; 3 stood for Uncertain; 4 was for agreement to some extent; and 5 indicated strong agreement. Based on literature review, Appropriateness is expected to positively influence Usage and Organizational performance. Bukhari (2005) indicated that users tend to use systems only if the systems improve the users' task performance or decision quality. If not, they may shun using such systems unless their use is mandatory.

Appropriateness was measured using the following seven dimensions discussed below:

3.3.1.1 Currency

Currency implies that the data available to be used in decision making should be up-to-date enough for the required purpose. Adopted from Goodhue (1998), wireless technologies

should avail up-to-date information and in a timely manner. MSEs requires current data and information relating to bank transactions, utility bills, enterprise data and any other business transactions such as the order processing for effective business operations. Currency is a dimension of TTF and is measured using one item based on Goodhue and Thompson (1995) and Goodhue (1995, 1998).

TTF1: Wireless technologies allow me to access up to date information to meet my needs.

3.3.1.2 Accuracy

Accuracy is the availability and use of correct data to facilitate decision making and in all business transactions. Adopted from Goodhue (1998), wireless technologies should allows MSEs to use accurate information as one can monitor all stages of particular processes such as bank clearance, delivery vehicles, and sales teams. Accuracy is a dimension of TTF and is measured using one item based on Goodhue and Thompson (1995) and Goodhue (1995, 1998).

TTF2: The data that I use or would like to use is accurate enough for my purposes.

3.3.1.3 Accessibility

Accessibility refers to the ease of accessing the required data. Adopted from Goodhue (1998), the users of wireless technologies in their business processes would require that with a touch of button, they are able to access the required data and information to allow them complete any transaction or make decision. Accessibility is a dimension of TTF and is measured using one item based on Goodhue and Thompson (1995) and Goodhue (1995, 1998).

TTF3: I can get the information I need quickly and easily using Wireless technologies.

3.3.1.4 Ease of Use

Perceived ease of use is defined as the degree to which a person believes that using a particular system would be free of effort (Davis *et al*., 1989). Adopted from Goodhue (1998) and Venkatesh *et al.,* (2003), Ease of Use implies that the users of a particular wireless technology as an eBusiness infrastructure should find it either easy to use for accessing data

or easy to learn how to use the technology to access data. Mathieson and Keil (1998) investigated the relationship between Task-Technology Fit and Perceived Ease of Use and found that perceived ease of use was a function of TTF. Ease of use is measured using one item based on Goodhue and Thompson (1995), Goodhue (1995, 1998) and Venkatesh *et al.*, (2003).

TTF4: I find wireless technologies convenient and easy to use.

3.3.1.5 Reliability

Reliability refers to dependability and consistency of access and uptime of systems (Goodhue and Thompson (1995). Adopted from Goodhue (1995), users of wireless technologies for implementing an eBusiness infrastructure should expect the wireless technologies to be dependable if they are not subject to frequent outages or regular break downs most of the times. Reliability is a dimension of TTF and is measured using one item based on Goodhue and Thompson (1995) and Goodhue (1995, 1998).

TTF5: Mobile technologies are not subject to frequent problems.

3.3.1.6 Assistance

Technical support within the organization and from the service providers of wireless technologies may increase the level of technology fit and acceptance. Assistance is the ease of getting help in the event of a problems occurring during the use of wireless technologies eBusiness infrastructure. Adopted from Goodhue (1998), assistance implies that when using wireless technologies as part of the eBusiness infrastructure, most users require technical support from within the organization as well as from the supplier of the technology failure to which the users will seek alternative technology. Assistance is a dimension of TTF and is measured using one item based on Goodhue and Thompson (1995) and Goodhue (1995, 1998).

TTF6: I am satisfied with the technical support provided by the suppliers of wireless technologies

3.3.1.7 Mobility

Mobility is an inherent characteristic of wireless technologies and it reduces time and location dependence. To measure use of wireless technologies or any other new technology which has seen such an explosive growth, vast country penetration and which has different use contexts, traditional Fit and Acceptance models need to be extended and modified. Mobility was added by the researcher to the TTF dimensions to take care of the use context of wireless technologies. Wireless technologies allow users to perform their duties away from their desks, office environment and to access information and services when they require it in every minute of every day which makes wireless technologies exceptionally useful. Norris and West (2001) describe three types of mobility. These are Terminal mobility where devices can access services from different locations while in motion, Personal mobility which enables a user to access services at ant fixed or mobile terminal, and Service mobility which provides access to the same set of services from any connection point within public and private environments.

Service Mobility can be used to enhance service delivery when using wireless technologies as part of cloud computing. Cloud computing is a general term used to refer to various technologies that involve delivery of hosted services over the Internet. The technologies use the Internet and remote servers to maintain data and applications allowing users to use applications without installation and access their files at any storage location over the Internet. Cloud computing services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). IaaS allows an organization to outsource equipments to support its business operations such as storage, hardware, servers and networking components while PaaS allows enterprises to use rented hardware, operating systems, storage and network capacity over the Internet for running existing applications or developing and testing new ones. SaaS is the delivery and use of software over the internet hence reducing acquisition costs as the enterprise does not require buying the software.

The use of Mobile Money Transfer Services in Kenya is one of the huge beneficiaries of cloud computing through the use of Platform as a Service (PAAS) from Obopay (https://www.obopay.com). The yuCash Mobile Money Transfer Services by the Essar Telecom Kenya Limited (http://www.yu.co.ke) uses Obopay mobile payments service platform for its money transfer services. Obopay as a mobile payments service uses a number of tools to allow people add Obopay to their mobile money transfer services which

allows its users to receive, send or spend money using their wireless devices through partnerships with major industry players.

Mobility is a dimension of TTF and was formulated from wireless technologies use context based on preliminary study results.

TTF7: Mobile technologies allows me to perform my duties anywhere/anytime (away from my desk/office environment)

3.3.2 User Acceptance

User acceptance of any technology is based on the belief that using the technology would be beneficial to both the user and the organization. Acceptance was used to look at the other essential factors facilitating the use and integration of wireless technologies in MSEs' business processes and which are not part of the appropriateness measurement. This study adopts Dillon and Morris's (1996) definition of user acceptance as "the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support". Two factors and seven questions were identified to measure acceptance. These factors are the Performance Expectance (also called Perceived Usefulness) and Social Influence and are based on items from Venkatesh *et al.,* (2003). To measure User Acceptance construct items, data were collected using five-point Likert-type scale, where 1 indicated strong disagreement; 2 showed some extent of disagreement; 3 stood for Uncertain; 4 was for agreement to some extent; and 5 indicated strong agreement. Based on literature review, User Acceptance is expected to directly influence Usage.

3.3.2.1 Performance Expectance

Performance Expectance, alternatively referred to Perceived Usefulness has been researched repeatedly since 1989 (Davis *et al*., 1989; Jackson *et al*., 1997; Hu *et al.*, 1999; Agarwal and Prasad, 1999; Venkatesh and Davis, 1996, 2000; Venkatesh, 1999, 2000; Venkatesh and Morris, 2000; Venkatesh *et al.*, 2003). The reason people and organizations employ any information technology is because they find the technology useful to their business operations. Adopted from Venkatesh *et al*., (2003) and Davis *et al.*, (1989), Performance Expectance refers to the degree to which the user of a system believes that using the technology would enhance his or her job performance in carrying out their job related task.

People tend to use or not to use an application to the extent that they believe it will enhance their job performance (Davis *et al.*, 1989). Therefore, Performance Expectance is the user's believe that using wireless technologies to implement an eBusiness infrastructure would enhance his or her job performance in carrying out any eBusiness related task. Performance is measured in terms of improved productivity, accuracy and improvement on the speed in which tasks are accomplished. High Performance Expectance is more likely to induce positive attitudes towards using wireless technologies for implementing an eBusiness infrastructure as well as continued usage. Performance Expectance is a dimension of User Acceptance and was measured using four items based on Venkatesh *et al.*, (2003).

PE1: I find wireless technologies useful in my work
PE2: Using wireless technologies increases my productivity
PE3: Using wireless technologies improves my job performance
PE4: Using wireless technologies enables me to accomplish my tasks more quickly

3.3.2.2 Social Influence

Adopted from Venkatesh *et al*., (2003), Social Influence is defined as the user's perception that importance others believe that he or she should use the system. The eBusiness infrastructure facilitates communications inside the organization and between organizations and therefore requires co-adoption between organizations. Therefore, critical mass is a requirement for any successive adoption of any inter-enterprise communication technologies. This means that Social Influence includes the perception that the technology is widely used within the economy, support from both the management and government, and pressure from customers and suppliers. From the literature, Social Influence will have a positive effect on Usage and it is a dimension of User Acceptance. Social Influence as a dimension of User Acceptance was measured using three items based on Venkatesh *et al.*, (2003).

SI1: The management supports the use of wireless technologies
SI2: Our customers/suppliers think that the enterprise should use wireless technologies
SI3: We are using wireless technologies because they are now widely used

3.3.3 Usage/utilization

Goodhue and Thompson (1995) defined utilization as "the behavior of employing the technology in completing tasks". Van (1986) indicates that organizations will not realize their desired organizational level impacts from IT without the usage of IT by individuals in the organization. This makes usage a key component of any successive information systems implementation. Usage is the decision by the particular MSE to make full use of wireless technologies in its business operations. Adopted from Goodhue (1998), usage is the intensity, diversity and frequency of using wireless technologies in the MSEs to facilitate intra-enterprise and inter-enterprises business processes. Usage is influenced by appropriateness and user acceptance and it is a predictor of organizational performance. It is a measure of how the organization is dependent on the wireless technologies for its eBusiness infrastructure and how wireless technologies support existing business processes. This study used two methods to measure usage. Usage is usually measured by frequency of use in performing a particular task (Davis, 1989, 1993; Kwon and Chidambaram, 2002; Mao, 2002; Fishbein and Ajzen, 1975; Malhotra and Galletta, 1999, Thompson *et al.*, 1991). The study also measured utilization using three measurement items based on Lee *et al.*, (2004); Davis *et al*., (1989); and Thompson *et al*., (1991). Usage will have a positive effect on organization and individual performances. Usage was measured using items based on Lee *et al.*, (2004); Davis *et al*., (1989); and Thompson *et al*., (1991).

US1: I consider using mobile technologies very positively
US2: It is a very good decision to use mobile technologies
US3: I am willing to use mobile technologies continuously

Statements to measure how frequent the organization uses wireless technologies in its business operations were also used to measure usage on a scale of 1(Do not use at all) to 7 (Uses several times in a day) how many times in a day the MSE uses wireless technologies.

3.3.4 Organizational Performance Impacts

Lucas (1975) suggests that one way to measure any Information Systems success is to determine the impact of Information Systems on individual or organizational performance. Performance impact relates to gains in organization's service delivery through efficient accomplishment of portfolio tasks by an individual. Irick (2008) suggests that an information system must be both utilized and fit the task that is supported in order to have a positive

impact on performance. Goodhue (1998) indicates that organizational performance is measured by evaluating the impact of usage on service delivery processes, service quality, delivery costs and efficiency. Therefore, organization performance impacts is a measure of how using wireless technologies as eBusiness infrastructure aids the performance of the MSE and the presence of identifiable operational, transactional and interactional benefits. Most of the wireless technologies are relatively new or fast evolving and as Jen *et al*., (2007) suggests, any use of new technology usually helps to improve organizational-wide performance. The construct Performance Impacts is positively related to both the usage and TTF. Performance impacts were measured using the following items.

OP1: Mobile technologies have a large, positive impact on enterprise performance
OP2: Mobile technologies have improved efficiency in the enterprise processes
OP3: Mobile technologies have helped the enterprise to provide better services
OP4: Using mobile technologies has reduced the enterprise's operational costs

3.3.5 Barriers

Though wireless technologies may meet the MSEs' eBusiness infrastructure requirements and even though they may be widely accepted and used, there remain factors which might negatively influence their usage. These include:

3.3.5.1 Performance Risks

Performance Risks are the technical challenges related to use of wireless technologies to implement as eBusiness infrastructure. Wang *et al*., (2003) defines perceived risk as the consumer's subjective expectation of suffering a loss in pursuit of a desired outcome while Greatorex and Mitchell (1994) suggest that perceived risk is multi-dimensional in nature and captures performance, physical, financial, psychological, social loss and time. Grewal *et al*., (1994) defines Performance Risk as "the possibility of the product malfunctioning and not performing as it was designed and advertised and therefore failing to deliver the desired benefits" and so does Horton (1976) who defines performance risk as a fear of loss that may be incurred when a brand, product or supplier does not perform as expected. The notion that performance risk is based on the belief that a product may not perform as expected or not provide the benefits desired is also supported by Pope *et al.*, (2001) and Mitchell (1998). The reputation of any wireless technologies is garnered through its performance and reliability.

While using wireless technologies, users may experience technical challenges related to their performance. Weak signal, congested voice networks and failure to confirm a Mobile Money transfer requests are some of the technical hitches that can occur when using wireless technologies in business operations. Weak signal reduces the expected performance of wireless Internet and mobile money transfer delays and outages causing a lot of anxiety. In this relationship performance risks is a dimension of barriers and have a negative effect on usage. If consistently present, functional problems of technical in nature may also hamper usage by presenting sporadic performance degradation or raise security issues which adversely affect quality of service resulting to inadequacy in the infrastructure. Performance risks were measured using the following items based on Grewal *et al*., (1994).

PR1: There are functionality (network outages such as temporary disruptions or communication failures) issues when using wireless technologies
PR2: There is high uncertainty about provider's action with errors occurring during the use of wireless technologies and related services such as money transfers

3.3.5.2 Security Risks

It is more important and critical to keep enterprise data and information private and secure. Perceived Security is defined as the ability of the wireless technologies to protect MSEs' data, information and financial transactions data from being accessed without authorization or even stolen during transmission. It is the degree to which a person believes that using wireless technologies in his or her daily business tasks renders them vulnerable to security risks. When using mobile money transfer services, money could be lost through the touch of the wrong button or through criminal acts, hence the fear of losing money could be a hindrance to use of mobile cash transfers. When using wireless Internet and WLAN, chances of hacking and eavesdropping also exist resulting to security and privacy risks. In some instances people may not be so much concerned about the security of the technology that they are using as indicated by Karvonen (1999) who suggests that the majority of computer system users are relatively ignorant about the security or non-security of system they use and even if asked, they claim that they do not care about it. Security risks were measured using the following two items.

SE1: Security concerns are an obstacle to the use of wireless technology services

SE2: There is a possibility of my information getting into the wrong hands when using wireless technologies

3.3.5.3 Affordability

Affordability refers to the ability of the MSE to pay for wireless technologies and related services. It is the ability of the enterprise to pay for the equipment, subscription of the services and continued use of the services. Affordability is usually determined by the price attributed to the purchase of the wireless equipments and the expenses associated with using the related services. Price is viewed more broadly as the sum of the values consumers exchange for the benefits of having or using the product or service (Kotler, *et al*., 2004), it is the amount of money an individual is prepared to pay to acquire a product or service. Siegel (2003) indicate that most consumers use price as a determining factor in deciding whether or not to purchase a product implying that affordability is dependent on prices. Most users of mobile telephones and related services purchase decisions are ultimately affected by the prices. There are two kinds of costs associated with use of wireless technologies. These are the initial purchase costs and the operational costs. High costs of the equipments and services could significantly affect the use of Mobile Internet and Mobile Money Transfer services even if these technologies adequately meet the MSEs' eBusiness infrastructure requirements. Prices and cost factors are measured using affordability variable. Saunders *et al*., (1991) suggests that high cost of technology leads to lower intent to adopt while DiMaggio *el al*., (1983) argued that the less expensive the innovation is, the more likely it will be adopted. The cost of wireless technologies includes the cost of purchase, setup, maintenance and the utilization cost. High cost of buying wireless devices and high charges of using wireless Internet, mobile telephone airtime and inter-connectivity rates would negatively impact on the use of wireless technologies. Price is considered as the most important attribute for basic and advanced users of advanced mobile features by Constantiou, Damsgaard, and Knutsen (2007). Cost variable was measured using two items adopted from Premkumar and Roberts (1999). These two items are the installation cost and maintenance cost. Therefore, cost will have a negative effect on usage. The following two items used to measure affordability are based on Premkumar and Roberts (1999) and modified to suite this study.

AF1: It is expensive to buy good quality wireless technologies and related services
AF2: It is expensive to use wireless technologies and related services

3.4 Research design

Formulation and description of the research design is a key component of this study. Kumar (2005) describes research design as a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately and economically while Kothari (2009) describes research design as the manner in which researchers go about collection and analysis of data to achieve research objectives. Therefore, the following study design gives an outline of the steps involved in planning, organization, collection and analysis of data with the objective of answering the research questions. This is done by identifying the methods involved in selecting the target population, identifying the location, getting the desired sample and collecting data. Cooper and Schindler (2008) present two important aspects of research design. One of the aspects portrays research design as the blueprint used for the collection, measurement, and analysis of data, while the other aspect depicts research design as an expression of both the structure of the research problem, the framework, organization, or configuration of the relationships among variables of the study and the plan of investigation used to obtain empirical evidence on these relationships. During this process the researcher sought to ensure quality in the procedures used in order to guarantee their validity, objectivity and accuracy.

A study may be either exploratory or formal. The main objective of exploratory studies is to discover a future research problem. A formal study begins with a hypothesis or research question and involves specific procedures and data sources (Cooper and Schindler, 2008). Examples of formal studies include experimental, quasi-experimental and descriptive. Experimental study involves control over the research environment and aims to establish a cause and effect relationship among variables. Quasi-experimental design involves comparing subjects under a specific treatment with specific group not exposed to similar statement. The aim of quasi-experiment design is to establish the impact of the treatment on research subjects (Kothari, 2009; Cooper and Schindler, 2008). Descriptive studies do not involve any form of control over the research subjects and the main goal is description of the state of affairs as it exists at present (Kothari, 2009; Cooper and Schindler, 2008). Since this study sought to describe the factors influencing the applications of wireless technologies in Kenyan MSEs business processes, a descriptive research design was considered the most appropriate. The other reason why descriptive research design was preferred for this study is drawn from Peil (1995) where descriptive research is recognized as having the ability to give room for probing for more information, exploring new ideas and simultaneously generating discussions and information on emerging concerns on the line of thoughts. Based on Yin

(2003), the suitability of descriptive research design for this study rests on the fact that human beings live by interpreting phenomenon around them. Yin (2003) also indicates that a research design is specific to a particular research and therefore, it should be chosen as a function of the research situation. Therefore a descriptive research design was used for this study because as Chandran (2004) suggests, a descriptive study describes the existing conditions and attitudes through observation and interpretation, and this is what this study intended to do. This study seeks to investigate and interpret specific factors influencing the use of wireless technologies in MSEs' business processes. A descriptive research design is also considered as one of the most accurate methods of carrying out research in human contexts because it portrays accurate current facts through data collection for testing hypothesis or answering questions with a view to concluding the study (Kothari, 2009).

3.4.1 Population and target population

A population is an entire group of individuals, events or objects having common observable characteristics that the researcher wishes to investigate (Sekaran, 2003). Cramer and Howitt (2004) define a population as all units of a particular type of entity. This may be limited by geographical location or other characteristics such as age or gender. Mugenda and Mugenda (2003) describe a population as an entire group of individuals, events or objects having common observable characteristics from which the researcher wishes to make some inferences and on which the obtained results are generalized. This study was intended to be a national representative survey on the use of wireless technologies in business processes within Kenyan MSEs. The population included all MSEs in Kenya and particularly those in the Trade, Manufacturing and Tourism sub-sectors. The relevant population was realized as follows:

Most MSEs in Kenya do not regularize their operations beyond the licensing requirements by local authorities. This makes using local and municipal council licenses as the only formal way of recognizing proper enterprises for this study. The government of Kenya has classified businesses in all municipal and county councils in eight broad categories. These categories are based on license categories as per city and municipal councils' by-laws. These categories are:

1. General Trade, Wholesale, Retail, Stores, Shops, and Personal Services: This includes businesses such as Distributors, Wholesalers, hypermarkets, supermarkets, show

rooms, boutiques, retail shops and stores, chemists, take-away butcheries, personal service providers, and kiosk.

In this category, the businesses that fall under MSEs as defined by the researcher were those which fall in codes 110 and 115. These subcategories had a total of 73,465 licensed enterprises in Nairobi and a total of 1723 licensed enterprises in Nanyuki.

2. The category constitutes what is commonly referred to as the informal or the "*Jua Kali"* sector. *Jua Kali* is Swahili word for "hot sun" which is used in Kenya to refer to micro-enterprises in the informal sector as most of the traditional informal sector enterprises carry out their businesses under the hot sun without adequate shelter or workshop space. These include the hawkers, street vendors and small traders and service providers operating on the streets, verandah or any temporary building.

This particular category was not a target for this study because by the time of the study, the councils had already stopped issuing this category of business with operating licenses. Instead, they pay a daily fee to operate from the designated hawking areas. The other reason why this group was not a target for the study is that hawkers are always on the move and operate from different locations at different times of the day.

3. The category comprise of businesses dealing with Transport, Storage and Communications: This includes businesses such as maritime and airlines, international carriers, taxis, matatu (public transport vehicles), buses, lories, planes, boats, driving schools, tour/safari operators, petrol stations, storage facilities, cold storage facilities, publishing co-newspapers, books, texts, telephone companies, broadcasters (radio and TV), and Internet provider.

In this category, the business that satisfied the criteria of MSEs as defined by the researcher was those that fall in codes 375 and 380. These subcategories had a total of 274 licensed enterprises in Nairobi and a total of 5 licensed enterprises in Nanyuki.

4. The category has businesses in Agriculture, Forestry and Natural Resources Extraction: This includes such business as production of coffee, tea, fruit, flowers, cereals, vegetable and horticultural products. It also has grain storage and processing, mills, bakeries, forestry and timber production, sawmills coal production as well as Animal breeding, dairy

products processing, slaughter houses. Mining and other natural resource extraction activities are also included in this category.

In this category, the business that satisfied the criteria of MSEs as defined by the researcher were those which fall in the codes 410 and 415. These subcategories had a total of 2843 licensed enterprises in Nairobi and a total of 27 licensed enterprises in Nanyuki.

5. The category comprise of businesses which offer Accommodation and Catering: This includes such businesses as international hotels, tourist camps, lodging houses, restaurants, bars, eating houses, tea and coffee houses. Also included in this category are Butcheries with meat roasting and/or soup kitchen facilities and Membership clubs, night clubs and casinos.

In this category, the business that satisfied the criteria of MSEs as defined by the researcher fall in the codes 506, 509, 512, and 515. These subcategories had a total of 563 licensed enterprises in Nairobi and a total of 32 licensed enterprises in Nanyuki.

6. The category constitutes businesses offering Professional and technical Services: These includes firms and individuals offering services on legal issues, financial, management, engineering, architecture, valuing, surveying, accountancy, secretarial support, data processing etc. Other businesses included in this category are stock and insurance brokering, security-protection, and customs clearing. Others include the banks, forex bureau, money-lenders, Hire Purchase Companies, Insurance companies, real estate, developing and finance companies.

In this category, there were no enterprises which satisfied the study requirement set by the researcher based on the MSEs' business operations.

7. Private Education, Health and Entertainment Services: These include businesses such as private education institutions including universities, museums, nurseries, primary and secondary schools, professional training centers/polytechnic institutes. In the health sub-sector this category includes Private Health Clinics and Doctor's surgeries, Consulting Offices of Doctors, Dentists, Physiotherapists, Psychologists and other health professionals. Other businesses in this category include the Herbalists and traditional Medicine

Practitioners, Funeral homes, Entertainment Facilities such as Cinema, Theatre, Video Show, Amusement Arcade, Juke box Arcade, Games Machines Arcade, Sports Club, and Gym.

In this category, there were no enterprises which satisfied the study requirement set by the researcher based on the MSEs' business operations.

8. The final category has businesses such as Industrial plants, Factories, Workshops, and Contractors. These include businesses like manufacturing of products, assembling vehicles, machinery and equipment, workshops for servicing and repairing products, vehicles, machinery and equipment. Also included in this category are the contractors of new buildings and service repairs.

In this category, the business that satisfied the criteria of MSEs as defined by the researcher falls in the code 815. This subcategory had a total of 664 licensed enterprises in Nairobi and a total of 14 licensed enterprises in Nanyuki.

Other than the number of employees in an MSE, the other criterion used to select the MSEs was the business operations sub-sector. The study enterprises were required to be operating in one of the three sectors, namely Tourism, Manufacturing and Trade (wholesale and retail). These are the key sectors given priority in the Kenya Vision 2030 (NESC, 2007) as economic strategy growth drivers. For the purpose of analysis, the questionnaire (appendix A) was designed in such a way that all the required parameters were captured. Based on the above criteria, the total population for this study was deemed as 74,668. This included 72,892 enterprises in Nairobi and 1766 enterprises in Nanyuki (table 3.3).

Business category	Business code	Description	Population in Nanyuki	Population in Nairobi
1	100	Medium Trader, Shop or retail Service	117	52,987
	115	Small Trader, Shop or retail Service	1,592	15,348
3	375	Medium Communications Company	2	82
	380	Small Communications Company	3	192
4	410	Medium Agricultural Producer/Processor	5	276
	415	Small Agricultural Producer/Processor	22	2,567
5	506	Medium High Standard Lodging House	1	49
	509	Small High Standard Lodging House	0	68
	512	Large Lodging House with restaurant	5	177
	515	Medium Lodging House with restaurant	4	269
	518	Small Lodging House with restaurant	11	213
8	815	Small Industrial plant	14	664
Total			1766	72892
Grand Total			**74,668**	

Table 3.3: Targeted population

3.4.2 Site description and selection

The study divided Kenya into two clusters. One cluster representing the cities and the other cluster representing the rural areas. The selection of the study sites was based on social and economic characteristics. Most of the Kenyan population live in the rural and remote areas thus making MSEs in rural areas a special focus. The rural representation site was Nanyuki while the city representation was Nairobi.

3.4.2.1 Nanyuki Town

Nanyuki town was chosen as a model Kenyan rural town. The researcher acknowledges that if wireless technologies are adopted successfully in rural areas, this could stir economic development through creation of new business opportunities, access to services and increased access to information. Nanyuki is a town lying on the equator and North West of Mount Kenya. It is often visited by climbers and backpackers on their way to or from Mount Kenya. Mount Kenya is the highest mountain in Kenya and the second-highest mountain in

Africa with its highest peak Batian at 5199 meters (17058ft) above sea level. Economic activities in Nanyuki consist mainly of tourism, trade, horticulture and ranching. Other economic activities include small scale industries in textile and food processing. Nanyuki also has the Kenya Air force training barrack as well a British army training base.

3.4.2.2 City of Nairobi

Kenya has three cities and Nairobi is the capital and the largest city. The city was an ideal study site as most technologies are usually first rolled out in Nairobi and naturally it tends to have a higher technology penetration rate. It is home to many companies and regional headquarters of several international companies and organizations making it an established hub for business. Goods manufactured in Nairobi include clothing, textiles, building materials, processed foods and beverages while several international companies have factories based in and around the city. Nairobi hosts many visitors not only for business but also safari-bound tourists as it is endowed with several tourist attractions sites, museums and hotels.

Figure 3.4 is a map of Kenya indicating where the two study towns are located, relative to each other in the context of Kenya as a whole.

Figure 3.4: Study Areas

Source: http://www.nationsonline.org/oneworld/map/kenya_map2.htm

Note: The Map is showing Kenya and the surrounding countries with international borders, the national capital Nairobi, provinces capitals, cities, main roads, railroads and major airports. The Study locations are shown using the red block arrows.

3.4.3 Sampling design

A sampling method is defined as away of selecting a portion of the population such that the selected portion represents the population adequately (Chandran, 2004). Cooper and Schidler (2008) describe a sampling procedure as the systematic process of selecting a number of individuals for a study to represent the larger group from which they are selected. There are two broad methods of selecting a sample namely non-random or judgmental and random or probability sampling. Non-random sampling is open to researcher's bias and sample characteristics cannot be generalized to the population as opposed to random sampling where each entity has an equal chance of being selected. The main advantage of random sampling is that the sample characteristics can be generalized to the population, although with a margin of error (Levin and Rubin, 2001). For this study random sampling was used.

Since data was to be collected in two different geographical locations, an area sampling or geographic cluster sampling was used. The enterprises were either in cluster one, which was Nanyuki town or cluster two, which was Nairobi city. In each cluster, the researcher employed proportionate stratified random sampling to select the respondents. In proportionate stratified sampling, the number of elements from each stratum in relation to its proportion in the total population is selected (Kumar, 2005). This means that the chosen sample is forced to contain participants from each of the segments or strata of the population such that the number of participants chosen from each group is proportional to the number in population. In this study, the population was segregated into mutually exclusive subpopulations, or strata using business categories. Stratified random sampling was chosen because it is efficient, gives adequate data and accommodates varying research procedures (Cooper and Schindler, 2008). The selected study enterprises were operating in one of the three sectors, namely Tourism, Manufacturing or Trade (wholesale and retail). These are the key sectors given priority in the Kenya Vision 2030 (NESC, 2007) as economic strategy growth drivers.

3.4.4 Sample size and selection

A sample is a set of entities drawn from a population with the aim of estimating characteristics of the population (Cramer and Howitt, 2004). Therefore, sampling is a systematic process of selecting a number of individuals for a study to represent the larger group from which they are selected. Cooper and Schindler (2008) gives reasons for sampling as lower cost, greater accuracy of results, greater speed of data collection and the availability

of population elements. The ultimate test of a sample is how well it represents the characteristics of the population that it purports to represent (Cramer and Howitt, 2004). Some principles that influence sample size include dispersion or variance within the population. The greater the dispersion or variance, the larger the sample must be to provide estimation precision and narrow the error range. The greater the number of subgroups of interest in the sample, the greater the sample size must be as each subgroup must meet the minimum sample requirements. Cost considerations also influence decisions about the size and type of sample (Cooper and Schindler, 2008). MSEs in Kenya operate under similar conditions and have uniform characteristics. This makes the sample size to be used not a critical factor. Hair *et al.,* (2006) recommend a sample of between 200 and 400 respondents are needed to derive adequate effect sizes for structural equation models. The researcher's main focus was to get a sufficient and correct sample.

Sekaran (2003) describes sampling as the process of selecting a sufficient number and the right type of elements for study from a certain population. In this study, the sample size (n) is 170 MSEs for Nanyuki and 400 MSEs for Nairobi.

The following process was used for drawing the sample for this study.

1. Stage one: Determining the variables to use for stratification and their respective proportions. The stratification was done using the business categories as indicated in table 3.3. These were (1) General Trade, Wholesale, Retail, Stores, Shops, and Personal Services; (3) Communications, (4) Agriculture Producer/Processor; (5) Accommodation and Catering; (8) Industrial Plants and Factories
2. Stage two: Randomize the elements within each stratum
3. Stage 3: Follow random sampling to draw samples from each stratum.

The sample included 570 enterprises of which 400 were drawn from Nairobi and 170 enterprises in Nanyuki (table 3.4 below).

Business category	Business code	Description	Sample size (n) for Nanyuki	Sample size (n) for Nairobi
1	100	Medium Trader, Shop or retail Service	10	150
	115	Small Trader, Shop or retail Service	105	100
3	375	Medium Communications Company	2	10
	380	Small Communications Company	3	10
4	410	Medium Agricultural Producer/Processor	5	20
	415	Small Agricultural Producer/Processor	20	30
5	506	Medium High standard Lodging House	1	10
	509	Small High standard Lodging House	0	10
	512	Large Lodging House with restaurant	5	10
	515	Medium Lodging House with restaurant	4	10
	518	Small Lodging House with restaurant	5	10
8	815	Small Industrial plant	10	30
		Total	**170**	**400**

Table 3.4: The targeted sample

3.4.5 Data collection methods and tools

Data collection procedures refer to the processes followed in collection of research data (Kothari, 2009). Data collection involves consulting primary and secondary data sources in order to elicit information, facts, evidence, proof or truths regarding research problems (Babbie, 2006). There are many methods of collecting primary data, but the choice of the method to use is influenced by the nature of the problem and the availability of time and money (Cooper and Schindler, 2008). Data was collected with the help of the entrepreneurs or key managers. Only one person per enterprise was allowed to participate in the survey. In some cases the managers would delegate this role to the technical person in charge of ICTs. The primary data collection tools used for data collection in this study included the questionnaire, case study and interviews. Data was collected over a period of three months between January 2010 and April 2010. The researcher also relied on Nanyuki Municipal Council and Nairobi City Council for the details of the licensed businesses under their jurisdiction for the study. The records were considered credible and reliable, because they

were availed by the licensing officers who are in charge of supervisions and who ensure that all enterprises operate only when issued with a license.

The research used a combined qualitative and quantitative research approach using the following methods for data collection:

a) Survey Questionnaire
b) Semi structured Interviews
c) Available records and observations
d) Case study

3.4.5.1 Questionnaires

Using the questionnaire method for data collection has become the most widely used method (Leedy, 2008). This is because of the method's versatility, cost effectiveness and elimination of time constraints relative to observations or interviewing. Questionnaire also has its limitations such as the unwillingness of the respondents to provide information for one reason or the other and the potential of the questioning process influencing the results obtained. In spite of these limitations, the questionnaire method was deemed the most appropriate technique since most survey participants' work both as the managers and employees of the enterprises. This keeps them quite busy most of the time during the day. Use of questionnaires allowed them to fill the questionnaire at a time of their choice. Leedy (2008) notes that a structured questionnaire produces more information from the respondents, which are easier to tabulate and interpret than those gathered by other ways such as the interviews or observations. Nanyuki is a small town and therefore the participants were selected randomly. To ensure representation of all the sub-sectors, Nairobi was divided into four area clusters from which respondents were drawn. The questionnaire had the following sections:

Section 1: This section had eleven questions to capture general information about the enterprise and respondent.

Section 1a: Five questions to capture information on the organization's background.
Section 1b: Six questions to capture information on the participant's background.

Section 2: This section had eighteen questions to capture information on the current enterprise business technological infrastructure and use of web and eBusiness applications.

Section 3: This section consisted of a list of twenty six general statements to measure the factors determining the use of mobile technologies in the organization's business processes. Each item in this section of the questionnaire was measured on a five-point Likert-type scale aimed at testing the level of agreement about the use of wireless technologies in MSEs business processes with two extreme end points of "strongly agree" (5) and "strongly disagree" (1).

Section 4: This section had statements to measure the frequency of using different wireless technologies for business processes within the organization. This was supposed to measure how dependent the enterprise was to various wireless technologies.

3.4.5.2 Case Studies

To get a deeper understanding of the status of wireless technologies in MSEs, and to further examine the specific factors influencing their use in MSEs' business processes, the researcher opted to cement the results of the questionnaire by doing five descriptive case studies. Case study method is an approach to studying a social phenomenon through a thorough analysis of an individual case (Kumar, 2005). This seeks to get an in-depth understanding of the subject of the study. Case study were used to gain better understanding of the factors identified in the modified model and to identify any new factors if any was present. Case studies are appropriate research strategy when "how" or "why" question are being asked about current set of events in their natural setting and when no experimental controls are involved (Yin, 2003). The results of a case study are not generalized because the technique rarely yields precise descriptive statements about a large population (Babbie, 2006). Therefore the results obtained in these cases are only used to gain an in-depth understanding of use of wireless technologies to implement an eBusiness infrastructure in the natural business environment. Table 3.5 gives the five enterprises selected as case studies of using wireless technologies to implementing eBusiness infrastructure. For each MSEs, data was collected using semi-structured interviews with the managers in two different occasions.

MSE	Location	Type of Business	eBusiness infrastructure based on Wireless technology
Enterprise A	Nairobi	Trade (Hardware)	Receiving payments through Mobile Money Transfer
Enterprise B	Nairobi	Tourism Services	SMS advertising
Enterprise C	Nanyuki	Manufacturing	Mobile Banking
Enterprise D	Nanyuki	Trade (Internet services)	Wireless Internet
Enterprise E	Nanyuki	Tourism	Extending LAN with WLAN

Table 3.5: Case study enterprises

The case study design

The case study design for this study includes five descriptive, in-depth studies on use of wireless Internet, Wireless LAN, M-banking, SMS advertising and Mobile money transfer services. This is because the case studies were aimed to help test and strengthen the final research model. Eisenhardt (1989) indicate that multiple case designs are appropriate when the intent of the research is description, theory testing, or theory building. Table 3.6 below presents details of the case study design.

Characteristics	Multiple Cases
Number of cases	Five
Unit of analysis	Managers
Study objectives	Explanation and Description
Appropriateness and user acceptance of wireless Internet, Wireless LAN and Mobile Money	Factors influencing their use and barriers to their use
Method of analysis	Description

Table 3.6: Case study design

Case study protocol: Yin (2003) states that having a case study tool is essential if a multiple case design is being used. A case study framework (Appendix C) consisting of open-ended questions was developed based on the final research model. Using the case study protocol was meant to boost the reliability of the case study.

Site Selection: An attempt was made to make the case studies all inclusive by selecting enterprises from each of the two clusters even though MSEs in Kenya operate under similar conditions and have uniform characteristics. The researcher selected enterprises across the three MSEs' study sub-sectors namely Trade, Tourism, and Manufacturing.

Data collection and analysis: The data was collected using face-to-face interviews with the manager or with the person responsible for the ICTs. Memo writing as described by Miles and Huberman (1994) was used to analyze and present data from each of the case studies.

3.4.6 Ethical considerations

Sommer and Sommer (1997) argue that ethical considerations such as anonymity, confidentiality and avoidance of deception are very important issues in social research. Prior to commencement with the data collection process, an application for approval through the ethics clearance process had to be lodged with the University's Humanities and Social Sciences Ethics Committee. The ethics approval letter was attached to all the questionnaires used during the survey. The ethics clearance approval letter is attached in this document as appendix G. The survey cover letter is included as appendix E and the consent form is also attached as appendix F. Contact details for the ethics office were also provided for any complains that could arise. The participants were assured that all the necessary ethical considerations of the study were met and that every effort has been made to eliminate any ethical concerns associated with this study. This was done by providing a guarantee of anonymity to the respondents and a level of ethical assurance. Merriam (2002) suggests that a good qualitative study is one that has been conducted in an ethical manner. The participants were assured that any information provided would be kept strictly confidential and will not be attributed to the entrepreneur or the enterprise. The participants were also made aware that the data they were providing was for research purposes only and individuals would not be identified with it in any way. The participants were also given a chance to request a summary of the study results to be mailed to them once the study is completed.

3.4.7 Pre-testing the questionnaire

The questionnaire was tested and refined to capture data from a large number of participants in a less supervised setting. During the questionnaire pre-testing phase, data was analyzed to see if all the constructs tested had internal validity through the Cronbach's Alpha coefficient. A further literature survey was conducted to support the findings. Then the findings were used in adapting the questionnaire for the survey and consolidating the proposed research model constructs. Pre-testing of a study instruments can be repeated many times to refine questions, instruments or procedures (Cooper and Schindler, 2008). Before embarking on the data collection, the researcher subjected the survey questionnaire to several pre-tests. The

researcher carried out fifteen pre-tests with participants. These fifteen responses were not included in the final study.

3.4.8 Pilot Study

A pilot study is conducted to detect weaknesses in design and instrumentation and to provide proxy data for selection. It should draw subjects from the target population and simulate the procedures and protocols that have been designed for data collection (Cooper and Schindler, 2008). The pilot study was used to test the questionnaire in order to eliminate unexpected responses, misunderstood questions and problems associated with completing the questionnaire. The size of the pilot study may range from 25 to 100 subjects (Cooper and Schindler, 2008). In this study, questionnaires were distributed to sixty enterprises within the Nanyuki cluster. 54 responses were returned. After eliminating incomplete responses, 50 usable responses were selected, an overall response rate of 83.33%. Such a good response rate was attributed to the ample response time given to the respondents to complete the questionnaire and the follow-up telephone calls made to the respondents in order to encourage their participation. Another contributing factor could be that most of the respondents in the survey were the owners or the managers of these enterprises. The pilot study results were presented at the Business Management Conference, 2009 at the Graduate Business School, University of KwaZulu-Natal, (Kanyi and Maharaj 2009) and 3rd International IDIA Development Informatics Conference, (Kanyi, 2009).

3.4.9 Reliability analysis of the instrument

It is good practice to test the goodness of the data obtained using the questionnaire by testing the reliability of the instrument. This is meant to ensure that the findings of the pilot study would be consistent even if the same study were to be repeated with a different sample or at a later date. Internal consistency is used to assess the consistency of results across items within a test. Cronbach's Alpha (Cronbach, 1951) is one of the most widely used diagnostic measures of internal consistency. Cronbach's Alpha was calculated for the core constructs and the results presented in table 3.7 below. All the constructs exhibited a Cronbach's alpha above the 0.7 acceptable levels as reported by Hair *et al.,* (2006). These results showed that the questionnaire was a reliable measuring instrument.

Construct	Reliability (Cronbachs's α)	Mean**	Standard Deviation
Appropriateness	0.924	4.08	0.944
User Acceptance	0.939	3.68	0.741
Usage	0.812	4.36	0.563
Affordability	0.953	3.62	1.107
Performance and Security Risks	0.895	3.44	1.195
Organizational Performance	0.952	4.24	0.657

* N=50, ** based on a scale of 1-5

Table 3.7: Reliability analysis and Descriptive Statistics of the survey instrument*

3.4.10 Data analysis and presentation

Zimmerman and Muraski (1995) divide statistics into descriptive statistics and inferential statistics. Descriptive statistics provide a description of the population based on numerical values while inferential statistics provide a tool for explaining and predicting selected characteristics of individuals studied. This study used descriptive statistics to build demographic profile of the participants and enterprises. Descriptive statistics include tabulation and organization of data in order to demonstrate their main characteristics and involves use of techniques such as measures of central tendency, measures of dispersion, correlation and graphical presentations. The research also used inferential statistics for reliability analysis, validity, data reduction, regression analysis, and correlation analysis. Data was presented using graphs and tables. The survey results were analyzed using SPSS 17 for Windows®, AMOS 5.0 and Microsoft Excel 2003®. Data analysis was done in four separate stages.

Phase 1: Use of spreadsheet to analyze respondents' demographics and technologies in use within MSEs.

Phase 2: The second stage involved testing the reliability and validity of the measures, descriptive statistics, and correlation.

Phase 3: The third stage was to evaluate the model by testing the structural model through linear regression analysis, correlation and testing the measurement model through model fit indices.

Phase 4: The fourth phase involves the intra-country comparison for the data from the two samples on their demographics and research model statistical differences using regression, model fit indices and t-tests.

3.4.11 Chapter summary

This chapter presented the details of the methodology and design employed in this study including preliminary study, pilot study, case studies, and the survey. Interviews and existing literature were used to develop and measure the constructs of the research model. It has the details on study location, population, sampling procedures and instrumentation. Issues regarding ethical considerations and generalizations are also highlighted. A detailed data analysis is presented and discussed in chapter four of this study.

Chapter 4: Research Findings and Data Analysis Results

4.1 Introduction

The aim of this data analysis chapter is to present the result of the survey and validation of the proposed research model. Leady (2008) points out that a good research should bring out new information that can cause status quo to change in the area of focus. The chapter starts by going through the descriptive analysis associated with the entrepreneurs, enterprises and the enterprises' ICT infrastructure. Then, describes how the enterprises use eBusiness applications, wireless technologies and the extent to which the enterprises are dependent on wireless technologies. Finally, the research model is statistically evaluated. This research was contemplated as a result of the appreciation of the significant benefits mobile telephones have brought to disparate and geographically remote population in Kenya. Its aim was to explore how this expanding mobile telephone infrastructure coupled with other wireless technologies and related services could be harnessed to support enterprise-wide eBusiness infrastructure and benefit MSEs by facilitating use of eBusiness solutions. Mobile telephone networks also come with a number of developmental benefits in terms of employment creation, faster access to services and increased access to information, hence contributing significantly to economic development while MSEs play a crucial role in improving the livelihood of rural and urban Kenyan population. This study was meant to fill the research gap on the role of new and emerging wireless technologies on eBusiness usage in Kenyan MSEs as well as the eBusiness applications use among MSEs in Kenya. Leady (2008) defines data analysis as the whole process, which starts immediately after data collection and ends at the point of interpretation and processing of the results. To do the data analysis, the Statistical Package for Social Sciences (SPSS) version 17, AMOS version 5 and Microsoft Excel 2003 were used. The result from data analysis fulfills the main and the secondary objectives of the study as well as providing answers to the research question.

4.2 Demographic data

Based on frequency distribution and percentages, the characteristics of the sample were captured under demographics, ICT usage, and eBusiness solutions usage. The basic demographics characteristics of the entrepreneurs were based on age, gender, education level, years of using ICTs and the level of expertise in using ICTs. The following section gives the important features of the respondents and enterprises.

4.2.1 Response rate

The study sample consisted of 570 respondents. A total of 570 questionnaires were distributed to MSEs operating in Nanyuki town and the city of Nairobi. This comprised of 170 questionnaires handed out in Nanyuki town and 400 questionnaires handed out in Nairobi. A total of 541 participating enterprises returned their questionnaires. This included 167 questionnaires from enterprises in Nanyuki and 374 questionnaires from enterprises in Nairobi. Out of the 541 questionnaires collected, 11 of the questionnaires were incomplete or had one or two missing entries and therefore were considered invalid for the study. These were 5 questionnaires form Nairobi and 6 questionnaires from Nanyuki. The remaining 530 valid questionnaires, representing a response rate of 94.9%, were complete and usable. These are the questionnaires used for this data analysis. Mugenda and Mugenda (2003) indicate that a response rate of 70% or above is very good for data analysis. Therefore, this response rate of 94.9% is considered adequate.

4.2.2 Number of employees

MSEs are defined as enterprises in both formal and informal sectors employing 1-50 workers (Government of Kenya, 2005). Micro-enterprises are those that employ 10 or fewer workers and small enterprises employ 11-50 workers. Figure 4.1 indicates that most enterprises in the study had 1-5 (35%) employees followed by those enterprises which had 21-50 (32%) employees. Only 18% enterprise had 5-10 employees while 15% had 11-20 employees. This implies that out of the 530 enterprises in the study, 53% were micro enterprises, while 47% were small enterprises. According to the 1999 National Baseline Survey (CBS, ICEG, K-REP, 1999), only a small proportion of MSEs' employ 11-50 workers. With time most of these MSEs have grown to be small industries hence the increase in the number of MSEs employing 21-50 (32% of MSEs in this Study) workers. Probably, rather than remaining small or fail as it is generally believed, there are possibilities that micro enterprises have grown to be midsized enterprises hence employing between 51-100 workers. This would be contrary to National baseline survey (CBS, ICEG, K-REP, 1999) where it is indicated that almost half of MSEs die within the first three years of their establishment.

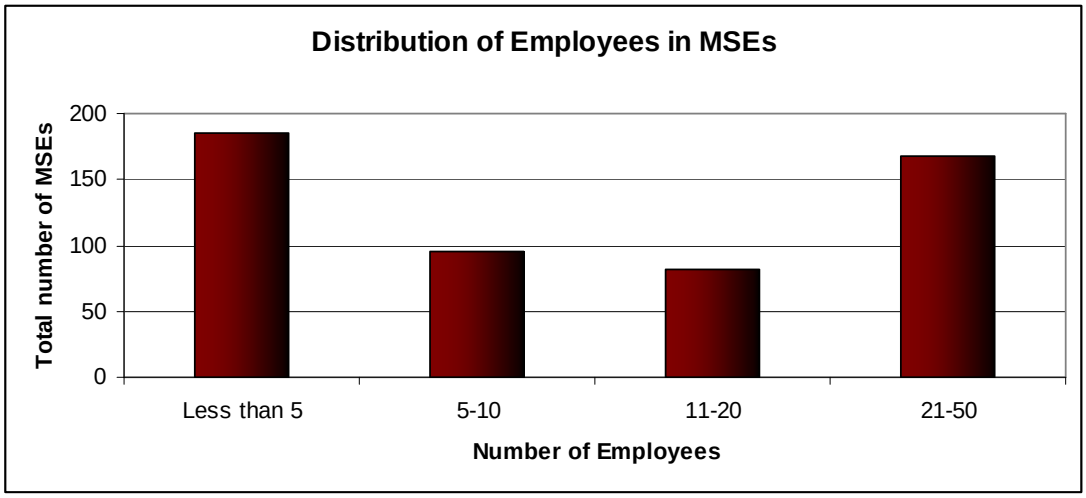

Figure 4.1: Number of employees

4.2.3 Respondents characteristics

This section provides the background information and characteristics of the survey respondents.

4.2.3.1 Respondents' profile

The respondents in the sampled enterprises were persons well placed to knowledgably answer questions on the business. In most cases the managers were the owners of the enterprises in the study. Out of the 530 respondents, 74% were owners-managers, while the remaining 26% were the personnel responsible for the ICTs as depicted in figure 4.2.

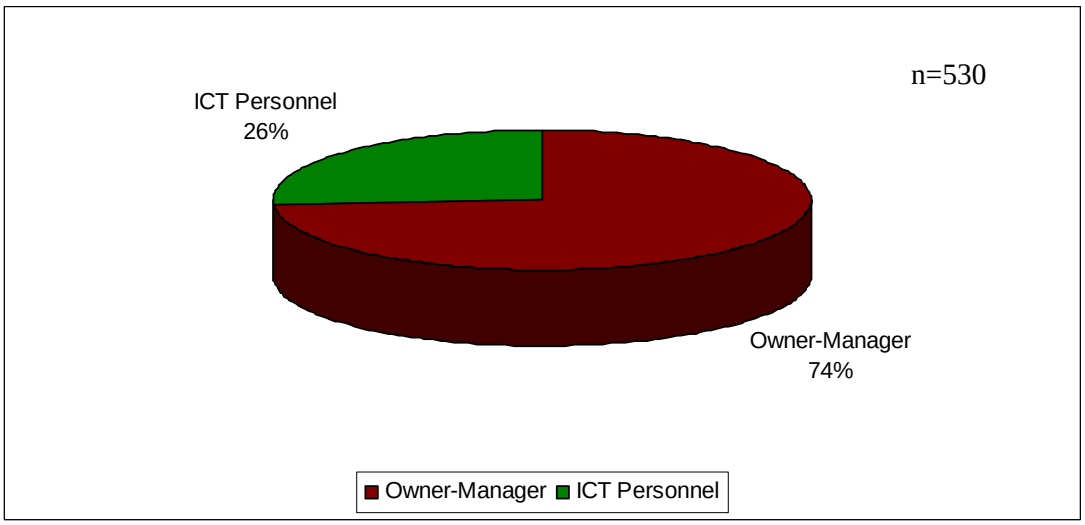

Figure 4.2: Respondents' profile by position in the enterprise

4.2.3.2 Gender distribution

In terms of gender distribution, there was a minor gender disparity as there were more men than women. The survey had 213 women respondents representing 40% and 317 men respondents representing 60% indicating a moderate gender difference. This however did not show any effect in any other business characteristic such as ICT usage and skills level. This could only be construed to mean that most rural and urban MSEs are owned and managed by men. Table 4.1 gives the respondents distribution by gender.

Gender	Nanyuki	Nairobi	Total	Percentage
Male	101	216	317	60%
Female	60	153	213	40%

Table 4.1: Respondents' profile by Gender

4.2.3.3 Respondent's Ages

A substantial number of the respondents, as shown in the figure 4.3, were in the age ranging between 25-34 years (56%), and 35-44 years (20%) which is consistent with Ronge *et al.*, (2002) which indicate that most Kenyan MSEs are owned and mainly run by people in their late 20s and early 30s. This could only be taken to imply that most Kenyan MSEs managers are fairly young entrepreneurs.

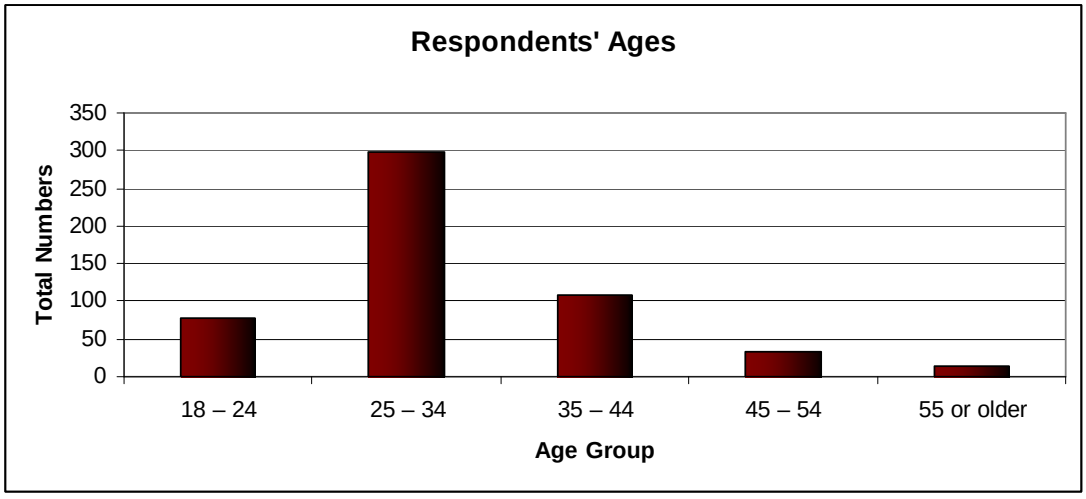

Figure 4.3: Respondents' age distribution.

4.2.3.4 Level of education

Regarding the respondents' level of education, the majority of the respondents had post high school training (95%), which contrasts Ronge *et al.*, (2002) where the conclusion is that MSEs are dominated by people with low levels of education. Only 5% of the respondents had no further training after finishing high school as opposed to more than 24% who had university degrees and 7% who had postgraduate degree (figure 4.4). This could only be taken to imply that most Kenyan MSEs managers are fairly educated and most of them are highly trained professionals. Unlike Ronge *et al.*, (2002), this study found that 95% of the respondents had post high school training.

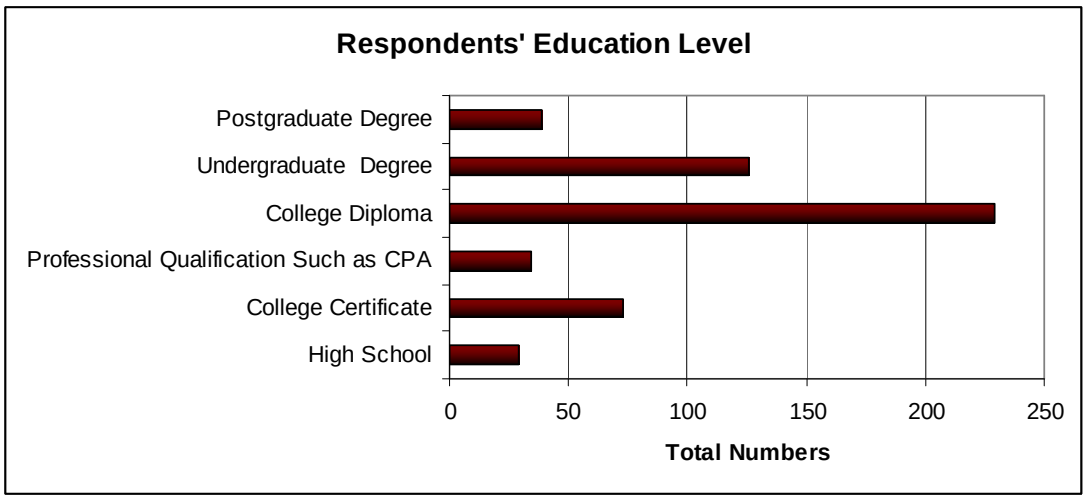

Figure 4.4: Respondents' level of education

4.2.3.5 Years in using ICTs

The results reveal that, at the time of the survey, the majority (45%) of entrepreneurs had used ICTs for about 6-10 years compared to those who had used the ICTs 3-5 years (33%), less than 2 years (5%) and more than 10 years (16%) as shown in the figure 4.5. This shows that the most entrepreneurs had years of experience in using ICTs making them ready and enthusiastic to adopt any new technology which is relevant to their personal needs and one that can support some or most of the MSEs' business operations.

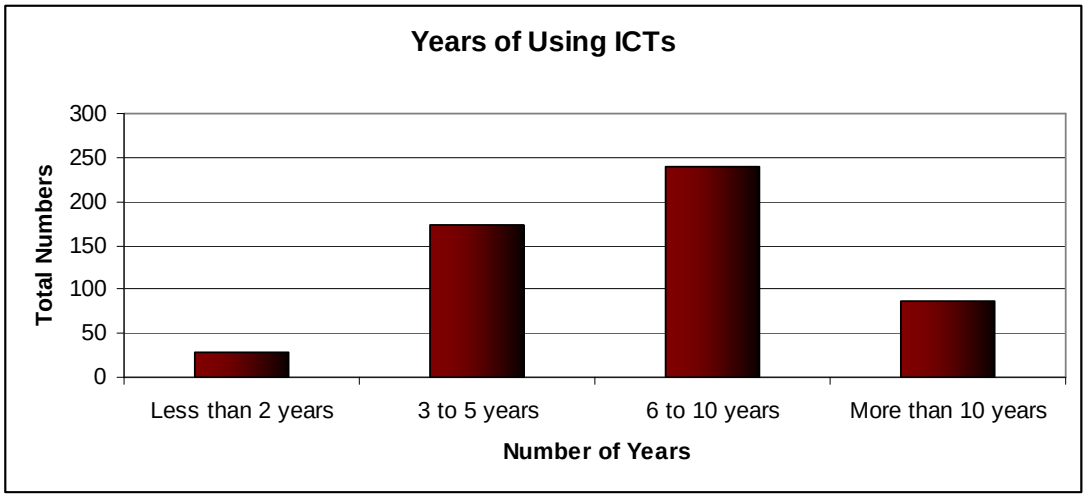

Figure 4.5: Respondents' years in using ICTs

4.2.3.6 Self-assessment on ICTs Skill Level

Regarding ICT usage skills, most entrepreneurs assessed themselves as competent (43%) in using ICTs as shown in table 4.2. No entrepreneur assessed themselves as beginner or novice in using ICTs, while (39%) considered themselves as proficient and 18% considered themselves as experts. This could be attributed to the academic levels of the entrepreneurs and years of using ICTs. Overall, all the respondents were competent in using ICTs which imply that ICTs are considered compatible with their daily business related tasks.

Skill Level	Cases	Percentage
Beginner	0	0
Novice	0	0
Competent	227	43
Proficient	207	39
Expert	96	18

Table 4.2: Respondents' ICTs skill levels

4.2.4 ICT infrastructure in MSEs

The availability and use of ICTs such as personal computers, mobile phones and local area networks in any MSE is an important indicator of readiness for eBusiness in part of the MSEs as these technologies avail adequate infrastructure to access and use Internet.

4.2.4.1 Number of computers

Most enterprises had at least one computer with the majority of the enterprises (38%) having less than 5 computers. The results reveal that 31% of the enterprises had 6-10 computers, 22% had 11-20 computers and only 9% had more than 20 computers as depicted in figure 4.6. This availability and ease of accessing computers is a good indicator of the current and future technological capacity of most MSEs. This is a positive sign of e-readiness among Kenyan MSEs as it is suggested that there is usually a direct relationship between personal computers penetration and eBusiness (Heeks, 2002; Joseph, 1995).

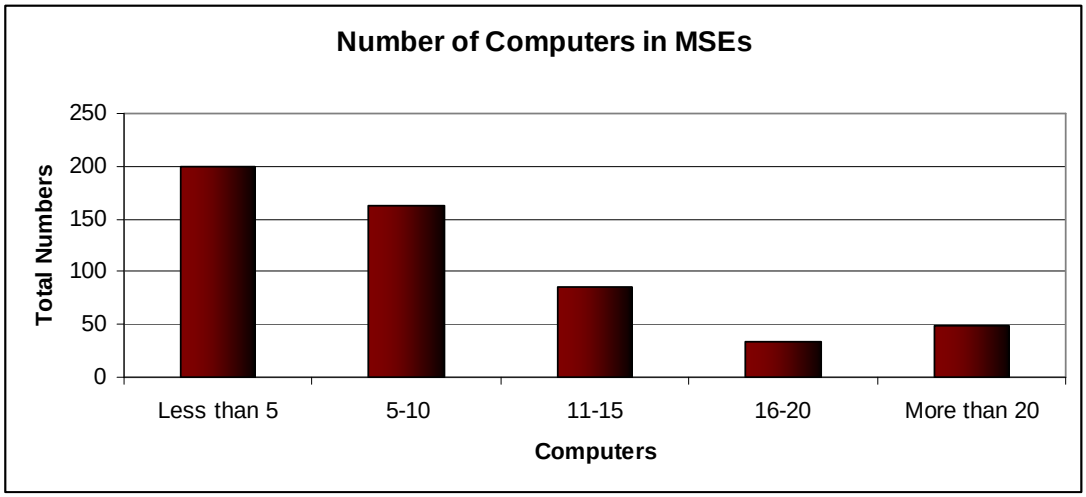

Figure 4.6: Number of computers in enterprises

4.2.4.2 How the enterprises access the Internet

Inter-organization and intra-organization communications would be impossible without the use of Internet especially if it involves faster and frequent document and information exchange. The respondents were asked to describe ways in which the enterprises access Internet. The entrepreneurs self-reported Internet access as depicted in the figure 4.7. Most of the enterprises (77%) use some form of cellular Internet either through a wireless modem, mobile telephones or wireless desktop telephones. It is also of interest to note that there are still a number of enterprises (4%) which are still using public Internet access services at cyber cafés for their Internet access and a 1% of the enterprises access their Internet through the satellite connection. Only 18% of the enterprises were accessing the Internet through wired connection, with 70% of these users on wired broadband while 30% of these users were on the traditional dial-up connection. It is also worth noting that most enterprises had

multiple Internet access using different methods of Internet access mostly as complementary to each other.

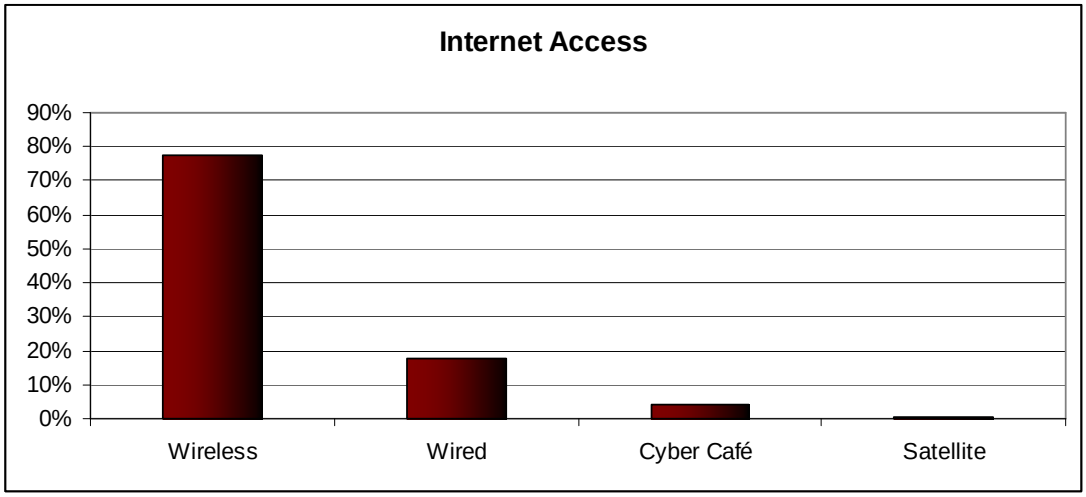

Figure 4.7: Type of Internet access.

For the enterprises accessing wireless Internet, they were using different methods as depicted in figure 4.8 below. 42% were using wireless modems, 33% were using mobile telephones for their Internet, and 8% were using wireless desktop telephones while 17% were using wireless broadband. Unpredictably all the ten cyber café's in Nanyuki were all using wireless Internet as opposed to only 2 in Nairobi.

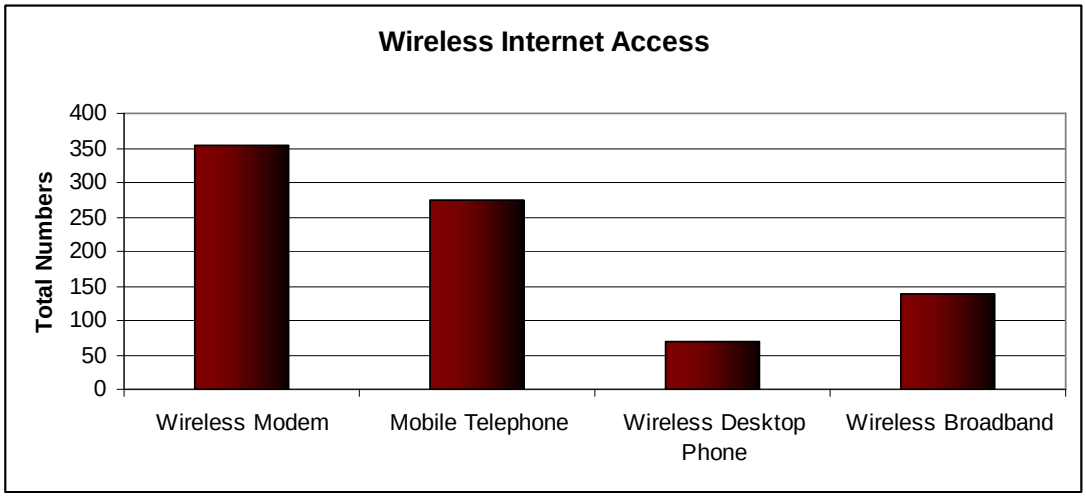

Figure 4.8: Type of wireless Internet access

4.2.4.3 Cost of accessing the Internet

Overall, the majority of the enterprises (64%) were spending less than Kenya Shilling 5,000 per month on Internet access, 30% were paying between five and ten thousands while only

6% of the enterprises were paying more than Kenya Shilling 10,000 as indicated in figure 4.9. This is quite interesting as most enterprises use cellular Internet which is usually expensive. This could only indicate use of stringent measures within the enterprises to ensure that only business related use of the Internet is allowed as opposed to most conventional organizational environments where employees use enterprise Internet to do non-business related or personal tasks as well as limiting the number of downloads. The entrepreneurs observed high costs of Internet access coupled with low bandwidth as the major challenges of using cellular Internet. This implies that very low bandwidth, fluctuating Internet speeds and very high use charges deter most enterprises from using cellular Internet.

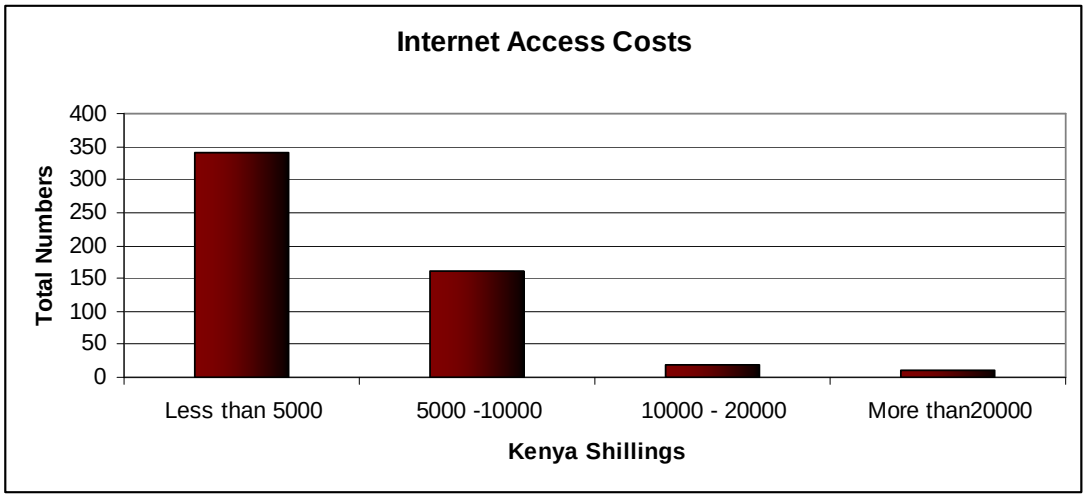

Figure 4.9: Cost of Internet access

4.2.4.4 Mobile telephone connection plan

The survey revealed that pay as you go or prepaid service is the preferred mode of mobile telephone subscription with more than 99% of MSEs having this type of subscription. This could be attributed to the availability of low value prepaid calling cards and ease of dropping a provider in case of changes in pricing and service tariff. A substantial number of enterprises had subscriptions from more than one service provider in order to reduce cross network charges while 8% of the enterprises had both prepaid and postpaid subscriptions as shown in figure 4.10. Cross network costs are usually high and switching to another provider would also disadvantage the people that the entrepreneur have been communicating with hence the best option has always been to have several SIM cards and changing when there is need to call suppliers and customers who are in a different network . About 84% of the MSEs in the study had more than one mobile telephone.

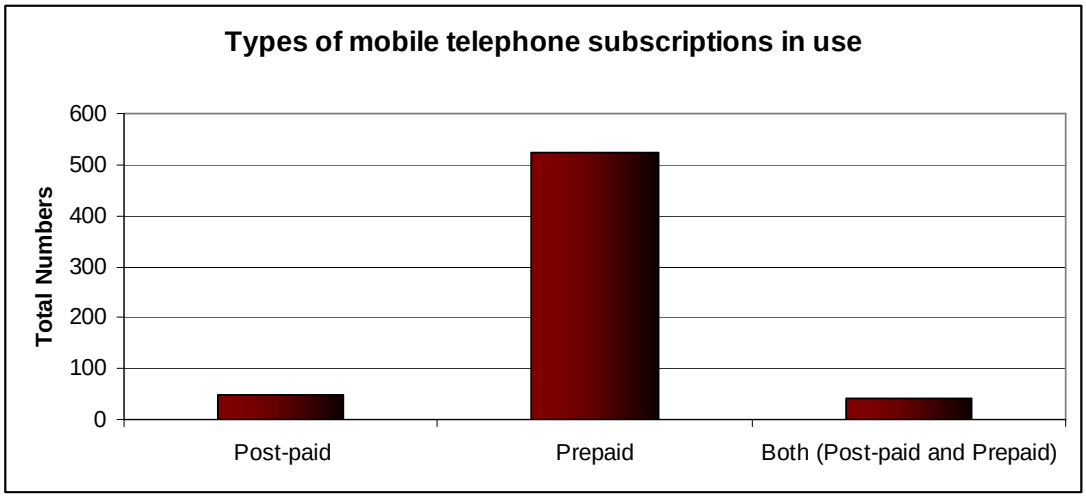

Figure 4.10: Mobile telephone subscription type

4.2.5 Enterprise wide Technologies

Application of enterprise wide technologies is the use of information technologies, information systems and computers within an organization for all of the enterprise's business processes. Some of the commonly used enterprise wide technologies include Intranets, web portals and extranets which allow the use enterprise computing tools such as Enterprise Resource Planning, Customer Relationship Management and Sales force Automation.

4.2.5.1 Office automation

Basic office automation involves the use of telephone, email and computer equipment to communicate with and transfer data within the enterprise. This involves the use of inexpensive software and Local Area Networks (LAN) for internal business processes and use of email and telephones for internal and external communications. Figure 4.11 below shows the number of enterprises which were using different basic office automation tools. The results indicate that the use of telephone and email to place and receive orders is a common thing in most of the MSEs in the study.

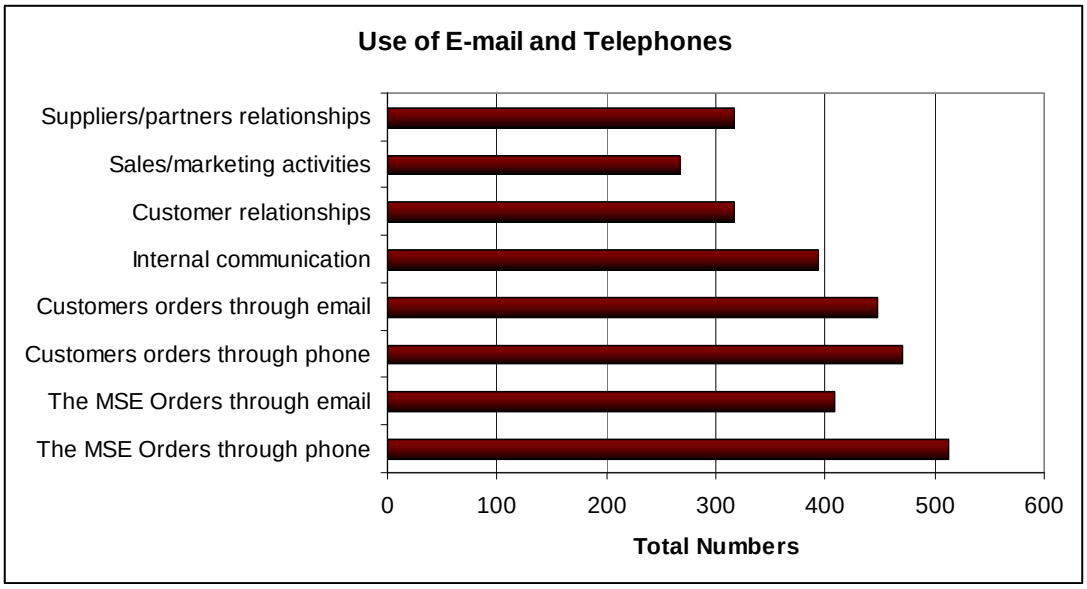

Figure 4.11: Automated business processes

4.2.5.2 Local Area Networks (LANs)

A vital technology for internal business processes is a LAN, figure 4.12 shows different kinds of LANs used within the study enterprises. LANs allows the employees to communicate, interact and to share applications and digital content with their co-workers. LANs also allow sharing of resources such as Internet connection and peripheral devices within the enterprise. Most (48%) of the respondents' enterprises had wireless LANs , 44% had wired LANs while 6% of the enterprises were sharing resources using Bluetooth. 9% of the enterprises in the study had used wireless LANs to extend their wired LANs. Lack of financial resources to invest on wired LANs has made implementation of WLAN a cheaper and reliable alternative but still 13% of the enterprises in the study had not implemented any LANs.

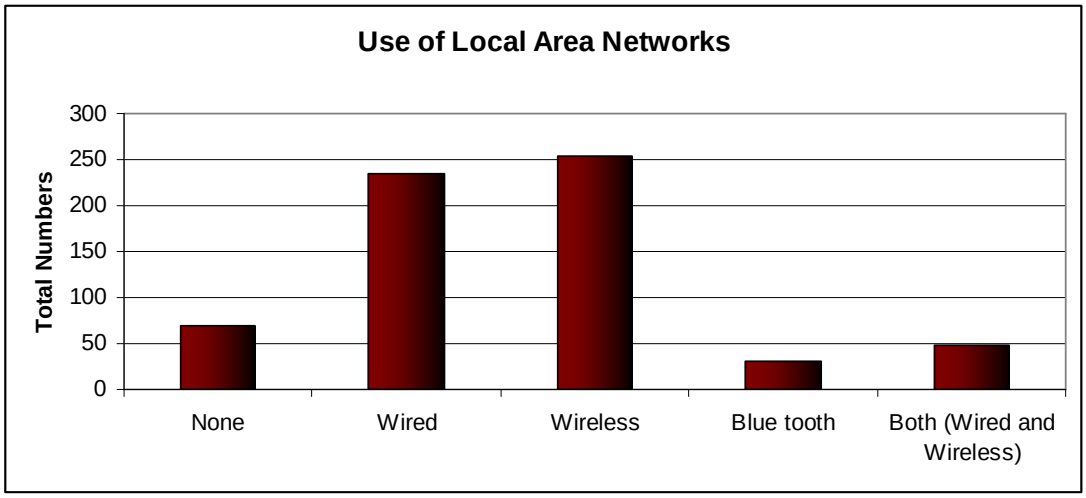

Figure 4.12: Availability of Local Area Networks

4.2.5.3 Web solutions

Another technology that a good number of the study enterprises are using for their competitive advantage is websites. The survey reveals that the presence of websites in the MSEs is at 38%. Of the enterprises that had a website, majority (100%) of these websites were for providing enterprise information, 43% of the websites are used to receive customer orders, and 9% are used for seeking employees while 46% were for buying and selling online as shown in figure 4.13. Majority (94%) of the enterprises in the study which had a website only update their websites when necessary while 2% update their websites once a month and 4% do it less than once a month. These results are consistence with Purao and Campbell (1998) that while most enterprises have an Internet presence in the form of a website, few are using Internet to conduct transactions with customers and suppliers.

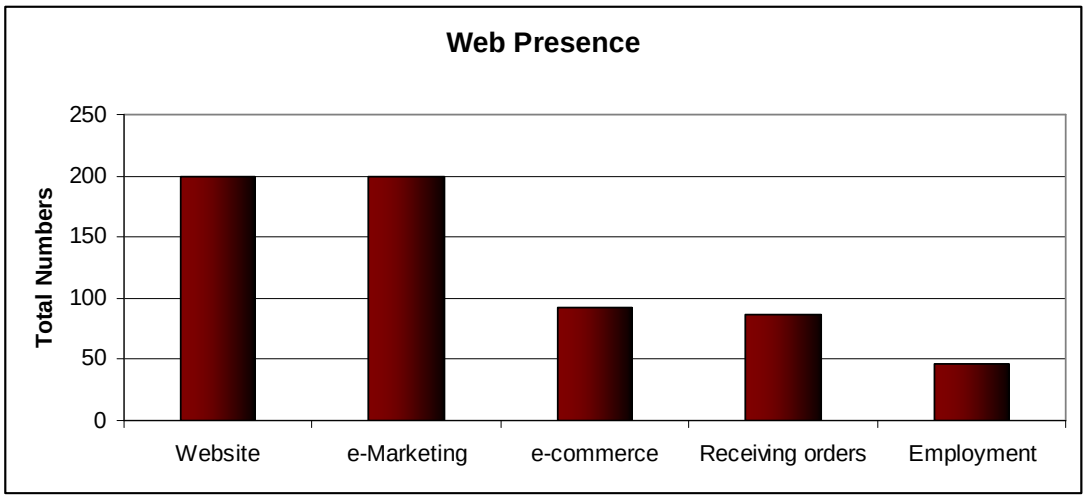

Figure 4.13: Presence and uses of websites

4.2.5.4 The eBusiness Solutions

Majority of the enterprises use email, computers and telephones in their business processes as a form of eBusiness solutions. However, use of sophisticated eBusiness solutions is limited as indicated in figure 4.14. Apart form buying and selling online (e-commerce) at 17%, all other technologies have a low usage rate of less than 10%. This could be attributed to inadequate legal and regulatory frameworks which could expose the enterprises to risk. Kenyan market is also largely a liquid cash market with most people preferring money changing hands while face to face transactions are usually considered as safe transactions.

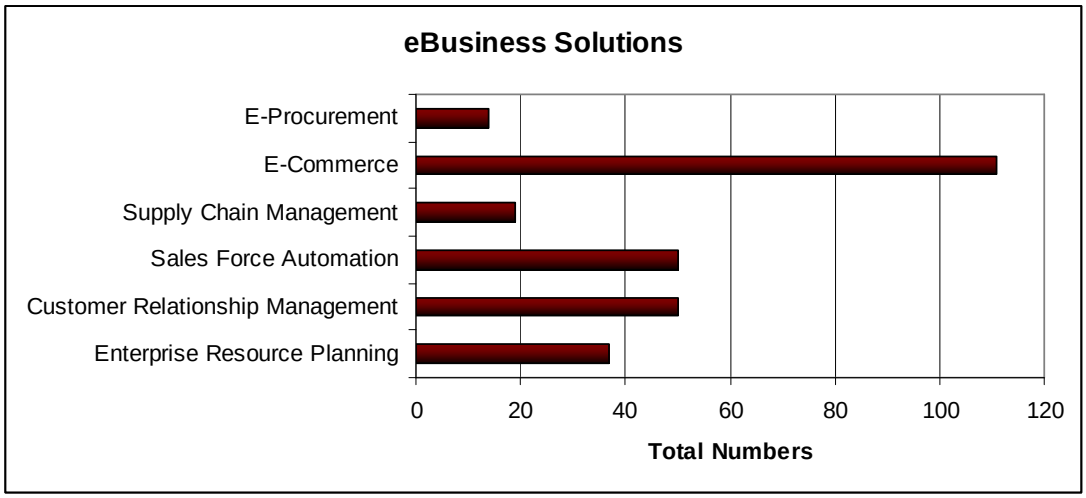

Figure 4.14: Sophisticated eBusiness solutions

4.2.6 Use of Mobile Telephones

Mobile telephones and the underlying technologies have become a part of everyday Kenyan's life mostly due to portability, network coverage, and availability of related products and services. The number of mobile telephone subscriptions in Kenya was about 19.5 million (CCK, 2010) by March 2010. Mobile telephones provide convenient services to Kenyan population including voice communication, entertainment, business tools and valued data services. In addition mobile telephones and their underlying technologies are used in both social and business domains. The enterprises in the study use mobile telephones in their business operations as shown in table 4.3 and discussed in the following sections. The availability of more advanced mobile telephone handsets and mobile valued added services has made mobile telephones the preferred tool for conducting business in Kenya today.

Mobile phone – Uses	**Frequency n=530**	**Percentage %**
Voice calls	530	100
Send text messages (SMS)	269	51
Wireless Desktop telephone calls	348	66
Voice over Internet Protocol calls	148	28
Checking and paying utility bills	162	32
M-banking	154	29
Receive SMS advertisements	220	42
Send SMS advertisements	63	12
Checking product and stock prices	87	16
Business information management	462	87
Mobile money transfers	201	38
M-Commerce	112	21
Download ring tones, wallpapers, games	57	11
News	180	34
Mobile tunes	28	5
Mobile Global Tracking System	13	2

Table 4.3: Respondents' Mobile Telephone uses

4.2.6.1 Voice Calls and Short Message Service (SMS)

The study shows high level of mobile telephone use by enterprises with all (100%) of the enterprises in the study using mobile telephones to make voice calls. This is depicted in

figure 4.15. SMS is usually considered a cheaper option to making voice calls, but from the study, there is no preference for SMS despite its low costs with only 51% of enterprises using it for official communication. This could be attributed to limited amount of information that could be passed using a single SMS as well as time taken to compose the required text. It also requires sending more than one SMS message to fully pass the desired message increasing the time and cost required to pass the desired information.

To have a fixed line connected to the enterprise premises is expensive and full of logistical handles on the side of the service providers. Fixed telephone lines are also prone to frequent and persistent down times and regular breakdowns as a result of vandalism. This has made most MSEs to use desktop Wireless telephones as a technology of choice to replace dial-up telephone lines. The study results show that 66% of the MSEs own a wireless desktop telephone.

The use of Internet telephone commonly referred to as Voice over Internet Protocol (VoIP) also seem to have taken root in most MSEs. At least 28% of the enterprises have used it to make cheaper international calls using either their mobile telephone, wireless desktop telephones or in a cyber café.

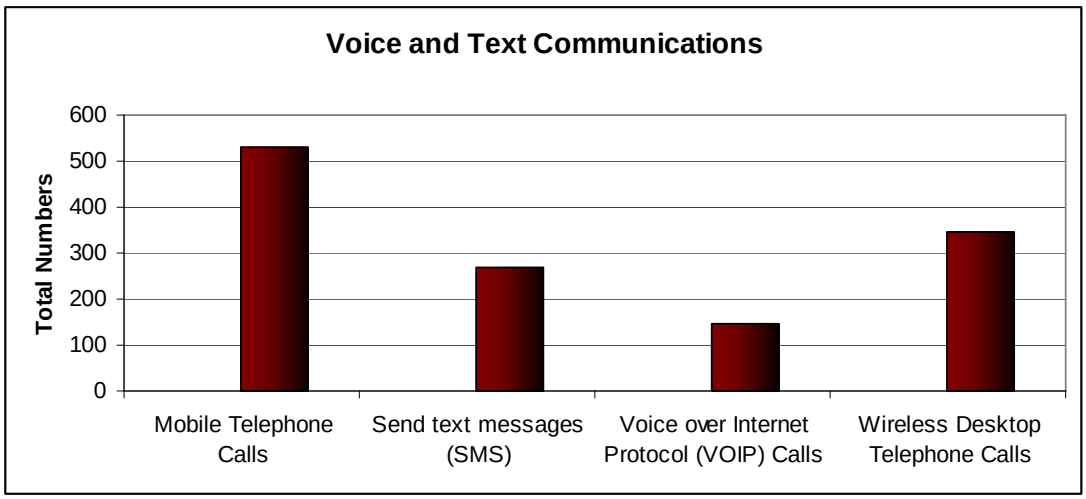

Figure 4.15: Use of Mobile telephone for Voice and SMS communications

4.2.6.2 Mobile business management Operations

The study shows high level of mobile telephone use in business management and operations as shown in figure 4:16. Business information management using mobile telephone includes

the use of Mobile telephone's calendar, reminders, and contacts management to organize, manage and schedule appointments and events. 87% of study respondents indicated that their organizations were using the tools available in their mobile telephones to manage their organizational events and activities as an alternative to walking around with a diary.

4.2.6.3 Checking utility bills

The use of mobile telephone to check the utility bills such as water and electricity is another mobile telephone technology that most enterprises are using with 32% (figure 4:16) of the enterprises using it as a quick method of getting their utility bills. Other enterprises shy off from the services due to its cost which is almost three times the cost of an ordinary SMS. Other enterprises have made prior arrangements on how to easily get their utility bills.

4.2.6.4 SMS advertising

Majority of the enterprises in the study do not use SMS advertising. Even though there are a lot of incentives offered by service providers on use of SMS advertising, most entrepreneurs prefer other forms of marketing. The use of SMS advertising is more of a preserve of service providers with only 12% (figure 4.16) of the enterprises in the study using it to market their products and services and 42% having received SMS advertisements from their business partners.

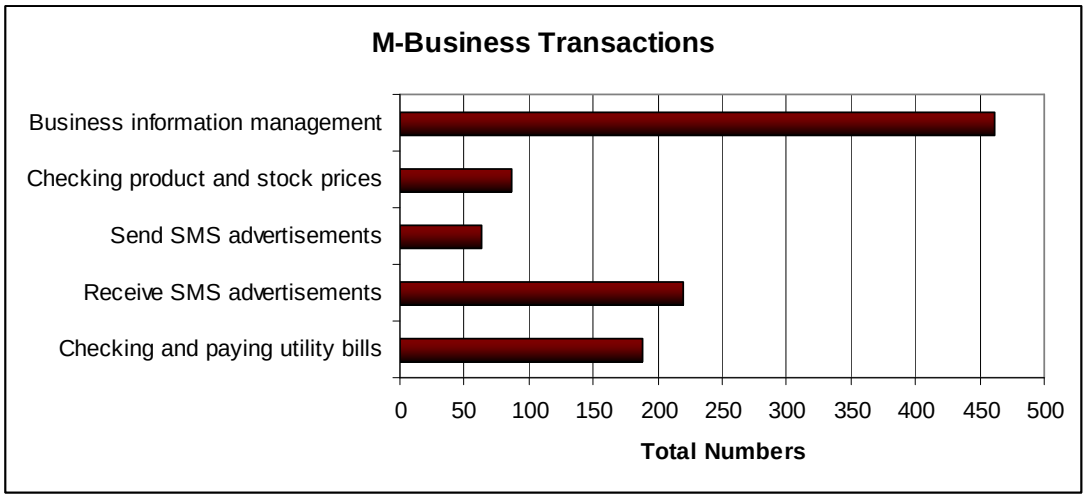

Figure 4.16: Use of Mobile Business Management Operations

4.2.6.5 Mobile Banking, Mobile Money Transfer and M-commerce

Table 4.4 shows that 38% of the enterprises use mobile money transfer services for sending, receiving or storing money. The stored money value could be used in paying for goods or services, sent to another subscriber or converted back to cash. From the study, the use of mobile money transfer services is hindered by its cost and performance risks. Though popular for personal use, the study found that it is not widely used for purchase of products and especially to buy goods from the mobile telephone service providers where no charges are levied. Due to the number of errors originating from the system and absence of an appropriate legal framework to protect users of this service, most enterprises have not fully embraced the use of mobile money transfer services for their business transactions. Mobile money transfer services have received a lot of attention and publicity but the service remains largely a money transfer service. The study revealed that there is limited use of mobile money transfer services for B2B and B2C e-commerce transactions as opposed to C2B and C2C ecommerce transactions. Largely this is due to limited amount of cash one can hold in their virtual account at a time, agent's lack of float and frequent outages which result to confirmation failures, delays or even absolute interruptions. The use of mobile money transfer services in B2B, C2B, C2C and B2C is also mired by the fear of losing money through the touch of the wrong button or through criminal acts. It takes at least 72 hours to reverse a wrong transfer of money by a user of mobile money transfer services and which is only possible if the recipient (wrong number) has not used a cent of money sent. Despite these barriers, C2C and C2B e-commerce transactions seem to have greatly benefited from mobile money transfer services as most customers use it to pay for their goods and services especially where the costs are below the maximum value transferable at once of 35,000 Kenya Shillings. Paying of utility bills using mobile money transfer services is the most acceptable and readily used type of C2B e-commerce transactions in Kenya today.

Even though mobile money transfers have solved most of the hassles people go through when paying for services, cases of customers being forced to pay their utility bills again as they sort out issues with the money transfer service providers for delayed or failed remittance due to errors occurring during mobile money transfer transactions are common. The number of organizations registered as pay bill partners to enable such organizations receive bulk mobile money is also limited with figures from all the three providers of mobile money transfer services showing a figure of about 205 partners as at June 2010. Another major challenge is lack of network coverage or poor signal in most rural areas, where

subscribers have to climb trees or travel for kilometers to be at a particular hill to make call or confirm whether their money transfer transactions have been successful.

Mobile banking is also not so popular among MSEs with only 29% of the study enterprises using it. This is because most Kenyan banks do not offer the services as well as high levies charged on using mobile banking services.

With M-Commerce, 21% of the enterprises in the study were using it. These are few enterprises compared with the number of MSEs using mobile devices to access Internet. Most entrepreneurs argued about the mobile telephone display size and security as some of the factors limiting the use of M-Commerce.

M-Transaction	**Frequency (n=530)**	**Percentage (%)**
M-Banking	154	29%
M-Commerce	112	21%
Mobile Money Transfer	201	38%

Table 4.4: Use of Mobile banking, Mobile money transfers and M-Commerce

Figure 4.17 below shows that there is limited use of mobile money transfer services for B2B and B2C e-commerce transactions as opposed to C2B and C2C ecommerce transactions. Of the 38% of mobile money transfer services users, almost all (98%) had used C2C mobile money transfer services as opposed to 30% and 21% who had use it for B2B and B2C respectively. C2B e-commerce transactions also had a higher percentage of use with 82% of respondents having used the services. This is mainly due to most entrepreneurs opting to pay for goods and services through Mobile Money Transfer Services.

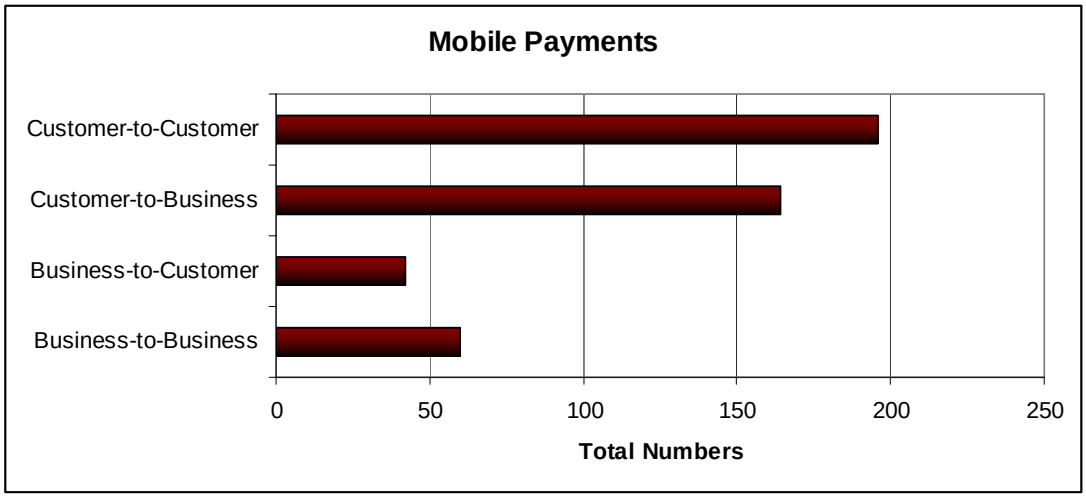

Figure 4.17: Mobile Money Transfer E-commerce Transactions

4.2.6.6 Mobile Entertainment

Even though entertainment was not part of the study, some of the enterprises in the study indicated to have downloaded ringtones, received news alerts and use of mobile tunes as other service they buy using mobile telephones. As depicted in figure 4.18, 11% of the enterprises in the study had downloaded ringtones, wallpapers or games. 34% of the respondents had registered to receive news alerts through the mobile telephone and 5% were using mobile tunes. A mobile tune is a form of entertainment that the caller listens as they wait the recipient of the call to answer the telephone. The costs of using this service is prohibitive to many would be users as it attracts a weekly fee.

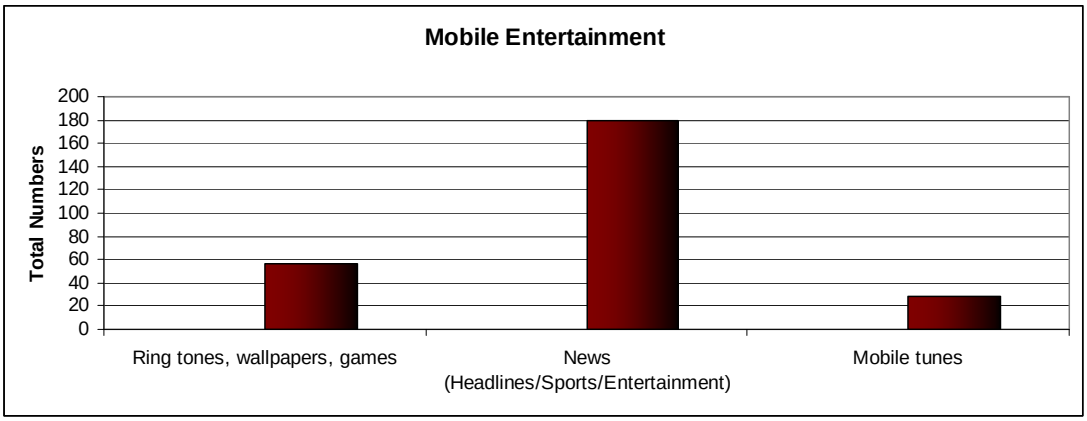

Figure 4.18: Use of Mobile telephone Entertainment

4.3 Dependence on wireless technologies

Use of mobile telephone to make call or send and SMS are the most preferred services as they are the traditional services provided by the mobile telephone service providers. To measure dependence, the study sought to analyze how often the wireless technology is used within a day, week or month. For the enterprises which have mobile and wireless desktop telephones, about 95.7% of the respondents use their mobile telephones to make calls several times a day as compared to 98% who use their wireless desktops to make calls daily. From the study only 51% of the users use SMS for their business operations and out of these, only 74% use SMS daily while 26% uses SMS just a few times in a month.

In regard to the use of mobile telephones for checking and paying utility bills such as the water and electricity bills, 98.8% of all the users of this service use pay or check bill service only a few times a month. This is probably because most utilities are paid on monthly basis.

From the study, mobile business information management tools are frequently used with the majority (83%) of the users using mobile telephone business information management tools such as the calendars, reminders, contacts and to schedulers on daily bases while 4% uses these tools only a few times in a week while others only use these tools only when necessary. This suggests that mobile telephone business tools are compatible with enterprise's daily tasks.

For those enterprises which use Mobile money transfers, only 20% use this facility on daily bases. The rest of the enterprises use the facility just a few times a month. Even if this facility is supposedly to cater to the unbanked and unavailability of debit and credit cards, it is not fully utilized for business transactions in most MSEs. However, there will probably be more use of mobile money transfer services for B2B and B2C in the future as people consider this service as a mode of payment. Currently, the study indicates that mobile money transfer services are very popular among its users for C2B and C2C transactions.

Wireless Internet and wireless LANs are used by most entrepreneurs on a daily basis and at several times in a day. This is probably because when installed WLAN and wireless Internet becomes part of transaction processing infrastructure.

To send or receive SMS advertisements is also not a common trend within MSEs. There was no enterprise in the study that was using this facility on daily bases. Of the 12% respondents

who use SMS advertising, 4% use it less often than once a week while the rest uses it less often than once a month. It was noted that most respondents consider SMS promotional and advertising messages as irritating especially if one was eagerly waiting for an urgent business communication or Mobile money transfer services confirmation message.

M-banking is another facility that is used just a few times in a month, with 40% of the users using it at most once a week to keep an update on their weekly transactions. This is mostly due to costs associated with the service and that most banks in Kenya either are not currently offering these services while others are just introducing them.

The same could be said about entertainment facilities of mobile tunes and downloading ringtones and games. Mobile tunes are charged a weekly fee while downloads are one off items. The respondents use these services less often.

4.4 Research Model Validation

This section uses statistical measures to validate the research model developed to guide the study. The model was based on twenty six items drawn from Task-Technology Fit, Unified Theory of Acceptance and Use of Technology and a pilot study within the population of the study using a questionnaire with items measured using a 5-point Likert-type scale where 1 indicated strong disagreement; 2 showed some extent of disagreement; 3 stood for Uncertain; 4 was for agreement to some extent; and 5 indicated strong agreement. This questionnaire section was to enable the respondents to rate fitness for purpose or the ability of the technology to perform a specific function, acceptance, barriers, usage and organization's performance.

4.4.1 Reliability and Validity of the Research instrument

The study uses two widely accepted and empirically validated models to investigate the factors influencing successive acceptance and use of wireless technologies for implementing an eBusiness infrastructure from an organization perspective. The study integrated these constructs through a preliminary study. This section gives the statistical tests conducted to ensure that the research model results are replicable, could be generalized and are statistically relevant. The statistical tests done to measure the quality of the study instrument and the research model include reliability, validity, regression analysis and fit indices.

4.4.1.1 Reliability

Reliability is an assessment of the internal consistency of the measurement instrument, a measure of the degree of homogeneity among the measurement items in a given construct. It is the assessment of whether the study instrument would give similar results in different situations or under same circumstances but at a different time such that the results remain consistent over repeated testing. Cronbach's alpha is widely accepted as a measure of internal reliability and consistency. The reliability analysis aims at identifying those items in the questionnaire that have low correlations in order to exclude them from further analysis. Cronbach (1951) proposed that reliability should be greater than 0.7, DeVellis (2003) suggested that an alpha value of 0.70 should be considered "acceptable" while a value equal to or greater than 0.70 is considered satisfactory (Nunnally and Bernstein, 1994). The alpha coefficients for the individual constructs are given on table 4.5. All the constructs have Cronbach's alpha between 0.712 and 0.929 hence the internal consistence of the study instrument is good, acceptable and satisfactory. Based on the Cronbach alpha coefficients for the original 26 items conceptualized as measurement items, the number reduced to 24 after two items were dropped.

Construct	Mean	Std. Deviation	Cronbach's Alpha
Task -Technology Fit	4.1657	.52660	.712
Acceptance	4.2382	.55016	.745
Barriers	3.6332	.86710	.817
Usage	4.6541	.44416	.929
Performance	4.0981	.71502	.771

Table 4.5: Descriptive statistics and Cronbach's Alpha

4.4.1.2 Validity

Validity of a study instrument is the measure of whether the study instrument would give same results under similar conditions, implying that the instrument is actually measuring the concept it purports to measure. Campbell and Fiske (1959) proposed two types of validity: convergent validity and discriminant validity. The following section evaluates the measurement instrument for convergent validity and discriminant validity.

(a) Convergent validity

Convergent validity is supported by examining constructs' Cronbach's alpha, composite reliability, and Average Variance Extracted (AVE) scores. For satisfactory convergent validity, Cronbach's alpha should be more than 0.7 (Hair *et al.*, 2006), composite reliability should be above 0.7 (Fornell and Larcker, 1981) and AVE of at least 0.5 (Hair *et al.*, 2006). All constructs (table 4.4) showed adequate convergent validity for the proposed constructs through acceptable levels of Cronbach's alpha, composite reliability and Average Variance Extracted.

Construct	Cronbach's Alpha	AVE	Composite Reliability
Task-Technology Fit	.712	0.578	0.891
Acceptance	.745	0.545	0.827
Barriers	.817	0.547	0.857
Usage	.929	0.739	0.895
Performance	.771	0.555	0.788

Table 4.6: Cronbach's alpha, Average Variance Extracted and Composite Reliability

(b) Discriminant validity

Discriminant validity is the measure of how the model constructs' measures are different. To assess discriminant validity, the commonly used measures are the factor loadings from factor analysis and correlations between constructs.

Exploratory Factor analysis

Factor analysis was conducted to investigate the internal structure as well as to determine the smallest number of factors that could be used to best represent the interrelations among the sets of variables for the conceptualized measurement constructs. Before factor analysis is done, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy has to be done in order to test the appropriateness of the sample for factor analysis. KMO is used to test whether the partial correlations among variables are small. For factor analysis to be conducted, KMO should be greater than 0.5 for a satisfactory analysis as Kasier (1974) recommends that values greater than 0.5 are acceptable, between 0.5 and 0.7 are mediocre, between 0.7 and 0.8 are good, between 0.8 and 0.9 are superb (Field, 2000). The study data yielded a KMO measure of sampling adequacy of .717 which is in the satisfactory "middling" category (Kaiser 1974) an indication that the sample was adequate for factor analysis. The Bartlett's

(Bartlett, 1950) Test of Sphericity was significant at $p<0.5$ as the values were (Chi square = 1187.555, $p<0.001$), as indicated in table 4.7.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.717
Bartlett's Test of Sphericity	Approx. Chi-Square	1187.555
	Df	351
	Sig.	.000

Table 4.7: KMO and Bartlett's Test

This confirms the appropriateness of proceeding with the analysis to reduce the number of items, and identify the dimensions of latent variables. To extract relevant factors from the research measurement items, factor analysis was conducted using principal component analysis and varimax rotation based on Kaiser-Guttman rule that retains components with Eigen values of equal or greater than 1. Various recommendations exist for the acceptable levels of significant factor loadings such as Hair *et al.*, (2006) recommendation of .5 while Comrey and Lee (1992) as cited in Tabachnick and Fidell (2007) considers .55 as good, .63 as very good and .71 as excellent. To ensure the factor loadings meets the recommended criteria, all loadings less than .63 were suppressed. Based on this factor loading criteria, 1 item was deleted from further analysis. Items were also checked for cross loadings with other factors. Another 2 items were dropped as they loaded highly on other factors. This resulted to 21 items loading in five different factors. All these 21 items were retained. The retained items loaded on five distinct constructs that also account for 76.012% of the total variance. Each item loaded distinctively on one factor and there were no cross loadings. The factor loadings (table 4.8) of all the retained items in the research model were greater than the suggested value of .63 (Very good). The loadings ranged from .657 to .883, exceeding the recommended figures, an indication of adequate convergent validity. The measurement items loaded highly on their right constructs while having low loadings (less than 0.50) on other constructs which is also an indication of high convergent and discriminant validity. The numbering and the naming of the factors took into account the significance of the loading patterns and were modified in order to enhance readability.

Measurement Item	Factor 1 Task Technology Fit	Factor 2 Acceptance	Factor 3 Performance	Factor 4 Barriers	Factor 5 Usage
Currency	.657				
Assistance	.748				
Accessibility	.804				
Ease of Use	.662				
Reliability	.856				
Mobility	.812				
Performance Expectance_1		.775			
Performance Expectance_4		.703			
Social Influence_1		.671			
Social Influence_3		.797			
Organizational Performance_2			.787		
Organizational Performance_3			.694		
Organizational Performance_4			.750		
Affordability_1				.664	
Affordability_2				.796	
Security Risks 1				.806	
Security Risks 2				.690	
Performance Risks_1				.732	
Usage_1					.850
Usage_2					.883
Usage_3					.846
%Variance explained	15.54%	13.16%	13.07%	17.40%	16.84%
Cumulative	15.54%	28.70%	41.77%	59.17%	76.01%
Eigen values	2.269	2.018	1.739	6.939	2.997

Table 4.8: Results of Factor analysis

Note: Extraction method: Principal component analysis; Rotation Method: Varimax with Kaiser Normalization. Only loading above 0.633 are shown.

Average Variance Explained Variance (AVE)

For satisfactory discriminant validity, Fornell and Larcker (1981) indicate that the square root of the AVE for any particular construct should be higher than the correlations between that construct and other constructs. Table 4.9 below shows the inter-construct correlation matrix with the diagonal elements having been replaced by the square roots of Average Variance Extracted. This implies that the diagonal elements which are in bold are the square root of the Average Variance Extracted (AVE) while the off-diagonal elements are the inter-construct correlations. For good discriminant validity the diagonal elements should be greater than corresponding off-diagonal elements and that the correlations between all items are less than .85 (Fornell and Larcker, 1981). This shows that the study results exhibits acceptable and satisfactory level of discriminant validity.

Inter-construct Correlation Matrix					
Construct	**Task Technology Fit**	**Acceptance**	**Barriers**	**Usage**	**Performance**
Task-Technology Fit	**0.760**				
Acceptance	.541**	**0.738**			
Barriers	.484**	.265**	**0.740**		
Usage	.516**	.475**	.411**	**0.860**	
Performance	.580**	.496**	.408**	.419**	**0.745**
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 4.9: Inter-construct correlation and discriminant validity

4.4.2 Structural Model

To assess the structural model quality, the study tested the model for the statistical significance of the estimated model's path coefficients (β) and the ability of the model to explain the variance in the dependant variables (R^2). This was done using linear regression. Linear regression is widely used to explain relationships between variables. To find relationships between the independent and dependent variables, independent variables were regressed individually against dependent variables. Figure 4.19, represents the results of the structural model test which includes the path coefficients (β) which gives the strength of the relationships between the independent and dependent variables and the R^2 value which represents the amount of variance explained by the independent variables. All path

coefficients were significant at the adopted level of 0.001, providing strong support for the structural model.

Both Task-Technology Fit and Usage have significant positive influence on Organization Performance and together explain 51.3% of the variance in Organization Performance (R^2 = 0.513). This R^2 value exceeds Falk and Miller's (1992) recommendation that R^2 should be greater than or equal to 10% as an indication of substantive explanatory power. Direct and total effect of Task-Technology Fit on organization performance was 0.580 while the total effect of Usage on organization performance was 0.419. This shows that Task-Technology Fit has a stronger effect than Usage in influencing organization performance. TTF alone explained 33.7% of variance in organizational performance while Usage alone explained 17.6% of variance in organizational performance. This is an indication that Task-Technology Fit plays an important role in use of wireless technologies as eBusiness infrastructure hence influencing organizational performance. This also suggests that higher level of usage and a higher perceived Task-Technology Fit would lead to a higher organization performance.

Task-Technology Fit and Acceptance both showed significant relationships with Usage. The value of R^2 for usage is 0.662, indicating approximately 66.2% of the variance in Usage is explained by Task-Technology Fit and User Acceptance. Therefore, Usage is significantly influenced by Task-Technology Fit and User Acceptance. With Task-Technology Fit and User Acceptance influencing usage, this is consistent with both UTAUT and TTF. Direct and total effect of Task-Technology Fit on Usage was 0.516 and alone TTF explained 26.7% of variance in Usage. The total effect of User Acceptance on usage was 0.475 and alone Acceptance explained 22.6% of variance in usage performance. This shows that Task-Technology Fit and User Acceptance have almost equal positive significant effect on Usage. This mean that high level of Task-Technology Fit coupled with huge levels of User Acceptance would lead to increased usage of wireless technologies for implementing eBusiness infrastructure in Kenyan MSEs. It also suggests that Usage mediates the influence of both Task-Technology Fit and Acceptance on Organizational performance.

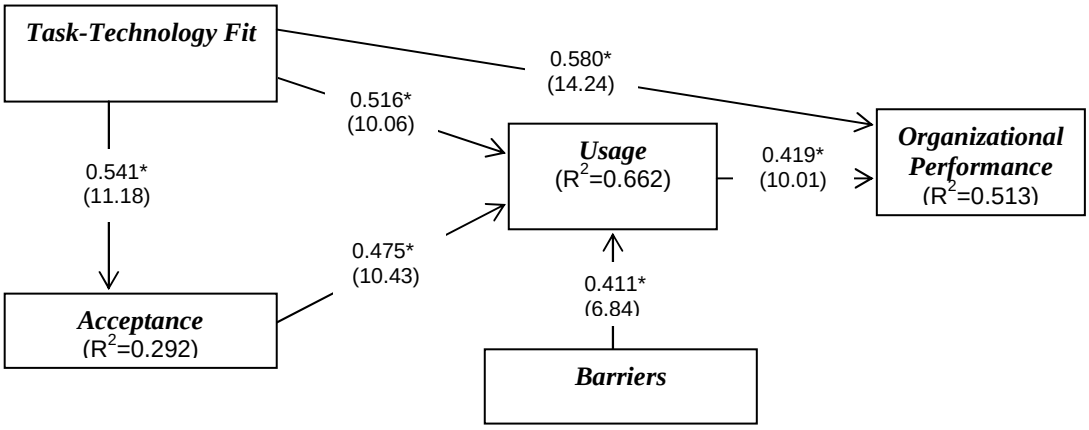

Figure 4.19: Structural model.

Notes: *path coefficients (β) significant at p<0.001 and corresponding t-value in parentheses. All path coefficients exceed the recommended 0.20 level.

In contrast to the expectations and somewhat surprising, barriers had a positive significant influence on Usage (β = 0.411) and explained 16.9% of total variance in usage. This necessitated further analysis on the effects of individual barriers on Usage to test the existence of any negative relationship. The expectation is that a higher perception of barriers will result in less use of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs.

Further analysis for the barriers was done using stepwise multiple regression analysis. When all the five measurement items in the barriers construct were considered simultaneously, interestingly only two items significantly entered the regression equation. Table 4:10 shows that only Performance Risk had a significant negative effect on Usage (β = -0.190 significant at p<0.001) while Perceived security risks showed positive relationship (β =0.480 significant at p<0.001).

Measurement Item	**β**	**T**	**Sig.**
Perceived Security Risks	.480	10.125	.000
Performance Risks	-.190	-4.005	.000

Table 4.10 Results of stepwise multiple regression for the barriers

Therefore, only Performance Risk among all the conceptualized barriers that affects Usage negatively. From these results it is possible to conclude that only technical challenges in form of performance related risks have a negative influence on the use of wireless

technologies to implement eBusiness infrastructure in Kenyan MSEs. The service providers and manufactures of wireless technologies should aim at reducing performance related problems associated with using wireless technologies, underlying technologies and related services. These results also suggest that there is trust towards use of wireless technologies to implement eBusiness infrastructure which removes all unnecessary security fears. The results also indicate that the benefits of using wireless technologies to implement an eBusiness infrastructure outweigh the purchase, installation and usage costs. This eliminates the perceived negative effects of high purchase, installation and usage costs on usage. Also the cost of implementing an eBusiness infrastructure using wireless technologies is not as high as that of either the available alternatives or traditionally existing methods of doing the same business transactions. It is also relatively easier to implement an eBusiness infrastructure using wireless technologies plus there is also a wider choice of technologies and service providers to choose products from which lowers the purchase, installation and usage costs. The lack of negative effect in case of costs and security does not necessarily mean that they are not important barriers to use of wireless technologies to implement an eBusiness infrastructure. This could only be taken to imply that there are some inherent advantages in using wireless technologies to implement an eBusiness infrastructure that diminish the effects of costs and security concerns. This could also imply that many respondents may not be aware of the security risks associated with using wireless technologies to implement eBusiness infrastructure. It may also imply that the price competition among the service providers and retailers of wireless products give the users of wireless technologies and related services a wide price range to choose from hence lowering the costs of using wireless technologies. The Kenyan Mobile telephone service providers have been using the low-cost competition strategy for the last few years as they try to retain their customers as well as make some profit as a result of mass affordability. Lack of any negative significant effect on using wireless technologies to implement an eBusiness infrastructure by Affordability could also be attributed to the Kenyan market where service providers and suppliers of wireless technologies and services use price and not quality of service as the main units of competition making the choice of wireless technologies and services vary widely. This also creates the advantage to the users that they do not need to worry about prices and security. Therefore cost factors are not perceived to be critical impediments in the wider use of wireless technologies by Kenyan MSEs but a reason to take advantage of the best price bargains. This could also be attributed to other mitigating factors such as time and cost savings achieved in using wireless technologies as compared to other available alternatives. Also the cost of implementing an eBusiness infrastructure using

wireless technologies is not as high as that of other existing alternatives. It is also relatively easier to implement an eBusiness infrastructure using wireless technologies and there is also a wider choice of technologies and service providers to choose from. For now Security and Affordability have no any significant negative association with usage while Performance Risks is the only barrier that has significant negative effect on use of wireless eBusiness infrastructure.

These empirical results from structural model evaluation provide considerable support for the model as all the relationships were found to be significant. This validates the proposed model which integrates TTF and UTAUT through a pilot study hence eliminating most of the overlaps in some of the constructs measurement items in both models such as ease of use.

4.4.3 Measurement Model Fit Indices

A confirmatory factor analysis (CFA) was conducted to test the fit between the research model and the data by estimating the research model parameters. This was done using AMOS graphics version 5.0 maximum likelihood estimation as recommended by Byrne (2001). The Fit indices of the model are shown in table 4.11. A comparison with their corresponding recommended values indicate that all the indices are above the suggested levels, thus a implying a good fit.

Wheaton (1987) did advocate for use of several fit measures to measure model whether the data fits the model by suggesting it is prudent to report several fit measures on a given model. Fit indexes are used to assess whether the variance and covariance in the data are accounted for by the model. It assesses the degree of congruence between the model and the data collected. There are several statistics that are used to test this research study model for good fit.

(a) Chi-square to the degrees of freedom

Bentler and Bonnet (1980) and Stank *et al.*, (2003) suggest that the ratio of X^2 (chi-square) to the degrees of freedom should not exceed 5 (<=5). For this study chi-square to the degrees of freedom is 4, and therefore well below the highest minimum value proposed of 5. This shows a good fit.

(b) Normed Fit Index

Bentler and Bonnet (1980) suggest a Normed Fit Index (NFI) which evaluates the estimated model by comparing the X^2 (chi-square) value of the model to the independence model. Higher values greater than 0.95 are an indicative of a good fitting model. For this study the NFI is 0.993 well above the recommended value of 0.95 which shows a good fit.

(c) Comparative fit index

The comparative Fit Index (CFI) assess the fit of a model relative to other models using non central X^2 (chi-square) distribution with non centrally parameters. Hair *et al*., (2006) considers higher values greater than 0.90 as a demonstration of a good fitting model. For this study the CFI is 0.995 well above the recommended value of 0.90 and which shows a good fit. CFI is used here because it is not usually affected by sample size.

(d) Root Mean Square Error of Approximation

Root mean square error of approximation (RMSEA) estimates the lack of fit in a model compared to a perfect model. RMSEA value less than 0.5 can be considered as good fit, values between 0.05 and 0.08 as adequate fit and values between 0.08 and 0.1 as mediocre fit whereas values above 0.10 are not acceptable (Browne and Cudek, 1993). This study reports a value of 0.075 which is within the recommended values for adequate fit.

(e) Tucker-Lewis Index

Tucker-Lewis Index (TLI) yields value between 0 and 1, with values close to 0.90 being indicative of good fit (Hair *et al*., 2006). For this study the TLI is 0.946 well above the recommended value of 0.90 and which is an indication of a good fit.

(f) Goodness-of Fit Index

The Goodness-of Fit Index (GFI) is a measure of the relative amount of variance and covariance in sample data that is jointly explained by sample data. GFI values more than 0.90 are an indicative of good fit (Blunch, 2008; Bagozzi and Yi, 1988). For this study the GFI is 0.997 well above the recommended value of 0.90 and an indication of god fit.

(g) Adjusted Goodness of Fit Index

Adjusted Goodness of Fit Index (AGFI) is the GFI which is adjusted for the degrees of freedom of a model relative to the number of variables. AGFI values more than 0.90 are an

indicative of good fit (Hair *et al*., 2006). For this study the AGFII is 0.955 well above the recommended value of 0.90 and an indication of god fit.

(h) Incremental Fit Index

Incremental Fit Index (IFI) is like all the other normed fit indices, values of IFI range from 0 to 1.00 with a value >0.90 indicating an acceptable fit to the data (Hair *et al*., 2006). For this study the IFI is 0.995 well above the recommended value of 0.90 and an indication of god fit.

(i) Root Mean Square Residual

Root Mean Square Residual (RMSR) is an index of the amount by which the model estimated variances and covariances differ from the observed variances and covariances. For this study the RMR is 0.007 which is less than the 0.05 recommended by Hair *et al*., (2006) and an indication of good fit.

Goodness of Fit Indices Measure	Recommended value	Measurement Model
X^2/d.f	<=5	4
NFI	>=0.95	0.993
TLI	>=0.90	0.946
CFI	>=0.90	0.995
GFI	>=0.90	0.997
AGFI	>=0.90	0.955
IFI	>=0.90	0.995
RMSR	<0.05	0.007
RMSEA	<0.08	0.075

Table 4.11: Fit indices for the proposed model

The results of the measurement model analysis yields acceptable CFA multiple fit indices given in table 4.11. These multiple fit indices indicate that the measurement model provided an excellent fit of the proposed research model to the research data collected hence the research model is both a valid and reliable model. It is also an indication that the responses from the managers of the MSEs generally support the theoretical and conceptual distinctions of all the variables and relationships proposed in this study. Therefore, the research model used in this study is valid and the data collected can be used for further data analysis.

4.4.4 Correlations between the model components

It is important after validating the model to verify its structure by looking at the relationships between its components. Table 4.12 depicts the correlations between the model components obtained using Bivariate correlations with Pearson Correlation coefficients. The correlation coefficients for the model constructs under investigation ranged from 0.265 to 0.580. All the correlations are less than 0.90 indicating the absence of multicollinearity problem (Hair *et al.*, 2006). Multicollinearity occurs when variables are highly correlated with each other.

Inter-Constructs Correlations					
Construct	**Task Technology Fit**	**Acceptance**	**Barriers**	**Usage**	**Performance**
Task Technology Fit	1				
Acceptance	.541**	1			
Barriers	.484**	.265**	1		
Usage	.516**	.475**	.411**	1	
Performance	.580**	.496**	.408**	.419**	1
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 4.12: Inter-correlations between the Model variables

From table 4.12, which shows the correlation matrix between the variables, the following deductions on the study constructs' relationships could be made:

Task-Technology Fit has a significant positive correlation with Acceptance, Barriers, Usage and performance. This confirms the existence of a direct effect of Task-Technology Fit on Usage and performance an indication that TTF highly and significantly predicts Usage and Organizational Performance. The positive correlation between Task-Technology Fit and User Acceptance is an indication that Task-Technology Fit also does influence Acceptance and that people who value Task-Technology Fit find it easy to accept the technology if it meets their task requirements and that User Acceptance of using wireless technologies in MSEs' business processes is largely dependent on the fit between the eBusiness infrastructure requirements and the functionalities of wireless technologies. This relationship was also established in a study on use of e-commerce by Klopping and McKinney (2004). The positive correlation between Task-Technology Fit and Barriers is an indication that technological barriers do influence Task-Technology Fit. Acceptance is correlated to Barriers, Usage and performance. This suggests that technological barriers also affect

acceptance while acceptance affects both Usage and Performance. This is an indication that users of wireless technologies in MSEs' business processes have concerns about each of the three barriers as regards use of wireless technologies to implement eBusiness infrastructure. Usage is correlated to performance. This suggests that Usage and performance are related. Those people who use the technology expect improved organizational performance. Barriers are correlated to Usage and performance. This is an indication that barriers to usage also impact negatively on organization performance.

4.4.5 Normality of the Data

This study employed the Structural Equation Modeling (SEM) to successively evaluate the proposed research model. SEM is considered a confirmatory technique (Tabachnick and Fidell, 2007). Most of the estimation techniques used in SEM analysis including CFA depends upon assumptions of multivariate normality (Tabachnick and Fidell, 2007). Normality of variables is usually assessed by either graphical or statistical methods. Two components of normality are skewness and kurtosis (Tabachnick and Fidell, 2007). To determine whether univariate normality exists, the study examined the distribution of each study construct for skewness and Kurtosis. Table 4.13 shows the constructs, number of items in the construct, mean, standard deviation, skewness, and kurtosis.

Construct	Number of Items	Mean	Standard Deviation	Skewness	Kurtosis
Task-Technology Fit	6	4.166	.527	-.655	2.190
Acceptance	4	4.238	.550	-.379	.438
Barriers	5	3.633	.867	-.621	-.085
Usage	3	4.654	.444	-.677	-1.401
Performance	3	4.098	.715	-.561	.502

Table 4.13: Assessment of normality

Skewness

Skewness is the degree to which a variable's distribution is asymmetrical meaning that a skewed variable has its mean away from the center of the distribution. All the constructs had significant negative skewness. According to Chou and Bentler (1995), skewness values greater than 3 are extreme while West *et al.*, (1995) recommends concerns if skewness is greater than two. Variables with skewness values numerically lower than 1 and preferably in

the same direction are considered appropriate (Byrne, 2001). The skewness values in table 4.13 are all less than 1 which is an indication that the data used in testing the model fit indices represents a passable normal distribution.

Kurtosis

Kurtosis represents the peak and the tails of a distribution. A distribution is either too peaked or too flat. Kurtosis index absolute value higher than 10.0 suggests a statistical problem, and value higher than 20.0 is considered to be extreme (Kline, 1998) while West *et al*., (1995) recommends concerns if kurtosis is greater than seven. From table 4.13, all the constructs had Kurtosis values are less than 3 suggesting that the data used in CFA represents a passable normal distribution.

Both the skewness and kurtosis were well within the acceptable range for assuming a normal distribution. All the five research model constructs were neither highly skewed nor highly kurtotic.

4.5 Chapter Summary

This chapter detailed the results of the data analysis based on the survey data. The demographic characteristics of the respondents and the enterprises are describes. The survey data is analyzed for reliability, validity and normality.

Regression analysis is used to analyze the research model relationships. The results of regression analysis indicate that TTF and Usage have significant positive effect on Organizational Performance while TTF and User Acceptance have positive influences Usage. There were mixed results on analyzing the effects of barriers on Usage with only the Performance Risks influencing Usage negatively.

Chapter 5: Intra-Country Comparison

5.1 Introduction

Most Kenyans live in rural and remote areas of the country with no access to mainstream technologies. Significant digital divide exists particularly between the urban and rural areas. For the last few years, mobile telephone is the first and only accessible telecommunication infrastructure available to many rural people, while the numbers of mobile telephone subscribers surpass that of fixed-line subscribers in the urban areas. A fast wireless broadband communication service is fundamental to economic and social development in rural areas since it removes the physical and spatial barriers that traditionally limit the rural areas. It is also very essential for the under-served urban areas. With low penetration or total nonexistence of fixed line in rural areas, mobile telephone networks as an alternative avails both voice and high speed broadband data communication services, tremendously paving the way for the diffusion of the Internet thus narrowing the digital divide. Mobile telephones and related services increases access to information and services while creating investment and employment opportunities. This chapter discusses the intra-country comparison of access and use of wireless technologies in implementing an eBusiness infrastructure in Kenyan rural and urban MSEs. It also evaluates the research model for both the urban and rural respondents.

The urban areas of Kenya have more economic activities as compared to most rural areas where most economic activities are farm related. Therefore, data collected and evaluated at the country level may mask large inequalities within a country of a varied technological and economic landscape such as Kenya. With poor quality of telecommunication infrastructure outside Kenyan urban centers, analyzing data based on different geographic locations could illuminate any inequalities present while confirming or rejecting the position of the national data. In Kenya, urban and rural areas have different quality of technological infrastructure development as well as levels of social and economic development. These disparities results in different information technology adoption and usage patterns hence a need for regional policies aimed at reducing technology access differences. To draw valid conclusions on the different regional data, the study data collected from the rural and urban areas was analyzed using the same methodology and technologies as the national data and the results were compared. These results were examined for any dramatic disparities and the extent of these disparities. Overall the mobile telephone infrastructure and related services are operated,

marketed and managed by the same companies although the availability of advanced mobile services and user support services are more readily available in urban areas as opposed to rural areas. The findings offer valuable insights to policy makers, providers (investors and marketers) of information and communications technologies and the MSEs on the significance of measured variables and the associated benefits and barriers of rural and urban wireless technologies acceptance and use.

5.2 Comparison between the rural and urban areas

When doing the comparison, it is worth noting that wireless technologies were introduced in the cities earlier than the rural areas, consequently making the cities a more mature market in terms of wireless technologies adoption. The nature of the mobile telephony infrastructure is also fundamentally different with cities enjoying wireless broadband services while most rural areas are yet to get these high speed data services. There is also low penetration of fixed-line telephones in rural areas as opposed to the cities where the infrastructure have been available for many years. In the cities, there is also the installation of metropolitan wired broadband connectivity based on a fiber-optic cable backbone networks. To demonstrated similarities and differences between the two samples, the study evaluates the respondents' demographics in the following sections.

5.2.1 Demographics

While most of the demographic features of the two samples exhibit similar characteristics, there are a number of significant differences in the acceptance and use of wireless technologies between the rural and urban areas. Table 5.1 provides a detailed comparison of demographic characteristics between the urban and rural respondents.

Characteristic	Category	Nanyuki		Nairobi	
		Respondents	**Percentage**	**Respondents**	**Percentage**
Gender	Men	101	63%	216	59%
	Women	60	37%	153	41%
Age	18 – 24	30	19%	47	13%
	25 – 34	56	35%	243	66%
	35 – 44	44	27%	63	17%
	45 – 54	17	11%	16	4%
	55 or older	14	9%	0	0%
Education Level	High School	13	9%	16	4%
	College Certificate	36	22%	37	10%
	Professional Qualification Such as CPA	18	11%	16	4%
	College Diploma	40	25%	189	51%
	Undergraduate Degree	52	32%	74	20%
	Postgraduate Degree	2	1%	37	10%

Table 5.1: Demographic profile of the samples

In terms of gender, the rural areas had a slightly larger proportion of men than women as compared to urban areas. In terms of respondents' ages, 66% of respondents in Nairobi were within the age group 25-34 compared to 35% in Nanyuki. There were no respondents older than 55 years in Nairobi as compared to Nanyuki which had 9% of respondents who were older than 55 years. This implies that the MSEs in urban areas are usually managed by relatively young people as opposed to the rural areas where most owners of MSEs are of advanced ages. It is worth noting than most enterprises in rural Kenya are owned and managed by retirees who after years of working in urban areas retire from public service to try their hands on business in their rural villages. In terms of academic qualifications where the percentage of owner/managers who have attained at least a college diploma qualification in Nairobi is 81% as compared to 58% in Nanyuki, with Nairobi having 10% of the MSEs'

owners having attained postgraduate qualifications while in Nanyuki only 1% had such qualifications.

5.2.2 IT infrastructure

The study looked at the number of computers in an organization as well as the manner and cost of Internet access. Table 5.2 provides a detailed comparison of IT infrastructure between the urban and rural samples.

IT component	Category	Nanyuki		Nairobi	
		Respondents	Percentage	Respondents	Percentage
Number of Computers	Less than 5	84	52%	116	31%
	5-10	26	16%	137	38%
	11-15	32	20%	53	14%
	16-20	13	8%	21	6%
	More than 20	6	4%	42	11%
LAN	None	62	39%	7	2%
	Wired	24	15%	210	57%
	Wireless	74	46%	179	49%
	Blue tooth	6	4%	24	7%
	Both (Wired and Wireless)	12	7%	36	10%
How they access Internet	Modem	117	73%	237	64%
	Mobile Telephone	66	41%	208	56%
	Wireless Desktop Phone	22	14%	46	12%
	Dialup	16	10%	42	11%
	Mobile devices	19	12%	37	10%
	Wired Broadband	0	0%	121	33%
	Wireless Broadband	34	21%	105	28%
	Cyber Café	20	12%	2	1%
	Satellite	4	2%	0	0%
Costs of accessing Internet per month	Less than 5000	157	98%	220	60%
	5000 -10000	4	2%	136	37%
	10000 – 20000	0	0%	16	3%
	More than 20000	0	0%	0	0%

Table 5.2: IT infrastructure of the samples

Usage and presence of IT infrastructure vary considerably between Nanyuki and Nairobi; in Nanyuki 52% of the enterprises have less than 5 computers, while in Nairobi 69% of the enterprises have more than 5 computers of which 11% of these enterprises have more than 20 computers. This could be attributed to availability and wide market for computer

hardware in Nairobi as opposed to Nanyuki where people interested in buying computers have to travel to Nairobi. The difference in the IT infrastructure is further reflected on the implementation of the LAN. In Nanyuki, 39% of enterprises have not connected their computers in any way. In contrast, only 2% of enterprises in Nairobi have not connected their computers with 57% have a wired LAN and 10% having connected their computers using both wired and wireless LANs. The sample had substantial responses on the use of wireless LANs from both rural areas and urban centers with Nanyuki having a proportion of 46% which was close to the proportion of Nairobi users at 49%. It is interesting to note that a mini-market in Nanyuki had three computers and each was running the point of sale software and yet they were not connected. This can only raise the question of technical support available in rural areas as well as the marketing strategies employed by the providers of Information Technology solutions. The supplier of the point of sale software ought to have offered the owner of the mini-market a comprehensive Information Technology solution rather than just selling their product per se.

The survey results indicate that there is continuous and exponential growth in use of Internet among MSEs in the country. There is also significant difference on how the rural areas and urban centers enterprises access their Internet. In Nanyuki, 12% of the enterprises access Internet from cyber café as compared to only 1% in Nairobi. It is important to note that MSEs in rural areas still value and use Internet cafés for Internet access making the case for the use of wireless broadband telecenters for the rural areas an ideal solution to narrowing the rural-urban digital divide. 33% of the enterprises in Nairobi use wired broadband Internet connection while none of the enterprises in Nanyuki has access to such kind of high speed Internet connectivity. Nairobi has a metropolitan wired broadband access network as opposed to Nanyuki and other rural areas. This requires government intervention in provision of low cost local broadband access networks in rural areas. Nanyuki also has a higher percentage of users of wireless modem (73%) and mobile devices (12%) to access Internet as compared to Nairobi (64% and 10% respectively). This indicates that wireless Internet is widely accepted as an Internet access solution in rural areas where other main stream technologies are not available. Modern consumer satellite Internet services offering broadband Internet, telephone and television are now available locally offering alternative connectivity in rural and urban areas. Only 2% of Nanyuki respondents were using consumer satellite Internet services while Nairobi had no users of these services.

On the cost of accessing the Internet, in Nanyuki all users were spending less than Kenya Shillings ten thousand (10,000), with 98% spending less than Kenya Shillings five thousands (5,000) per month on Internet access while in Nairobi 3% of the enterprises were spending more than Kenya Shillings ten thousand (10,000) every month. The modes and cost of accessing Internet and related services in MSEs indicates that the enterprises in rural areas prefer low investment and access costs. The survey results are consistent with the usual belief that acceptable speed, low cost and wide accessibility would increase the level of Internet diffusion in developing countries such as Kenya.

5.2.3 Automated business processes

For business success and improved competitiveness, businesses should automate their internal business processes so that they can improve on their efficiency, productivity and financial performance. This would be good for MSEs as it would change their conventional way of doing business. Table 5.3 provides a detailed comparison on the presence of automated business processes in MSEs in the urban and rural samples.

Business Automation	Category	Nanyuki		Nairobi	
		Respondents	Percentage	Respondents	Percentage
eBusiness Applications	Orders through phone	154	96%	358	97%
	Orders through email	92	57%	316	86%
	Customers orders through phone	122	76%	348	94%
	Customers orders through email	111	69%	337	91%
	Automated Internal communication	98	61%	295	80%
	Automated Customer relationships	37	23%	279	76%
	Automated Sales/marketing activities	24	15%	243	66%
	Automated Suppliers/partners relationships	42	26%	274	74%
	Employees access resources from outside	10	6%	105	28%
Have a website	Website	16	10%	184	50%
How is the website used	e-Marketing	16	10%	184	50%
	e-commerce	6	4%	86	23%
	Receiving orders	6	4%	80	22%
	Employment	2	1%	44	12%

Table 5.3: Automated Business Solutions

5.2.4 Use of advanced eBusiness Solutions

The growing number of wireless based technologies users in urban and rural areas in Kenya offers an ideal opportunity for the MSEs to use m-commerce and therefore access to a wider market. Adequate infrastructure is vital to the use of eBusiness applications as most eBusiness solutions and applications fail due to inadequate infrastructure support within the enterprises. A successful eBusiness solution provides an enterprise the ability to quickly and

efficiently meet its costs and operational requirements through improved responsiveness. All eBusiness applications are highly beneficial to enterprises by significantly transforming the way MSEs conduct their business through improved processes, but from table 5.4, there is gross under-utilization of advance and sophisticated eBusiness solutions in Kenyan MSEs. Rural MSEs have extremely low level of website and crucially very low access to e-commerce. This indicates that for the majority of rural MSEs' payments are mostly done offline and not e-commerce based. On visiting the URLs for web sites provided by the rural MSEs, it is worth noting that most websites are not active or are redirected while the rest of the web sites are mostly used for informational purposes and only a handful are used for eBusiness activities.

eBusiness Solutions	**Nanyuki**		**Nairobi**	
	Respondents	**Percentage**	**Respondents**	**Percentage**
Website	16	10%	184	50%
Enterprise Resource Planning	5	3%	32	9%
Customer Relationship Management	7	4%	43	12%
Sales Force Automation	8	5%	42	11%
Supply Chain Management	6	4%	13	4%
E-Commerce	6	4%	86	23%
E-Procurement	2	1%	12	3%

Table 5.4: Use of eBusiness Solutions

5.2.5 Mobile Financial Transactions

The use of mobile financial transactions is markedly different in rural and urban areas as indicated in table 5.5. The rates of mobile financial transaction services usage for M-banking and Mobile Money Transfer are generally higher in rural areas than urban areas (40% use of M-banking in rural areas and 24% in urban areas, 40% use of Mobile Money Transfer Services in rural areas and 37% in the urban areas). This implies that M-banking and Mobile Money Transfer are particularly useful to rural MSEs. M-Commerce has higher usage rates in urban areas at 27% compared with 9% in rural areas. These results indicate that the prevailing availability and use of mobile telephones has not translated to huge use of M-Commerce in rural MSEs.

M-Commerce Transactions	Nanyuki		Nairobi	
	Respondents	Percentage	Respondents	Percentage
M-Banking	64	40%	90	24%
M-Commerce	14	9%	98	27%
Mobile Money Transfer	64	40%	137	37%

Table 5.5: Use of financial transactions

5.2.6 Use of Short Message Service

Although all the enterprises use mobile telephones for voice communication only 51% of the enterprises use the short message service (SMS). SMS usage varies considerably between rural and urban areas. Table 5.6 shows that using SMS is much lower in urban areas at 40% as compared to 75% in rural areas. This could be attributed to high cost of cross network calls as compared to using SMS. MSEs in rural areas have on average subscribed to two service providers while the urban enterprises have subscribed to an average of three service providers. With four mobile telephone operators and one fixed wireless operator the rural enterprises prefer using SMS for cross network communications instead of voice communications. Therefore SMS is a very useful service for MSEs in rural areas and hence used more frequently in rural areas.

Short Message Services Usage (SMS)	Nanyuki		Nairobi	
	Respondents	Percentage	Respondents	Percentage
Send text messages	120	75%	149	40%
Send SMS advertisements	10	14%	53	6%
Checking utility bills	8	5%	162	44%
Checking product and stock prices	24	17%	63	15%

Table 5.6: Use of short message service

The use of Short Message Service for other value added services has been extremely successive and continues to grow exponentially. Some other mobile telephone text based services include advertising, getting utility bills and requesting product and stock prices. Using mobile telephone to get the utility bills is more significant in urban areas as most of these services are not available in rural areas and where available the service is not utterly reliable. This could be the reason why the use of checking bill utility is much lower in rural areas at 5% as compared to 44% in urban areas. The rural areas also happen to use SMS

advertisement more than the urban area (14% compared to 6% in urban areas) while the usage rates for checking product and stock prices are almost similar.

5.3 The results of the Research Model

Before comparing rural and urban areas, the research model was tested using the entire dataset in chapter 4. The comparison of rural and urban areas revealed significant differences between the two areas in terms of the magnitude of path coefficients (structural parameters). The effect of Task-Technology Fit on both the Organizational Performance and Usage were greater in urban areas while the effect of User Acceptance on Usage was greater in rural areas as indicated in table 5.7 and figures 5.1 and 5.2.

Relationship	**Urban (Nairobi)**			**Rural (Nanyuki)**		
	β	**t-value**	***p*-value**	β	**t-value**	***p*-value**
TTF → Performance	.569	13.266	.000	.445	6.265	.000
Usage → Performance	.397	8.293	.000	.403	5.547	.000
TTF → Usage	.419	8.834	.000	.369	5.003	.000
Acceptance → Usage	.406	8.511	.000	.429	5.981	.000
Barriers → Usage	.277	5.524	.000	.304	4.027	.000
Performance risks → Usage	-.170	-2.941	.003	-.237	-2.832	.005
Usefulness → Usage	.301	6.039	.000	.306	4.060	.000
Influence → Usage	.411	8.626	.000	.439	6.166	.000

Table 5.7: Path Estimates for rural and urban areas (Structural Coefficients)

Figure 5.1 and figure 5.2 depict the resulting path coefficients of the research model for the rural and urban samples respectively. All path were significant at $p<0.001$ with the exception of the impact of Performance risks on Usage which is significant at $p<0.01$.

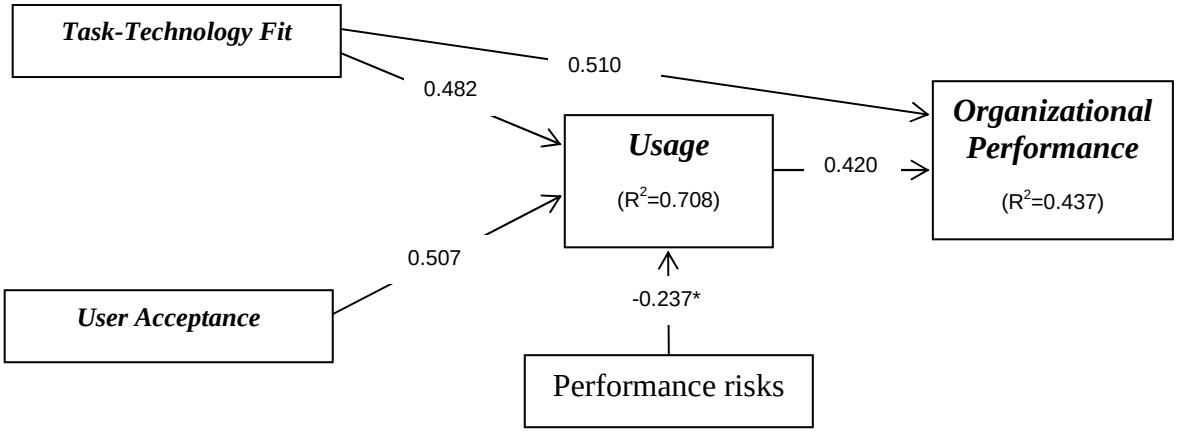

Figure 5.1: Result of Rural Sample

Note: All path coefficients (β) significant at p<0.001 except * where path coefficients (β) is significant at p<0.01

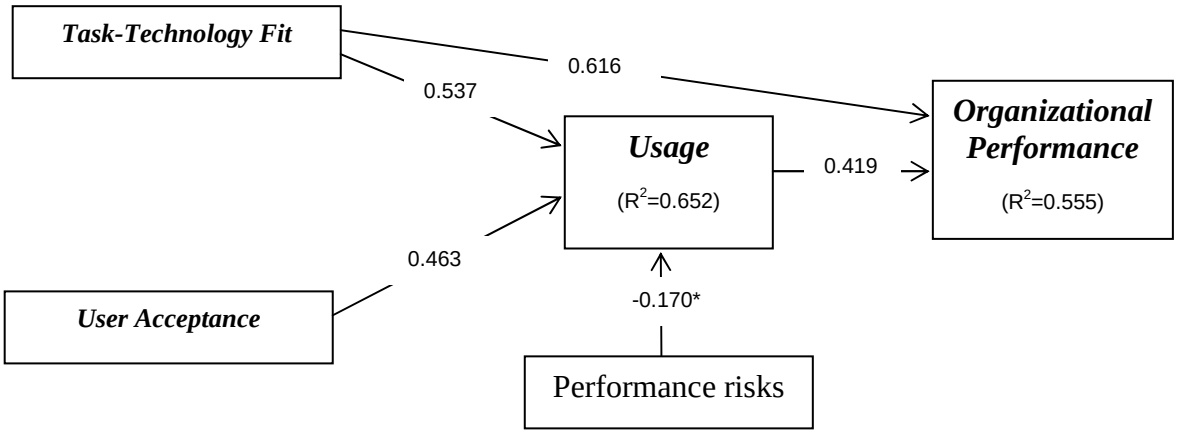

Figure 5.2: Result of Urban Sample

Note: All path coefficients (β) significant at p<0.001 except * where path coefficients (β) is significant at p<0.01

From table 5.7 and figures 5.1 and 5.2, there were apparent differences between the rural and urban areas such as:

- Task-Technology Fit had a large and significant effect on Organization performance and Usage in urban areas while it had no such huge significant effects in rural areas. Therefore, Task-Technology Fit has more significant influence on Organization performance in urban areas and hence critical to willingness to use wireless technologies to implement an eBusiness infrastructure in the urban MSEs than the rural MSEs.

- User Acceptance had a large and significant influence on Usage in rural areas while it had no such large significant influence in urban areas. Wireless technologies user acceptance causes high willingness to use for both the rural and urban MSEs, but the effect is greater for the rural MSEs.
- User acceptance is the strongest predictor of using wireless technologies to implement an eBusiness infrastructure for the rural areas sample as opposed to the urban areas where TTF (the ability to perform the required specific function) is the strongest predictor of usage. Therefore, user acceptance of wireless technologies is higher in the rural areas than urban areas while urban respondents strongly believe wireless technologies meets their eBusiness infrastructure requirements.
- Organizational performance was found to be significantly determined by TTF and Usage resulting to R^2 of 0.437 (a satisfactory high R^2) for rural areas and 0.555 (an exceptionally high R^2) for urban areas. This means that the combined effects of TTF and Usage explained 44% of the variance in Organizational performance in rural areas and 56% of the variance in Organizational performance in urban areas. This implies that even though the research model is capable of explaining relatively high variances, the model had more explanatory power in urban areas than in rural areas.
- Usage was found to be significantly determined by TTF and User Acceptance. The resulting R^2 of .708 in Usage for the rural area is exceptionally high as compared to R^2 of .652 in usage for urban areas. This implies that the model explains higher variance in usage in rural areas than in urban areas. This is because the usage in rural areas is more dependent on User Acceptance ($\beta = .507$) as opposed TTF ($\beta = .482$) whereas in urban areas usage is more dependent on TTF ($\beta = .537$) as opposed to User Acceptance ($\beta = .463$).

The differences in model parameters suggest that Task-Technology Fit influences performance and usage in urban areas more than the rural areas as there are other available alternative technologies for implementing an eBusiness infrastructure in MSEs for the urban MSEs to choose from. For the rural MSEs, they have no other cheaper alternatives to accomplish their eBusiness tasks. The use of wireless technology in urban areas is therefore purely on the bases of process fit as opposed to rural areas where usefulness and social influences are key determinants of usage. That is why Task-Technology Fit exhibited strong direct and total effects on performance and usage in urban areas while user acceptance exhibited strong and total effect on usage in rural areas. These results could be especially

valuable for government policy makers and wireless technology suppliers and service providers for their policy development and marketing practices.

To test the research model, a confirmatory factor analysis was done using the Analysis of Moment Structures (AMOS 5.0). AMOS was chosen because of its simplicity and technically advanced nature (Miles, 2000). Table 5.8 shows the model fit indices for the overall model and separately for the rural and urban samples. The fit indices indicate that the models fit the data well providing a strong support for the research model. The good fit of the two models for both rural and urban areas is an indication of decreasing digital divide as there is increased access and diffusion of technologies in rural areas through wireless technologies. Wireless technologies are the only technology that seems to blur intra-country social and economic disparities. The overall good fit of the proposed model structure for the rural and urban areas indicates that the proposed research model is acceptable and reflects adequately reality of wireless technologies in implementing eBusiness infrastructure in MSEs and if another sample is taken from any location in Kenya the similar results would be obtained.

Fit Indices	**Recommended value**	**Overall Model**	**Urban (Nairobi)**	**Rural (Nanyuki)**
X^2/d.f	<=5	4	2.5	1.58
NFI	>=0.95	.993	.994	.990
TLI/NNFI	>=0.90	.946	.963	.961
CFI	>=0.90	.995	.996	.996
GFI	>=0.90	.997	.997	.996
AGFI	>=0.90	.955	.959	.941
IFI	>=0.90	.995	.996	.996
RMR	<0.05	.007	.007	.008
RMSEA	<0.08	.075	.064	.060

Table 5.8: Fit indices

The fit indices above indicate that the model fits the data well a cross the country hence it is both a valid and reliable model. It is worth noting that the X^2/d.f (chi-square/degree of freedom) value is usually sensitive to the sample size. For relatively large sample sizes the value of X^2/d.f ratio is usually high as indicated by the high chi-square/degree of freedom value for the national data. Therefore, relying on X^2/d.f ratio for assessing model

specifications can be misleading hence the chi-square goodness of fit (GOF) is not used as a sole indictor of model fit (Hair *et al.,* 2006; Byrne, 2001).

Responses within each sample are expected to be similar while greater differences are expected between the rural and urban respondents. A further investigation to try and verify if there are differences in perceptions of the research variables between the rural and urban respondents was carried out using t-test to try and indentify the differences among ratings of the research model variables. Table 5.9 shows the results of the t-test performed on the means of the five constructs of the research model.

Constructs	**Nairobi (N=369)**		**Nanyuki (N=161)**		**t-value**	**p-value**
	Mean	***Std. Deviation***	***Mean***	***Std. Deviation***		
TTF	4.1707	.50546	4.1542	.57360	.331	.741
Acceptance	4.2236	.55273	4.2717	.54443	-.927	.354
Barriers	3.6266	.87802	3.6484	.84403	-.267	.790
Usage	4.6459	.44761	4.6729	.43696	-.643	.521
Performance	4.0804	.72597	4.1387	.68977	-.863	.388

Table 5.9: T-test result for perceived differences between rural and urban responses

All means were greater than 3.5 (ranging from 3.6266 to 4. 6729) indicating an overall positive response to the study constructs, while the standard deviations for the constructs were less than 1 an indication that the measurement item scores were around the mean scores. From table 5.9, even though all factors with the exception of TTF were rated higher in rural areas than urban areas, the differences between rural and urban MSEs' ratings on the research model constructs are not statistically significant as p-values are greater than 0.05 (with or without assumed normality). This means that the respondents treated the research variables in the same way in both rural and urban areas implying that the responses were not significantly different between the rural and urban areas.

In addition, a multivariate analysis of variance (MANOVA) was performed on the data from both samples. MANOVA emphasizes the mean differences and statistical significance of differences among groups (Tabachnick and Fidell, 2007). Wilks' lambda is a test statistic used in MANOVA to test whether there are differences between the means of identified groups of subjects. The MANOVA results indicated that there are significant agreements between the two samples in their responses to the research model constructs. The MANOVA

test showed a non significant multivariate F with Wilks' Lambda of 0.995, and $F = 0.484$, with a p value of 0.788 (the observed significant level is more than the required $\alpha = 0.5$). This result confirms that there is highly significant agreement between the rural and urban users of wireless technologies in their perceptions of the research model constructs.

5.4 Conclusion

It is evident that while there are indisputable similarities between usage and perception of barriers and benefits of using wireless technologies to implement eBusiness infrastructure between the rural areas and urban centers in Kenya, there are also some considerable differences though surprisingly small. With Kenyan's Vision 2030 (NESC, 2007) seeking to firmly interconnect the country through a network of roads, railways, ports, airports, and water ways, and telecommunications so as to make it impossible to refer to any region of our country as "remote", wireless technologies seems to be the ideal solution to move the country faster into the information age (to be an information and knowledge-based society). These results also eliminate the perception that rural areas are backward regions and that improved connectivity in rural areas gives the rural MSEs an equal footing with urban centers' MSEs.

The study also reveals significant differences between rural and urban MSEs in access and usage of wireless Internet. These findings offer valuable insights to the Kenyan government in particular on the need to develop and implement a national telecommunications' policy and strategy on using wireless Internet for development. This should target provision of widespread Internet access through end-to-end wireless broadband infrastructure and mobile telephone networks to the underserved areas of the country which are considered less commercially profitable by service providers to help bridge Kenya's growing urban–rural digital divide.

It could be argued that some factors are more important to MSEs in urban centers while others are more important in rural areas when deciding on using wireless technologies to implement an eBusiness infrastructure. This resulted to varied influence on dependent variables by independent variables on the research model when tested using the two different samples. But there seems to be agreement on the effect of barriers on usage implying that some factors may be important to both samples on usage decisions. For example, there was no significant difference on the negative effect of Performance Risks on Usage in both the

urban areas and rural areas. The difference was very minimal at 0.067. Therefore, Performance Risks negatively influence the use of wireless technologies to implement an eBusiness infrastructure in both the urban and rural MSEs.

To alleviate the existing huge technology access disparity between rural and urban areas, and to ensure equity in digital access, the rural areas should leapfrog to wireless technologies which offer relatively faster and less expensive ways of building telecommunication infrastructure over the more expensive and time-consuming tasks of building fiber cable based connectivity or the fixed (wired) telephone networks. Wireless technologies could also be used in urban areas to complement the fixed broadband networks.

Chapter 6: Case Studies Results

6.1 Introduction

This chapter examines five MSEs which have used wireless technologies to implement eBusiness solutions at different points in their business processes. The results are based on the current uses, barriers and performance impacts of using a particular wireless technology to implement an eBusiness infrastructure in individual MSEs. Table 6.1 gives the five enterprises included in the sample of users of wireless technologies for implementing an eBusiness infrastructure. For each MSE, data was collected using semi-structured interviews with the manager in two different occasions. The objective of conducting the interview more than once was to avoid any bias in the responses. On request, permission was granted in all the five cases for direct observations on the actual us of the wireless technology during business operations. The managers of the case study enterprises preferred not to be indentified by their names as well as disclosing their enterprise names and details. The results from data collection is written up as individual cases and followed by the discussion on the issues raised during the study.

MSE	Location	eBusiness infrastructure based on Wireless technology
Enterprise A	Nairobi	Receiving payments through Mobile Money Transfer
Enterprise B	Nairobi	SMS advertising
Enterprise C	Nanyuki	Mobile Banking
Enterprise D	Nanyuki	Wireless Internet
Enterprise E	Nanyuki	Extending LAN with WLAN

Table 6.1: Case study MSEs and study focus

6.2 Characteristics of the MSEs in the sample

Using the MSE as the initial unit of analysis the study examines the current uses of wireless technologies to implement eBusiness infrastructure and the impact this has on the enterprise performance. Table 6.2 has the information on the enterprises included in the case studies sample.

Characteristic	MSE A	MSE B	MSE C	MSE D	MSE E
Number of years in operations	6	18	17	4	12
Number of employees	5	16	48	2	28
Type of business	Trade (Hardware)	Tourism	Manufacturing	Trade (Internet services)	Tourism
Role of the respondent	Manager	Manager	Manager	Manager	Manager

Table 6.2: Characteristics of the MSEs

From table 6.2, the MSEs had employed between two and forty eight employees. This indicates that the sample had both micro and small enterprises. Nairobi had one micro enterprise and one small enterprise while Nanyuki had one micro enterprise and two small enterprises. Micro enterprises employ 1 to 10 employees while small enterprises employ 11 to 50 employees. It is also interesting to note that the manufacturing MSEs had more employees than the MSEs in the other subsectors of trade and tourism.

6.3 Research model factors influence on use of wireless technology

From the research model, three factors influence the use of wireless technologies to implement an eBusiness infrastructure. The influence of these factors on users' perception is considered as either positive or negative and their effect on usage is considered high, moderate or low.

Factor		Influence	MSE A	MSE B	MSE C	MSE D	MSE E
Task-Technology Fit		Positive	High	High	High	High	High
User Acceptance	*Usefulness*	Positive	High	High	High	High	High
	Social Influence	Positive	High	High	High	Low	Low
Barriers	*Affordability*	Negative	Moderate	Low	Low	High	Low
	Security	Negative	High	Low	High	Low	High
	Performance risks	Negative	High	Low	High	High	Moderate

Table 6.3: Research constructs influence on usage

The case studies revealed that the four research constructs were relevant to the use of wireless technologies in MSEs' business processes and therefore verified to be appropriate measures for this study. The case studies revealed that all the MSEs considered Task-

Technology Fit and Performance Expectance or usefulness to be relevant in their use of wireless technologies to implement an eBusiness infrastructure and therefore rated them highly. This makes these two dimensions appropriate measures for this study. MSEs A, B and C consider the effects of Social Influence on their usage of wireless technologies as high. This makes Social Influence a key dimension in the adoption of wireless technologies in implementing an eBusiness infrastructure. This is primarily because the technologies (Mobile Money Transfer, SMS advertising and M-Banking) these MSEs were using requires general acceptance (widely used) and usage (co-adoption) by trading partners and general public within the economy for the enterprises to realize tangible benefits from using these technologies. MSEs D and E considers the effects of Social Influence as low because the technologies (Wireless Internet and Wireless LAN) they are using do not require co-adoption and that they address the unique enterprise technological needs. Barriers dimensions had considerable variations among case study MSEs. The Security dimension shows considerable variations among study MSEs with three out of five MSEs considering it important. With the exception of MSE E all the other MSEs have experienced performance problems with their wireless technologies. MSE E has extended its LAN using WLAN and it seem to have enjoyed its services as the manager does not seem to experienced the usual performance problems associated with wireless technologies. The affordability dimension does not have any negative effects on usage for four MSEs. The only exception is in the MSE D whose use of wireless Internet is considered expensive but it is the only available alternative in the rural areas that the MSE can afford in terms of installation and access costs. All other MSEs are satisfied and consider the benefit of using their respective wireless technologies to outweigh the costs of purchase and usage or access.

6.4 Individual case studies

The aim of eBusiness solutions is more than just automating transactions. It is creating value and realization of the benefits of integrated business processes. The only limiting factor is that for most of eBusiness solutions to work well for the enterprise, equivalent technologies must be implemented by all other MSEs the enterprise is doing business with. This implies that for any wireless technology to achieve its functional targets on improving the desired business processes and without raising operation costs, MSEs and its suppliers and customers must deploy or have access to mutually (jointly employ) compatible technologies for their eBusiness solutions.

The next section presents the results of individual cases showing how MSEs are using relevant wireless technologies to implement an eBusiness infrastructure for operational, transactional and interactional benefits coupled with low costs of acquiring and using these technologies. All eBusiness solutions are intra-company and inter-company solutions and therefore are dependent on organizational and environmental factors for their success.

6.4.1 MSE A: Mobile Money Transfer

MSE A is a business-to-consumer retailer of building and construction hardware materials serving a booming construction industry in the city of Nairobi. The enterprise stocks more than a thousand different type of building materials and offers delivery services to the buyers as part of its service to the customers. The MSE has integrated the use of Mobile Money Transfer to its business operations. Mobile Money Transfer service is the use of the mobile telephone to store, send, or receive money allowing the users of these services to move or keep money more safely. The money held in the mobile account can then be used to buy airtime (or related products from the service provider), pay bills or be transferred to another person person's account. Buying of products from the service providers or loading money into the mobile accounts attracts no charges. Withdrawing money from the mobile account, paying bill using the mobile account or transferring money from one mobile account to another mobile account attracts transaction charges. Successful use of Mobile Money Transfer Services in MSE A requires its customers to have mobile account and be ready to use it to pay for the goods and services as most eBusiness solutions fail due to lack of collaborations among partners. Although Mobile Money Transfer Services was targeted for personal money storage and person-to-person money exchange for the unbanked millions of Kenyans, the introduction of bill payments option as well as customers accepting to use the facility to pay for goods and services then transforms the service to a mobile commerce tool. The number of bulk mobile payments receiving businesses usually referred as pay bill partners has continued to grow, but the growth is only exponential in Nairobi and is largely dominated by huge corporations and government agencies.

How does the MSE A use Mobile Money Transfer Services? The MSEs' manager receives customer orders through the mobile telephone, processes the order and sends text using the Short Message Service giving the total order cost to the customer. The customers can also come to the MSEs' premises and get their orders processed. The customer then makes the payment by sending or transferring money from their mobile account to one of the MSE's

mobile accounts. Even though the order processing is done manually the order details are keyed in and stored in the MSE's computer by the end of the day for easier reporting and record keeping. The use of Mobile Money transfer is supposed to create value for the customer and the enterprise as both do not have to risk holding a lot of liquid cash. With most armed robberies targeting traders or money on transit nowadays, Mobile Money Transfer services eliminates the possibility of money loss through theft as no liquid cash changes hand at the MSE's premises. This has given MSE A significant operational benefits by providing a more secure and reliable mode of receiving money without increasing its operation costs. But this is not without some technological challenges. Initially the trader had four mobile telephones to cater for the Money Transfer Services as the maximum amount of money one can hold in their mobile account is Kenya shillings 50,000 and with an allowed maximum daily transaction of Kenya shillings 75,000. Probably Mobile Money Transfer services were meant for micro payments only but times and demands of paying for good and services using the service has come and therefore the technology should move to the next level and allow holding more money and paying huge amounts paving way for the future dependable m-commerce transactions. Currently commercial banks are trying to inter-link the Mobile Money Transfer Services to their members' accounts to allow users of Mobile Money Transfer Services to perform basic banking transactions like deposits and withdrawals of money held in mobile accounts using conventional banking systems. By August 2010, four commercial banks were allowing loading and downloading of money between the users bank account and the mobile account. Loading and downloading of money between the bank accounts and the mobile accounts gives a different picture of mobile money transfer services which was presumably to help the millions of unbanked Kenyans and indicates that most of the mobile money transfer services users have bank accounts. The Kenyan banking industry has changed over the last few years since the enacting of the Microfinance act of 2006 which came into effect in May of 2008 and saw the introduction of deposit taking microfinance institutions which resulted to an increase in the number of banked Kenyans. Therefore, mobile money transfer service is just a form of money digitization which allows efficiency in personal and business transactions by reducing physical and financial difficulties experienced by most Kenyans in accessing financial services. This makes mobile money transfer services a form of mobile wallet which also avails basic banking services to everyone within mobile telephone network coverage areas with branchless banking.

The occasional transaction delays and failures also negatively impact on use of Mobile Money Transfer Services. It is a known fact that on most Fridays and end of the month days the network in most urban areas is always congested increasing delays or even total failure of Mobile Money Transfer Services as well as denial of service in making voice calls. Even if the chances of making a mistake when transferring money are low, sending the money to the wrong number will result to a waiting period of 72 hours for the transaction to be reversed. This is also subject to whom the recipient of money is and their action after receiving the money. If by any chance they use even a single cent of the money received, the transaction cannot be reversed. But Mobile Money transfer services is the only alternative available to most of Kenyan population where the country wide total number of cards in use as at December 2008 is 2,541,827 compared to more than 7.4 million registered mobile account holders as at June 30th 2009 (CBK, 2009). These 2,541,827 cards include ATM, credit, debit and charge cards. The banking sector branch network as at June 30th 2009 was 930 branches countrywide (CBK, 2009). These bank branches are sparse and few in number to satisfactorily avail the desired banking financial services to Kenyan business population and particularly the MSEs' subsector. But with more than 10,735 registered agents for mobile money transfer services as at as at June 30th 2009 (CBK, 2009), mobile money transfer services avails the desired platform for financial transactions in most parts of the country through use of mobile financial services. The government should ensure that the necessary and sufficient mobile commerce laws and regulatory frameworks are in place in order to protect the users of mobile money transfer services while the mobile money transfer services providers should guarantee that their services and gadgets are foul proof and to reduce performance and security risks. The cost of operating a mobile account may seem cheap at face value, but using the mobile account services is expensive if one is to conduct several transactions at the current service charges available from respective service providers and which are given here in table 6.4 below. The study results also indicate that MSEs as well as most Kenyans are willing to pay for the high costs of using of Mobile Money Transfer Services because of its convenience and efficiency thus reducing the would be negative effects of costs on usage.

Service Provider and service		**Safaricom M-Pesa**	**Zain Zap**	**Yu YuCash**
Deposit money 100 – 35,000		0	0	0
Send money		30 (US$0.40)	10 (US$0.13)	25 (US$0.30)
Withdraw money	5000 - 10000	75 ((US$0.90)	80 (US$1.00)	65 ((US$0.80)
	10001–35000	145 – 170 (US$1.80) - (US$2.13)	160 (US$2.00)	130 – 150 (US$1.63) - (US$1.88)
Withdraw money using ATM	5000 - 10000	100 (US$1.25)	80 (US$1.00)	Not available
	10001–35000	175 (US$2.19)	160 (US$2.00)	Not available
Download mobile account money to a bank account	5000 - 10000	Depends on the bank	1.6% of the amount	Not available
	10001–35000	Depends on the bank	1.6% of the amount	Not available
Checking Account Balance		1 (US$0.01)	1 (US$0.01)	0
Top up Airtime		0	0	0
Pay Utility Bills		0 – 30 (US$0 - US$0.40)	0	Not available
Maximum account balance		50,000 (US$625)	100,000	50,000 (US$625)
Maximum daily transaction		75,000 (US$937.5)	100,000 (US$1250)	75,000 (US$937.5)

Table 6.4: Cost of mobile money transactions

Note: Amount is in Kenya Shillings and USD amount in parenthesis

6.4.2 MSE B: SMS Advertising

MSE B is a tour and travel services enterprise and a destination management enterprise which offer tailor-made safari packages, beach holidays and hotel bookings. It also customizes safaris and holiday packages to fit individual's budget for both luxury and affordable wildlife or camping safari packages. SMS advertising allows the MSE to send personalized offers on its products and services to a target audience. SMS advertising is a cheap and very effective form of direct marketing as the message reaches the right person eliminating waste of advertising money. This is even more effective now with the Kenyan mobile service providers introducing multi-media messaging which allows their customers to send text, pictures and video messages. SMS advertising gives enterprises the advantage of

running advertising campaigns targeted and tailored towards a selected group of people or institution.

How does MSE B use SMS advertising? The MSE gets telephone numbers from people attending the annual holiday exhibition held in Nairobi during the month of March as well as many other tourism related meetings, conferences and exhibitions using a short questionnaire. Then in every two weeks, the marketing team sends SMS to the questionnaire respondents offering one affordable holiday destination and a chance to visit their offices to know more about available holiday destinations and packages. The MSE has been using the SMS advertising services for the last ten years and has continued to use the service because it is a convenient and a low cost advertising service. The SMS advertising services has improved the MSE's marketing services as well as increasing the number of customers. Even though the study findings (chapter 4) indicate that the use of mobile advertising by Kenyan MSEs is still very limited MSE B have immensely benefited from using SMS advertising and the MSE's management believes it is easier for prospective customers to respond to an SMS advertisement faster than to any other form of marketing campaign such use of using a poster campaign. The MSE B manager also felt that SMS advertising is cheaper than other marketing. MSE B management considers SMS marketing as a starting point in developing relationships with their target customers. Ordinarily, most users of SMS indicate that one disadvantage of SMS marketing is the limited number of characters per SMS which is restricted to just 160 characters. MSE B management indicated that this is advantageous to some extent as it allows the MSE to just send a precise, purposeful and persuasive message to the target customers. The MSE B's manager appreciates that SMS marketing also allows an element of personalization in their marketing, which increases the possibility of response by the targeted consumers.

MSE B find SMS advertising very affordable compared to other available channels of advertising. The only challenge MSE B's has experienced when using SMS advertising has to do with performance related problems which sometimes results to delayed SMS delivery due to network congestions. MSE B has greatly reaped the benefits associated SMS marketing.

6.4.3 MSE C: Mobile Banking

MSE C is a producer of high quality flour for the ever growing Kenyan market as well as for export mainly in East Africa. The Mobile banking or m-banking is convenient banking through mobile telephone 24 hours a day, seven days a week as an alternative banking channel. Mobile banking involves the use of SMS to access and transact banking and related financial services even when the mobile telephone user is away from their nearest bank branch or accessing the Internet. M-banking services allow the registered users to manage their accounts using their mobile telephones and conduct all of their banking transactions without necessarily visiting a branch. Some of the M-banking services available include transfer of funds, Balance Inquiry, Bank mini Statement Request, Cheque Book Order, Stop Cheque, pay utilities, top-up their mobile telephones and SMS Transaction Alerts. In Kenya M-banking services are also supported by mobile telephone accounts which allow customers to conduct most banking hall activities from their mobile telephones and they are also linked to the Mobile Money Transfer services.

How does MSE C use mobile banking? MSE C has a large customer and supplier base and using mobile banking has made banking services more accessible. M-banking allows the manager of MSE C to track the enterprise's bank accounts for money received through their travelling sales team as well as transferring fund to their suppliers' accounts. The managers are also able to monitor account balances from the comfort of the enterprise offices as well as getting continuous updates on any transactions on the MSE's bank account using SMS transaction alerts. Being a food processing industry located a few Kilometers out of Nanyuki town's central business district, m-banking is such a valuable tool to the MSE's daily operations for convenient, faster and secure fund transfer to its suppliers hence increasing their satisfaction. The ability to access the bank account any time of the day is a major advantage to MSE C. In Kenya today, even with its availability in some of the rural areas, m-banking use remains low. MSE C management indicated that the use of M-banking is expensive as charges are levied on all transactions as opposed to use of Automatic Teller Machines (ATMs) machines where some transactions such as getting a mini statement are free. The other barrier the respondents in MSE C associated with the use of m-banking is the extent and number of persistent outages experienced when using m-banking services which sometimes even seems to negatively affect the accrued benefits availed to the MSE by the use of the m-banking services. To some extent, the respondents in MSE C also felt that having the MSE's banking information easily available through the mobile telephone may also pose some sort of security and privacy risks. Therefore, even if m-banking has

simplified the way the MSE C conducts its banking and financial transactions, affordability, performance risks, security and privacy risks are the primary reasons that most of the other Kenyan MSEs are not using mobile banking as cited by MSE C respondents. There are other issues which could also be the cause of low use of m-banking in Kenyan MSEs such as most banks no offering mobile banking services while in other cases customers are even not aware that their current bank offers mobile banking services.

6.4.4 MSE D: Wireless Internet

MSE D is a telecentre offering a wide range of IT related services which include Internet access (cyber café), data processing services, computer stationary sales and payphone services. The MSE also sell mobile telephone recharge vouchers (air time) and soft drinks. Just like all the other telecentres and cyber cafés in Nanyuki, its Internet connection is through a wireless link. Wireless technologies have made it possible for the trading partners to efficiently communicate now than in the past. Wireless Internet offers a cheaper alternative form of communication that is less costly as compared to postal and telephone communications. Current Internet technologies which wireless Internet have made available to rural and urban MSEs include email, instant messaging, web conferencing and Voice over Internet Protocol (VOIP or the Internet telephony) which allows MSEs to communicate, collaborate and share information for successively implementing eBusiness solutions. Wireless Internet has a relative advantage over wired Internet in terms of reach and installation costs which probably are the primary reasons all the cyber cafés in Nanyuki are using it. From data analysis in chapter four, most users of wireless Internet in Kenyan rural areas are using wireless modems. The users of cellular Internet have the advantage of accessing the Internet anywhere there is mobile telephone service provider's signal as opposed to Wi-Fi which has restricted locations where the service is available. Wireless Internet access through wireless modems has become popular with many Kenyan MSEs as the modems are plug and play devices and easy to use and very user friendly gadgets. Benefits of wireless Internet are visible in the rural area of Nanyuki where the number of trips to the city for most traders has been reduced because of easier, sufficient, and reliable inter-enterprise communication. But for successive use of wireless Internet, there is need for co-adoption of similar technologies between MSEs trading partners.

How is MSE D using wireless Internet? MSE D connects wireless Internet using a 3G Broadband router which is connected to the LAN using a switch and offers speeds of up to

7.2Mbps. The distance allowed between the router and the computers is 10 meters and the router can support up to 32 computers although the MSE currently has eight computers. The supplier of the broadband router recommends connecting a single router to between one and ten computers so as to experience good speeds. This is because the speed of one machine is dependent on the number of machines connected to the router.

The MSE's wireless Internet service is used as an income generating income activity. The MSE's offers Internet services and has eight computers a printer and a scanner on a LAN and two extra ports for anyone coming with their laptops and a wireless access point for wireless connectivity. With good Internet speed, the MSE charges the lowest market rates of one shilling per minute.

MSE D also uses email to communicate with its suppliers in Nairobi. The manager uses email to send the requisition documents and with the mail software configured to give feedback when the mail is read, the manager is assured of effective communication. The suppliers usually reply with the necessary information which includes item costs and total costs. The manager then pays through the Mobile money transfer services awaiting goods to be delivered. The use of email allows the manager to provide all the necessary requisition details eliminating the need to travel to Nairobi.

The MSE use of wireless Internet is faced with the challenges of the cost of installation and cost of use or access. The cost of buying the equipment and setting up is high as well as the cost of access and yet the MSE has to charge it customers' generally low rates to survive the competition. The cost of wireless Internet access is still very high as shown in Table 6.5 which gives the current rates of cellular Internet access compiled from data available from the respective mobile telephone service providers as at August 2010. These are http://www.ke.zain.com, http://www.safaricom.co.ke, http://www.orange.co.ke and http://www.yu.co.ke.

Service Provider	**Safaricom**	**Zain**	**Yu**	**Orange**
Cost of the Modem in Kenya Shillings	1999	2010	1799	1999
1GB Data Bundle in Kenya Shillings	2499	1750	2000	1500
Out of bundle rate in Kenya Shillings	8	7	3	7

Table 6.5: Cost of accessing cellular Internet

Even with the witnessed phenomenal growth in the use of cellular Internet, the problems of poor connectivity or the connection not performing as expected and not even delivering the promised speeds are rampant. Failed connections which may sometimes keep the link down for hours resulting to loss of revenue are also a common occurrence. There is also a huge difference between the advertised and the actual Internet speeds especially at the peak times of the day due to cellular network congestion. Yet upload and download speeds are very crucial for any cyber café business operations. These are the problems MSE D is faced with everyday as a user of wireless Internet. Before switching to the current service provider, MSE E was experiencing frequent technological challenges with the link going down most of the time. The current service provider has so far provided optimal services to MSE D by providing the most reliable Internet connection in comparison to other wireless Internet service providers the MSE had subscribed to in the past. MSE D bought the wireless broadband router at a cost of 25,000 Kenya Shillings and purchases a monthly 8GB data bundle at a cost of 10,000 Kenya Shillings. During the school holidays, which are in April, August and December, the MSE purchases a monthly 30GB data bundle at a cost of 30,000 Kenya Shillings (USD 375) as the number of clients is usually high during those three months. For MSE D, price and performance risks were important and influential factors when choosing the type of Internet access and the service provider for the wireless Internet. From the entrepreneur and her customers, the existence of cellular Internet in rural areas has tremendously paved the way for the diffusion of e-commerce and eBusiness in rural areas. This case study shows that wireless Internet have a huge impact in Kenya rural areas which is contrary to Chigona *et al.*, (2009) where it is purported that the impact of mobile Internet is not as high as is often portrayed by the popular press.

6.4.5 MSE E: Extending LAN with WLAN

MSE E is a hotel business which has a contemporary ambiance and it an ideal place for retreats as well as local and international holiday makers. It is situated at an ideal location with extensive facilities in luxurious surrounding and is perched on the slopes of Mount Kenya and has a magnificent view of the mountain. The MSE is just a few meters from the equator and it is a hub for trekkers climbing Mount Kenya using the Sirimon and Burguret routes. The MSE offers accommodation on its two wing hotel buildings and several luxurious 1-2 roomed cottages with a unique blend of comfort, relaxation and adventure. It also has seminars and conference facilities as well as a business centre.

How is MSE E using Wireless Local Area Network? The MSE installed a wired Local Area Network for its own business operations on its inception. Five years later and with increase in visitors demand for Internet access, the MSE management decided to extend Internet access to the rooms, cottages and conference facilities. This presented a number of challenges because of high costs of laying cables and installing network points, disruptive activities around the hotel as laying cables takes along time and physical constraints to lay network cables at certain locations such as the sports complex and the play ground. With the new and renovated buildings scattered all over the hotel compound, the best option to share the Internet connection was to extend the LAN using Wireless infrastructure because of its low infrastructure costs, ease of installation and network accessibility at every point through access points (hot spots) within the MSE's compound. This new WLAN extension has added value to the MSE because the guests can now access the Internet using laptops and other wireless devices from their rooms, restaurants and conference facilities. The only challenge facing MSE E on using WLAN is the fear of people who are not hotel guests or employees accessing the wireless connection. To overcome the problem of an authorized access, the MSE's management has tried to make the WLAN safe and secure from malicious users who may want to snoop into guests or even the MSE's data and information in the MSE's file server. MSE E gave an indication that costs were not a barrier to installation and continued use of WLAN. The reason why affordability may not a barrier (has no negative effect on usage) on usage is probably because WLAN has cheaper installation costs as compared to other available technologies. The cost of WLAN access points available locally is quite affordable by most MSEs. With high costs associated with setting up and maintaining a wired LAN, the availability of a vast market of affordable wireless technologies is a blessing to most Kenyan MSEs such as MSE E. The only barrier to installation, use and management of WLAN are security and privacy risks. MSE E has tried to overcome these threats and to provide high level solid security for data communication amongst wireless clients by using Wi-Fi Protected Access settings and implementing MAC Address Access Control List.

6.5 Perceived impacts of Wireless Technologies in Case Study MSEs

The case studies results revealed significant perceived positive benefits experienced by the case study MSEs in using various wireless technologies. Table 6.6 summarizes the responses relating to perceived performance impact on organization operational performance and cost

savings as perceived by the respondent in the study cases. These performance impacts relates to the operational, interactional and transactional benefits attained by the case study MSEs.

1	**Overall:** Using wireless technologies in the MSEs have resulted to improved efficiency, individual productivity as well as organizational performance
2	Reduced transaction costs and efficiency through automated transactions in MSEs' operations
3	Quick response or improved responsiveness resulting to improved customer service
4	Improved accuracy in transaction data through integrated business processes
5	Information availability through integrated business processes
6	Greater integration within the enterprise as a result of connectivity
7	Reliable and secure information exchange within the MSEs and with other MSEs
8	Efficiently manage orders with either customers or suppliers: Coordination improved
9	Reduction in operating costs (cost savings)
10	Improvement in communications through better access to information and faster information retrieval
11	Improvements in efficiency and productivity: Internal processes are more efficient while staff productivity is increased.
12	A secure mode of making payments
13	Increase in customer numbers as well as profits.
14	Improved business communications leading to improvements in the MSEs' efficiency

Table 6.6: Organizational impacts

From table 6.6, the case studies result suggest that wireless technologies have had a positive influence on MSEs success when used as part of eBusiness solutions infrastructure. To most of the MSEs, wireless technologies have become operational necessities. Therefore, wireless technologies have given the Kenyan MSEs the competitive advantage which usually result from using eBusiness activities as indicated by Sawhney and Zabin (2001) in their definition of eBusiness as "the use of electronic networks and associated technologies to enable, improve, enhance, transform or invent a business process or business system to create superior value for current or potential customers".

6.6 Discussion of the case study results

The case studies results revealed some of the benefits of using wireless technologies in MSEs' business processes as improved business correspondence, reduction in operations cost, speedy and reliable communication between and within businesses and customers, efficient coordination among MSEs and closer relationship among business partners. For each of the MSE studied the wireless technology used has greatly helped to transform the enterprise to a smart MSE. The case studies presented here serves as a proof that no matter the size or the location, MSEs can significantly benefit from using different wireless technologies to address their eBusiness infrastructure needs. This may be a good starting point for MSEs to learn the potential and power of using modern technologies in their business processes regardless of the kind of products and services the MSE deals with. Importantly, service providers and manufactures of products should also avail services and products that fit MSEs' information technology needs and budgets rather than MSEs trying to appropriate products designed for other market segments.

There is also the need to setup community Internet centers in the rural areas to pave way for general uptake of Internet based technologies which would integrate well with the presence of rural smart MSEs and which would encourage digital channel interactions as opposed to face-to-face or personal interactions. With the current available technologies such as the wireless broadband, this is feasible. But this is also dependent on how fast the country can successfully rollout nationwide wireless broadband services

Mobile money transfer services allow customers to pay for goods and services delivered by the MSEs. This is a case on customer-to-Business (C2B) e-commerce and it is made possible by the fact that mobile money transfer services is bidirectional and allows money transfer from not only between customers but also between business to customers as well as from customers to businesses. The mobile telephone service providers should separate mobile money transfer services into three distinct variants. The three different categories are customer-to-customer version, the customer-to-business version and the business-to-business version. This would help in the uptake of business-to-business mobile money transfer services as currently there is limited use of mobile money transfer services for B2B and B2C business transactions as opposed to consumer-to-business (C2B) and C2C transactions that involve payments for goods and services as reported in chapter four.

Although usage of wireless technologies to implement eBusiness infrastructure may vary from one MSE to another, the case studies findings can be broadly applicable to most MSEs in Kenya. Therefore, the conclusions drawn here represent the current perceptions of using wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs and are a true representation of the Kenyan MSEs population which enables generalization of the results obtained to most of the MSEs in Kenya. It is also important to note that MSEs in Kenya operate under similar conditions and have uniform characteristics.

Chapter 7: Interpretation and Discussion of Results and Findings

7.1 Introduction

This chapter presents a detailed interpretation and discussion of the findings and data analysis of the study results presented in chapters four, five, and six. The objectives of this study is to investigate appropriateness and user acceptance of wireless technologies for implementing an eBusiness infrastructure in Kenyan MSEs, the status of eBusiness applications among MSEs in Kenya, the role of geographic area (city or rural) in the use of wireless technologies in the Kenyan MSEs and to develop a theoretical hybrid model for technology fit and acceptance in Kenyan MSEs. Most MSEs have taken advantage of the many benefits that comes with integrating wireless technologies in business processes. The results indicate that most MSEs have used wireless technologies as part of their eBusiness infrastructure because the technologies meet the eBusiness infrastructure requirements and that the critical mass that is necessary for using wireless technology for inter-enterprise business transactions already exists. To aid in the interpretation of the study results, each research objective and its related research questions are presented and discussed in the following sections.

7.2 Appropriateness and user acceptance of wireless technologies

The unprecedented penetration of mobile devices, wireless networks and mobile communication services has allowed the Kenyan MSEs to enjoy efficient communication, payments and marketing systems only available to the huge organizations and government corporations in the past. To achieve saturation levels in use of wireless technologies in the Kenyan MSEs, it is important for the key players in wireless technologies industry to understand all the factors that contribute to the suitability of wireless technologies for implementing an eBusiness infrastructure. The suitability of wireless technologies for implementing an eBusiness infrastructure could be assessed using Goodhue and Thompson (1995) suggestion, that for any Information Technology to have any positive impact on performance, the technology must be utilized, and must be a good fit with the task is supports.

The study had proposed an extended TTF model that integrated Performance Expectance, Social Influence and barriers with TTF to investigate the suitability of using wireless technologies to implement an eBusiness infrastructure. The study found positive relationships between TTF and Performance, TTF and Usage, Usage and Performance, and also between Acceptance and Usage which are consistent with previous research results (Goodhue and Thompson, 1995; Venkatesh *et al*., 2003; Goodhue, 1995; Dishaw and Strong, 1998; Benslimane *et al*., 2002; Gagnon *et al.*, 2004; Norzaidi and Mohamed, 2008; Klopping and McKinney, 2004; and Davis, 1989).

The primary research objective of this study was to investigate appropriateness and user acceptance of wireless technologies in implementing an eBusiness infrastructure in Kenyan MSEs. This primary objective was addressed using the following five research questions;

Research Question 1: How does task-technology fit influence utilization of wireless technology in implementing an eBusiness infrastructure?
Research Question 2: Does task-technology fit influence MSE performance?
Research Question 3: What is the impact of various UTAUT variables on acceptance and use of wireless technologies for implementing an eBusiness infrastructure?
Research Question 6: Does utilization of wireless technology in implementing an eBusiness infrastructure result to higher MSE performance?
Research Question 7: What are the barriers to utilizing wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs?

The results of the study answered the above listed five questions as discussed in the following sections under their specific sub headings.

7.2.1 Task-Technology Fit influence on Utilization

Research Question 1: How does task-technology fit influence utilization of wireless technology in implementing an eBusiness infrastructure?

The results of the study show that TTF had a very strong influence on utilization. Considering the predictive power of the structural model, the R^2 of 0.267 of the Usage indicates that TTF accounts for 26.7 percent of the variance in Usage. The path coefficient

score of TTF on usage was 0.516 which showed a strong positive relationship. This relationship was significant at level 0.001. This result suggest that the greater the fit, the more use of wireless technologies to implement an eBusiness infrastructure in the Kenyan MSEs.

TTF has a significant direct influence on utilization which implies that higher TTF results in higher utilization as TTF positively affects utilization. The structural model indicated that TTF has a stronger total effect on utilization compared to user acceptance. With TTF having a high effect on utilization, this supports the need to include constructs in TTF that describes wireless technology use context such mobility. Therefore, increasing TTF increases utilization an indication that TTF is a critical usage factor. This result is consistent with most of the other previous studies of fit at organizational such as those of Tornatzky and Klein (1982) and Cooper and Zmud (1990). This suggests that any wireless technology will be used if it provides the features that fit the requirements of an eBusiness task.

7.2.2 Task-Technology Fit influence on Organizational Performance

Research Question 2: Does task-technology fit influence MSE performance?

The results of this study show that TTF had very strong direct and indirect effects on perceived organizational performance. The structural model indicated that TTF has the strongest total effect on organization performance compared to Usage. This implies that higher TTF results in higher organizational performance as TTF positively affects performance. Therefore increasing TTF increases both utilization and performance. The study results also demonstrate the importance of usage in mediating the relationship between the User Acceptance on organizational performance impacts.

Considering the predictive power of the structural model, the R^2 of 0.337 of the Organizational Performance indicates that TTF accounts for 33.7 percent of the variance in Organizational Performance. The path coefficient score of TTF on Organizational Performance was 0.580 which showed a strong positive relationship and was significant at level 0.001. This result suggests that the greater the fit, the more perceived Organizational Performance will be achieved when wireless technologies are used for implementing an eBusiness infrastructure in the Kenyan MSEs. Therefore, a better TTF causes higher positive organizational performance impacts as users find wireless technologies more relevant to their

eBusiness infrastructure requirements. This implies that a better fit between wireless technologies and MSEs' eBusiness infrastructure requirements causes more MSEs to use wireless technologies for their eBusiness infrastructure as they find them more appropriate to use in their daily business operations. This result shows the importance of fit between wireless technologies and MSEs' eBusiness infrastructure requirements. TTF have a direct and indirect effect on the organization performance significantly influencing overall MSEs' performance. This implies that TTF can be used to improve overall organizational performance.

The study results also demonstrate the importance of usage in mediating the relationship between the User Acceptance on organizational performance impacts. TTF indirectly influence organization performance by its influence on usage.

7.2.3 Performance Expectance and Social influence on Acceptance and Usage

Research Question 3: What is the impact of various UTAUT variables on acceptance and use of wireless technologies for implementing an eBusiness infrastructure?

UTAUT variables were represented in the research model by the dimensions of User Acceptance which are Social Influence and Performance Expectance. Considering the predictive power of the structural model, the R^2 of 0.226 of the usage indicates that Social influence and Performance expectance accounts for 22.6 percent of the variance in Usage. The path coefficient of Social Influence (0.574) is more than three times stronger than the path coefficient of Performance Expectance (0.569). Both path coefficients were found to be significant at 0.001 levels.

The study results points out that Social Influence strongly influences usage as the path coefficient for Social influence to Acceptance β = .574 was stronger than the path coefficient of Performance Expectance β = .569. This is expected from theoretical view as eBusiness processes require co-adoption of wireless technologies among trading MSEs for easier communication and exchange of data making the environmental variable a key factor when it comes to technology utilization. This supports the argument by Henderson and Venkatraman (1999) that the inability to generate value from IT adoption is in part, due to lack of alignment between IT and enterprises' internal and external business environments. If using

mobile telephone, being on the same network allows MSEs to communicate at low costs which make the choice of the service provider and user acceptance a critical determinant of usage. Therefore, for maximum utilization of wireless technologies in implementing an eBusiness infrastructure in Kenyan MSEs, the MSEs need to adopt strategies that align with the local operational environment.

The results of the study also indicates that Performance Expectance also referred to as Perceived Usefulness as significantly influencing usage. This is inconsistent with a study by Brown (2002) where Perceived Usefulness is reported to have no significant influence on use.

Therefore Performance Expectance and Social Influence are critical determinants of wireless technology usage in implementing an eBusiness infrastructure and Social influence had a much stronger positive influence on Usage than Performance Expectance in the context of this study.

7.2.4 Utilization on Organizational Performance

Research Question 6: Does utilization of wireless technology in implementing an eBusiness infrastructure result to higher MSE performance?

Utilization positively influenced organization performance, results which are consistent with Information Systems model by DeLone and McLean (1992) which suggested that information systems usage is positively related to other measures of information systems success such as user satisfaction, and individual and organizational impact. Considering the predictive power of the structural model, the R^2 of 0.176 of the Organizational Performance indicates that Usage accounts for 17.6 percent of the variance in Organizational Performance. The path coefficient score of Usage on Organizational Performance was 0.419 which showed a strong positive relationship and was significant at level 0.001. This result suggests that the more a particular MSE uses the wireless technologies for implementing an eBusiness infrastructure, the more perceived Organizational Performance will be achieved. Therefore, the respondents believed that using wireless technologies to implement an eBusiness infrastructure in their respective MSEs improved their organizational performance.

The study results also demonstrate the importance of Usage in mediating the relationship between the TTF and User Acceptance on the Organizational Performance impacts. Both TTF and User Acceptance indirectly influence Organization Performance by its influence on usage.

7.2.5 Barriers

Research question 7: What are the barriers to utilizing wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs?

In this study, the barriers construct is a multidimensional construct and consist of Affordability, Security and Privacy Risks, and Performance Risks. Considering the predictive power of the structural model, the R^2 of 0.169 of the Usage indicates that Barriers accounts for 16.9 percent of the variance in Usage. The path coefficient score of Barriers on Usage was 0.411 which showed a strong positive relationship and was significant at level 0.001. Interestingly, only Performance Risks had a negative significant relationship to Usage after verification of the regression results using stepwise multiple regression analysis.

7.2.5.1 Affordability

The results of this study found that in contrast to what was expected, affordability (costs) and Security and Privacy Risks did not have the conceptualized negative effect on Usage. The results showed that Cost did not have any direct relationship with usage which contrasts past studies by Premkumar and Roberts (1999), Cox and Ghoneim (1996), Tobin and Bidoli (2006) and Chau and Jim, (2002) where cost was found to be negatively related to new information technology adoption. But, it is consistent with Tornatzky and Klein (1982) where the relationship between cost and innovation adoption was found not to be significant and yet Rogers (1983) indicates that the less expensive the innovation is, the more likely that the innovation will be adopted. Tornatzky and Klein (1982) conducted a meta-analysis on fifteen cost studies of which ten of the fifteen reported statistical findings. The findings reported only five correlations of which three were positive correlations and two which were negative correlations. The rest of the studies just like this study did not find costs (Affordability) to have any effect on usage. This could be attributed to low usage costs of

some of the wireless technologies such as WLAN which only impose significant one time cost during the installation while the cost of use and maintenance is very minimal.

This absence of negative relationship between costs and usage could also be attributed to the nature of Kenyan wireless technologies market. The Kenyan mobile telephone and related services market is characterized by price wars which has seen prices of using mobile telephone and related services reduced drastically in recent months. Therefore, the users usually go for the cheaper option hence reducing the negative effect of usage costs. Although most price offers seems to target personal users rather than business users as cheaper rates are usually offered during off-peak hours when businesses are closed for the day, the entrepreneurs are able to choose the best tariff for their businesses based on the available options. From the case studies results, it is worth noting that even if affordability did not have a negative effect on usage for the entire study, the high-end mobile services such as Mobile Banking, Mobile Money Transfer Services and Wireless Internet acceptance is still determined by their pricing. MSEs require affordable prices to be able to continue using these services and therefore the providers of mobile telephone and related services should consider price as a primary determinant of usage.

7.2.5.2 Performance Risks

Considering the predictive power of the structural model, the R^2 of 0.025 of the Usage indicates that Performance Risks accounts for 25 percent of the variance in Usage. The path coefficient score of Performance Risks on Usage was -0.190 which showed a strong negative relationship and was significant at level 0.01. These results suggested a negative relationship between Performance Risks and Usage. These results are consistent with previous research results (Lee, 2009; Forsythe and Shi, 2003). This indicates real concerns on the frequency of technical failures during business operations when using wireless technologies and related services to facilitate eBusiness transactions. Performance Risks adversely affect most of wireless technology services such as money transfer services and mobile Internet hence the need for the manufactures of wireless devices and related technologies as well as the service providers to continuously look for solutions to mitigate performance risks related to use of wireless technologies.

Performance risks are experienced more on voice communication, wireless Internet and Mobile money transfer services. Using mobile money transfer services for e-payments offers

a convenient and dependable way of paying for goods and services. It has offered both the MSEs their suppliers and customers easily accessible payment services though it comes at a cost. Most entrepreneurs believe mobile payments are a secure, convenient and faster mode of making payments than most of the other traditional modes of payments though hampered by persistent outages. They also felt that the technical hitches experienced when using wireless technologies could be avoided if the service providers had offered some basic training to users and had a refund and compensation system that allows compensations when the systems do not meet users' expectation.

One message that all mobile money transfer users dread when sending or receiving money is: **"The service is experiencing delays and is not able to accept your request. Please wait for 10 minutes before trying again".** From the case study results, the respondents who had this experience indicated that these 10 minutes may translate into hours causing a lot of anxiety to both the recipient and the sender of the money if they had already performed the required transaction request. Another message often encountered by users of mobile money transfer services and who hold money on their mobile account and would want to buy airtime from the service providers is: **"The service is already attempting to purchase AirTime for you. For more information call or SMS the customer services on 234".**

When connecting to wireless Internet, frequent failures are also a common thing as cellular based Internet uses shared bandwidth between all connecting devices. One message that all wireless Internet users dread is **"The remote computer did not respond. For further assistance, click more information or search help".** The remote computer may fail to respond for a very long time hence delay in accessing the Internet for a long duration of time which greatly affects interactions and transaction processing within and between the MSEs and its partners and customers.

7.2.5.3 Security and Privacy Risks

This study did not find any negative relationship between Security Risks and Usage. Considering the predictive power of the structural model, the R^2 of 0.142 of the Usage indicates that Security and Privacy Risks accounts for 14.2 percent of the variance in Usage. The path coefficient score of Security and Privacy Risks on Usage was 0.480 which showed a strong positive relationship and was significant at level 0.00. Gauging from the study and the case studies, MSEs' managers did not seem to attribute Security and Privacy Risks to use

of wireless technologies to implement an eBusiness infrastructure. This could be attributed to the newness of most the value added services related to mobile telephones and other wireless technologies such that incidences of insecurity are rare or go unreported. It also could be attributed to what Karvonen, (1999) refers to as do not care attitude by the users. Karvonen, (1999) when describing users of computing technologies indicate that when users of information technology are questioned on security and privacy matters they respond with "they do not care about security or insecurity of their systems". It could also be attributed to the decision by the users of wireless technologies to throw caution to the wind when they have an urgent need that can only be met by using of wireless eBusiness infrastructure. Therefore, there is an urgent need to increase awareness of the security and privacy issues attributed to use of wireless technologies as well as formulation of legal framework to protect users of wireless technologies and related services in case of any user experiencing any security or privacy related infringement.

7.3 Use of eBusiness Solutions

Secondary objective 1: To investigate the status of eBusiness applications among MSEs in Kenya.

Research question 4: What are some of the current eBusiness initiatives in Kenyan MSEs?

For MSEs to benefit from use of eBusiness solutions, adequate infrastructure and general use of Internet by public and other business organizations is necessary. This is because inadequate infrastructure has always been an impediment to the use of eBusiness in most organizations and countries in general. Wireless technologies have helped Kenyan MSEs overcome the problems of Internet access by providing reliable communications infrastructures which are singled out as serious obstacles to the use of eBusiness in the developing countries (Han and Noh, 1999; Heeks, 2002).

For successive use of eBusiness solutions in Kenyan MSEs, the availability of sound physical and legal infrastructure is a major requirement and wireless technologies and related services avail more that just these two basic requirements. The wireless technologies available to the Kenyan MSEs locally avails sufficient infrastructure enough to offer rural

MSEs the only real chance that they have to overcome the existing technical and non-technical challenges in their business automation processes.

In general, the descriptive results of the study show that most Kenyan MSEs are using eBusiness solutions with 17% having e-commerce systems but all other advanced eBusiness solutions such as Supply Chain Management, Enterprise Resource Planning and Customer Relationship Management systems has less that 10% usage in all MSEs in the study. Most MSEs have automated internal business processes with about 48% of the MSEs having a WLAN, while use of email, Internet access and computers in business operations is quite common in almost all the MSEs. For the MSEs that have automated their business processes using the available wireless technologies and related services, the gains in terms of efficiency, cost savings and competitiveness equal those of large organizations.

The results of the study indicate that a good number of rural and urban MSEs have employed eBusiness solutions in their business automation processes which is an indication that wireless technologies can comprehensively support eBusiness processes by providing the much needed infrastructure.

7.4 Influence of Geographic Location

Secondary objective 2: To investigate the role of geographic area (city centers or rural areas) in the use of wireless technologies in the Kenyan MSEs.

Research question 5: Does the geographic location of the MSE necessitate implementation of an eBusiness infrastructure using wireless technologies?

7.4.1 Demographic disparities

The descriptive statistics indicate that the MSEs in both the rural and urban areas are managed by relatively young managers and who have excellent skills in ICTs usage and hence it is easier for them to accept new technologies as they have high technology readiness. This has a positive impact on use of wireless technologies in MSEs' business processes as the users are already aware of the benefits provided by wireless technologies.

But when it comes to how rural and urban areas are using the wireless technologies in their business there are significant differences between the rural and urban areas. From the study results, it can be construed that MSEs in rural areas lagged behind the urban MSEs in the adoption and use of LANs. Only 2% of MSEs in the urban sample did not have LANs as compared to 39% of MSEs in the rural areas. Of the 98% of MSEs in the urban sample that had LANs 49% had installed WLAN as compared to 46% of the 61% of the MSEs in the rural areas that had installed LANs. On Internet access, MSEs in the rural areas have embraced use of wireless Internet as this is the most available Internet connectivity there with 73% of the MSEs using wireless modems for their Internet connection as compared to 64% of MSEs in the urban areas. This is an indication that wireless Internet is a blessing to the MSEs in the rural areas as there were more users of wireless Internet in rural areas as compared to urban centers. On using web technologies, MSEs in rural areas lagged behind the urban MSEs in the adoption and use of websites, e-commerce and advanced eBusiness solutions. This is demonstrated by having 50% of urban MSEs having websites as compared to 10% of MSEs in the rural areas. The urban MSEs also have a higher rate of e-commerce usage with 23% as compared to 4% of MSEs in the rural areas. On advanced eBusiness solutions the MSEs in the rural areas have an average usage of 4% as compared to an average of 11% of MSEs in Urban areas. With most MSEs in the Kenya using mobile telephones for their voice communication, it is expected that M-commerce rates of the adoption should be high. In the contrary only 23% of urban MSEs and 9% of rural MSEs are using M-commerce. But when it comes to M-banking and Mobile Money Transfer services, the rural MSEs have a high average rate of using these two M-transactions with an average of 40% as compared to urban MSEs with an average of 30%. This is a clear indication of how MSEs in rural areas have continued to benefit greatly by the availability of mobile telephone networks.

7.4.2 Research Model Disparities

The structural model testing results showed that TTF of wireless technologies had more strong and positive direct effect on Organization Performance in the urban MSEs. This could be due to the fact that the urban areas have more than one option of information technologies to select from and chooses the information technology that fits their task requirements while the rural MSEs in most cases have only wireless technologies available for them. Therefore, urban MSEs deploy wireless technologies as a substitute to already existing technologies which is not the case for the rural MSEs.

The structural model testing results also showed that User Acceptance of wireless technologies had more strong effect on Usage in the rural MSEs as opposed to urban MSEs. This could be attributed to the fact that wireless technologies are the only option for the rural MSEs and therefore their perceived usefulness of wireless technologies is high.

The study result demonstrates that Performance Risks significantly and negatively impacts Usage. This negative effect was stronger in the rural MSEs as compared to the urban MSEs. This could be attributed to the installation capacity and availability of technical support in urban areas. The positive effects of the availability of sufficient and proper technical support in urban areas could result assurance of the value of the services hence increase the use of wireless technologies to implement an eBusiness infrastructure in urban areas. An understanding of wireless technologies characteristics and the external business environment by the entrepreneurs will also help overcome barriers to using wireless technologies in eBusiness processes and enhance the adoption of wireless technologies.

7.5 Discussion on the research model results

Secondary objective 3: Develop a theoretical hybrid model for technology fit and acceptance in Kenyan MSEs

One of the important contributions of this study is the testing and validation of metrics for TTF, User Acceptance, Usage and Performance impacts of using wireless technologies to implement an eBusiness infrastructure. The scales used showed high reliability and validity while several relationships were discovered that determine use of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs. TTF and User Acceptance explained more than 66 percent of the variance in Usage while TTF and Usage explained more than 51 percent of variance in Organizational Performance impacts, thus demonstrating the efficacy of the research model. This supports the use of TTF and UTAUT models as good theoretical foundation for the study on use of wireless technologies in Kenyan MSEs' business processes. The study also has shown that Task-Technology Fit and Usage are strongly correlated to Organizational Performance while Task-Technology Fit and User Acceptance are strongly correlated to Usage. However, the study did not show negative correlation between the barriers and Usage as expected. When further analysis was done on the barriers, only Performance Risks exhibited significant negative effect on Usage implying

that Affordability and Security do not have any negative effect on use of wireless technologies to facilitate business processes.

For the rural sample TTF and User Acceptance significantly predicted Usage and explained 70.8 percent of the variance in Usage while TTF and Usage were found to be significant predictors of Organizational performance and explained 43.7 percent of variance in Organizational Performance impacts. Comparing these results with the urban sample where TTF and User Acceptance explained 65.2 percent of the variance in Usage while TTF and Usage explained 55.5 percent of variance in Organizational Performance impacts, shows that the research model was able to explain more variance on Usage in rural areas than urban areas but was able to explain more variance on Organization Performance in urban areas than rural areas. Pertaining to the effects of Performance Risks on Usage, the rural sample had more negative effects on Usage by Performance Risks at -0.237 as compared to -0.170 for the urban sample.

Figure 7.1 below represents the final revised research model and the results of regression analysis for the final research model and the supported relationships are shown in figure 7.2, while the regression analysis for the final revised research model and the supported relationships are shown in figure 7.3.

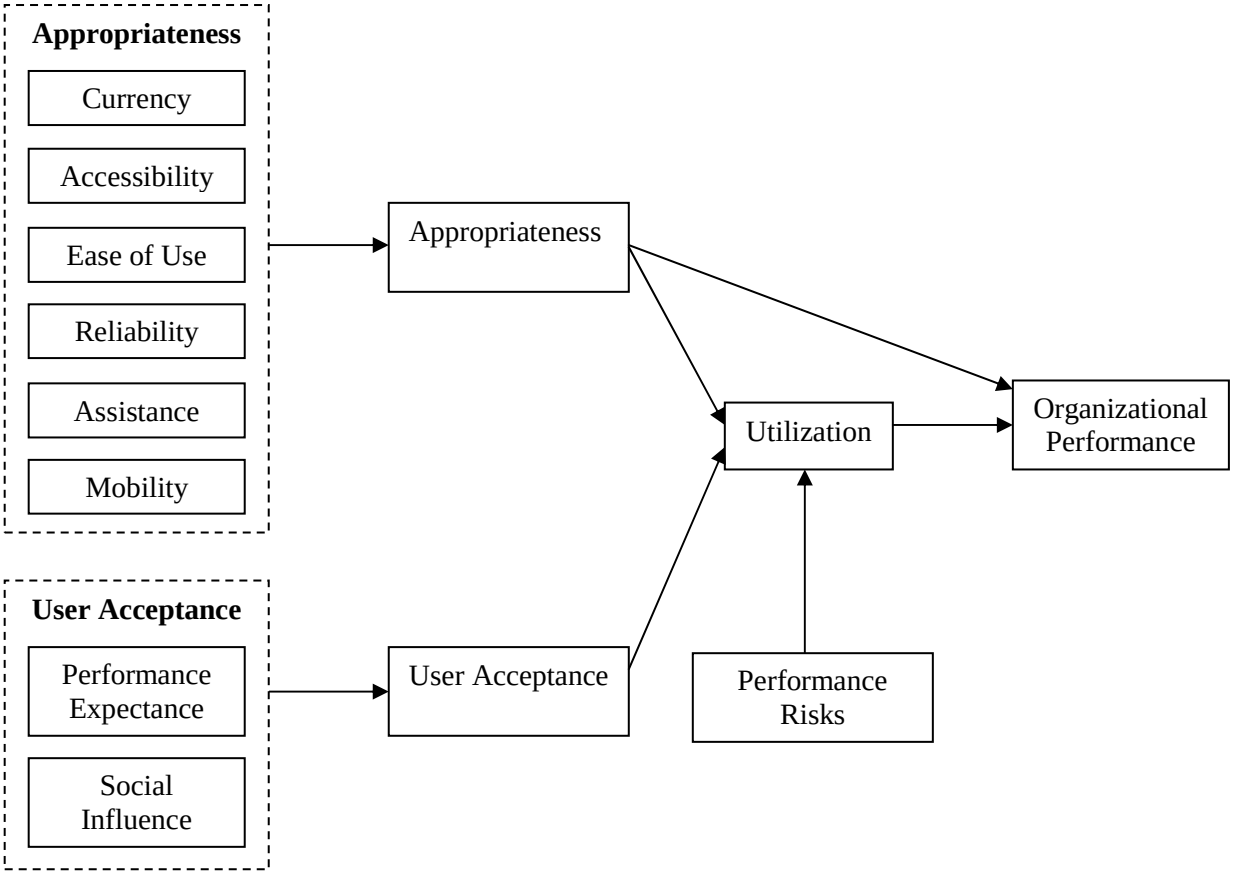

Figure 7.1: Revised Research Model

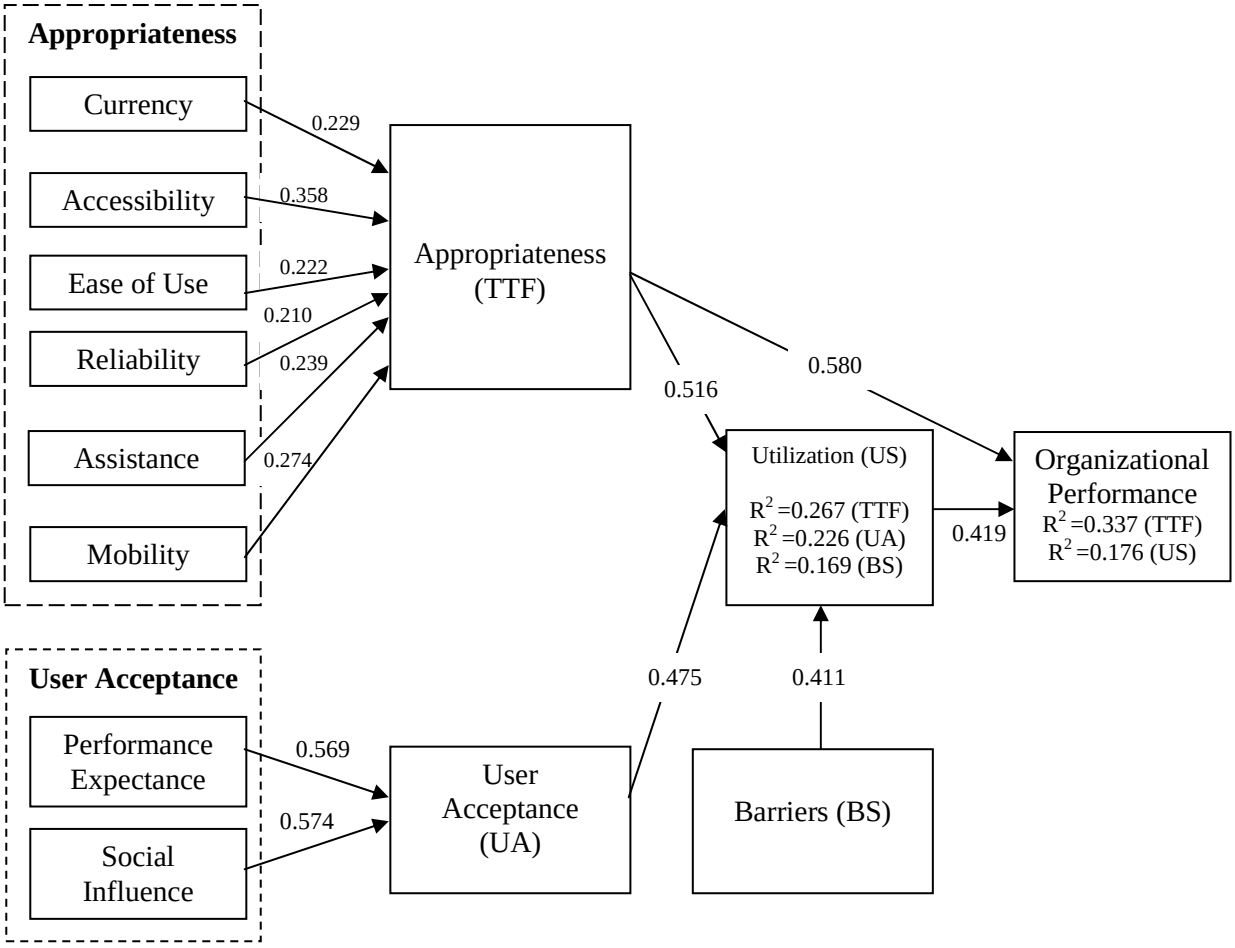

Figure 7.2: Regression Analysis of the final research model

Note: All path coefficients (β) significant at $p<0.001$

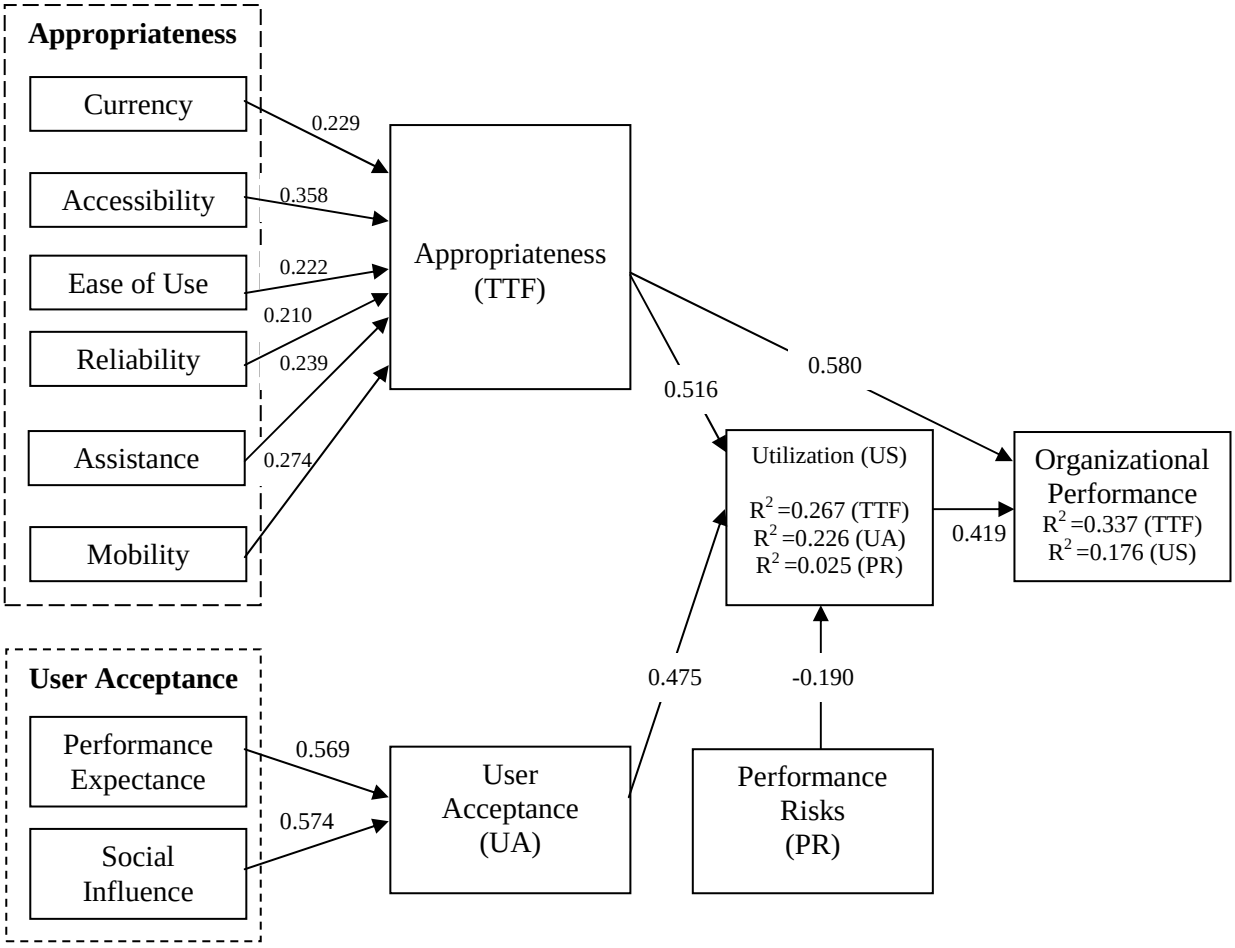

Figure 7.3: Regression Analysis of the final revised model
Note: All path coefficients (β) significant at p<0.001

Overall, the data provided substantial support for the final revised research model.

7.6 Chapter Summary

This chapter discussed the results of data analysis in chapter four. The research model constructs relationships were assessed and further discussed. Chapter eight discusses the theoretical, managerial and policy implication of the research results.

Chapter 8: Theoretical, Managerial and Policy Implications

This study contributes to the existing body of knowledge in terms of narrowing the research gap by examining the suitability of wireless technologies to implement an eBusiness infrastructure in the Kenyan MSEs and their impact on the MSEs' performance. The multi-dimensional and comprehensive research model used in the study is based on the TTF model which was extended using UTAUT variables and the key impediments to using wireless technologies to implement an eBusiness infrastructure in the MSEs which identified through a preliminary study.

The value of this study lies in the findings, especially regarding the impact of TTF and User Acceptance on Utilization of wireless eBusiness infrastructure in Kenyan MSEs. The results are the true picture of the current status of use and factors influencing of wireless technologies to implement an eBusiness infrastructure in the Kenyan MSEs. The results obtained in this study will ultimately be valuable to researchers, the government and managers of mobile telephone service providers who would want to assess the likelihood of success of new wireless technologies and the underlying services. The role and influence of TTF and User Acceptance in using wireless technologies to implement an eBusiness infrastructure has been confirmed by this study and strongly supports the appropriateness of using the extended TTF to understand the factors influencing use of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs.

8.1 Theoretical Implications

From a theoretical standpoint, this study develops a new theoretical framework for conceptualizing use of wireless technologies to implement an eBusiness infrastructure in the Kenyan MSEs. The proposed model and the outcome of the empirical tests makes a relevant practical contribution to the existing literature on the use of wireless technologies to facilitate business processes by providing insights on the drivers, barriers and benefits of using wireless technologies to implement an eBusiness infrastructure. It also unveils the only key barrier to using wireless technologies to implement an eBusiness infrastructure. All this information is helpful to any MSE intending to adopt wireless technologies to implement an eBusiness infrastructure as well as the service providers who need to package and market their products effectively.

Both rural and urban MSEs have successively integrated wireless technologies in their business process narrowing the digital divide between rural areas and urban centers in Kenya. This research provides the marketers with important insights on the factors that may encourage or deter use of wireless technologies to implement eBusiness infrastructure in Kenyan MSEs for survival and competitiveness. Because of the negative relationship between Performance Risks and Usage, there is the need to redesign the Mobile Money Transfer Services or embark on user training. The government should also spearhead policy and legal framework to safeguard users of Mobile money transfer services from con artists.

If Kenyans were to wait upon the government and profit minded organizations to provide Internet access to the rural areas and to the urban poor, this would take a very long time before it happens. Cellular networks have bridged this distance by availing Internet services to the people who were initially less likely to access it because of their low installation costs and wide network coverage. This has also allowed the rural and urban MSEs to compete effectively and efficiently with major players in the domestic market because of reduced communication costs, ease of communication and efficiency.

Theoretically, unlike other previous studies, this study applied the TTF in the newly emerging and enabling context of eBusiness, M-business and wireless technologies. The study also developed an extended TTF model which should be helpful in understanding what factors influence organizational performance in the context of eBusiness, M-business and wireless technologies. User acceptance has long been an obstacle to the successive adoption of any information system which makes the findings of this study theoretically important as the study extends TTF with User Acceptance.

The proposed extended TTF model exhibits an excellent exploratory power with its greater ability to explain performance impacts when MSEs' use wireless technologies to implement an eBusiness infrastructure. The R^2 for predicting performance impacts is at 51.3% while the original model by Goodhue and Thompson (1995) was only 16%. The R^2 for predicting Utilization is at 66.2% while most of other theories measuring use and intention to use normally averages at about 40 %. These findings are significant in confirming the role of extended TTF model in measuring utilization and performance impacts of any wireless technology. Further more, the research model explains substantive percentage of variance in both the Usage (ranging from .652 to .708) and Organizational Performance Impacts (ranging from .437 to .555) for the separate geographical samples and the entire sample. The

results also indicate that TTF model can be applied universally to measure Utilization and Organizational Performance across different firm sizes, sectors and countries.

8.2 Managerial Implications

Mobile Internet is a very attractive option for MSEs as it is easily accessible (to 84.5% of Kenyan population) and offers great value for money by allowing enterprises to manage their operations in efficient and time saving manner. Mobile telephone networks avails faster, cheaper and more efficient voice communication, Internet access and data services for reliable and efficient communication between enterprises. This calls on the service providers to make their infrastructures more resilient and more reliable through service improvements in order to reduce performance related risks.

Another key managerial contribution of the study is the confirmation of the importance of TTF, Utilization and Performance Impacts in the Task-Technology Fit model and that Performance Expectance, Social Influence and Performance Risks significantly influence use of wireless technologies to implement an eBusiness infrastructure. With this, the study has helped in indentifying the essential factors that influence the use of wireless eBusiness infrastructure in MSEs. Understanding what determines use of wireless eBusiness infrastructure in MSEs provides great management insights into development of effective strategies to assist MSEs to increase efficiency and effectiveness through use wireless technologies helping the MSEs to remain competitive.

Another major implication for the managers of mobile telephone service providers is that the results of this study requires them to start developing new innovative services that are geared towards solving information needs of the MSEs. This is because most of the mobile solutions available and are in use to facilitate business processes today were initially developed for social use and only evolved later to be useful as eBusiness tools. A case example is Mobile Money Transfer services, initially was intended for sending money from one unbanked person to the other in purely social settings. Today, the mobile money transfer services have become a major boost to MSEs as a mode of payment. This usually makes the uptake such applications for B2B transactions to be very slow as compared to huge acceptance and use in B2C transactions. Therefore, the managers should always consider the fit between the MSEs' business tasks requirements and the functionalities of wireless technologies available.

8.3 Policy Implications

The study findings also have meaningful implications for the policy makers who are responsible for increasing access and use of wireless technologies in business processes and in particular in the Kenyan MSEs. Government institutions have in the past focused more on availability of telecommunications technologies in the entire country but the focus should now shift to using these technologies for social and economic development. Availing the technologies and not creating the right environment for their use will only lead to under utilization. This means that the government of Kenya should seek to enhance the regulatory framework such as improving Kenya National ICT policy (2006) and the Kenya Communications (Amendment) Act (2009) because both of these policy documents barely offer a clear framework for conducting and management of electronic transactions. The 2007 Electronic Transactions Bill which sought to address electronic commerce issues such as recognition of electronic transactions and electronic signatures is yet to be enacted.

The Kenyan government needs to intervene in the expansion of the mobile telephone networks to the underserved areas of the country, which are more often than not considered as less commercially attractive by private sector investors, through deliberate policies and guidance. With only 34% of the Kenyan land mass currently connected using mobile telephone networks, the Kenyan government should offer incentives to investors who would want to invest in marginalized areas while others do shy away from investing in those areas which are usually considered not being commercially lucrative by most for commercially minded investors.

The need to develop and implement a national telecommunications' policy and strategy on using wireless Internet for development should be emphasized. This could target provision of widespread Internet access through end-to-end wireless broadband infrastructure and mobile telephone networks to the underserved areas of the country which are considered less commercially profitable by service providers to help bridge Kenya's growing urban–rural digital divide. This should also target to reduce intra-urban digital disparities caused by poor access to technologies by the urban poor who mostly live in the informal settlements.

The government and the policy makers should deal with the urgent need of an improved regulatory and policy frameworks especially now with the convergence of computers and telecommunication and the use of eBusiness solutions which the current generic ICT policy

does not address. A part from the policies, government should also target projects to avail wireless broadband to under-served areas where there are no telecommunication services. It should also avail community broadband centers and promote their use in facilitating farming business related transactions in the rural areas.

MSEs contribute significantly to the Kenyan economy and providing them with wireless broadband access will enable them to work efficiently with their customers, suppliers and business partners to improve their overall performance through better and faster decisions. It will also allow them to compete effectively and efficiently in both domestic and international markets. It is expected that in the year 2030, no part of Kenya will be termed as "remote area" (Kenya Vision 2030, NESC, 2007), as the government plans to have developed the necessary infrastructure and intensified the application of science and technology consequently raising the levels of productivity and efficiency. This is only possible through enabling government policies as government policies in place can either severely hinder or augment use of any ICTs.

Government policies need to be coupled with appropriate regulatory framework in order to protect MSEs from sub-standard ICTs products and services. Most of ICTs products in the Kenyan Market today are substandard because of poor quality imports and second hand gadgets brought into the country by unscrupulous businessmen aimed at making a quick kill from unsuspecting public. When the Kenyan government did zero rate ICTs hardware two years ago, the expectation was that the price of hardware would reduce drastically. This is yet to materialize as most traders seek to maximize profits on hardware sales as cost of making voice calls and use of other mobile telephone non-voice services continue to fall. Therefore, strong legal and regulatory frameworks must be introduced so as to prevent exploitation of the users of wireless technologies by ensuring that the prices of wireless devices and other mobile telephone hardware come down further through rational pricing.

Chapter 9: Conclusion and Recommendations

9.1 Introduction

The purpose of this chapter is to summarize the study findings, give conclusions and recommendations. By successively exploring appropriateness and user acceptance of using wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs, the study has made significant theoretical and practical contributions by producing information on an overview of the current situation on MSEs use of wireless technologies and eBusiness as well as giving suggestions on policy issues to relevant stakeholders for successful integration of wireless technologies into MSEs' business processes.

9.2 Summary of the Research

It is necessary to have a review of the research process in order to demonstrate the extent to which the research questions posed at the beginning of the study were answered as well as to determine whether the objectives of the study were achieved. In this section, the researcher will present an overview of the research on an investigation on the suitability of wireless technologies for implementing an eBusiness infrastructure in Kenyan Micro and Small Enterprises; provide answers to questions that guided the study and are stated in chapter one; and to determine whether the objectives of the study (chapter one) were achieved.

9.2.1 The Research Objectives

The main objective of this study was to investigate appropriateness and user acceptance of wireless technologies for implementing an eBusiness infrastructure in Kenyan MSEs while the secondary objectives included an investigation into the status of eBusiness applications among MSEs in Kenya; the role of geographic area in the use of wireless technologies in the Kenyan MSEs and to develop a theoretical hybrid model to be used in evaluating how wireless technologies and related applications best fit MSEs' eBusiness infrastructure among Kenyan MSEs. The study was motivated by a look at the significant benefits mobile telephones and related services have brought to disparate and even geographically remote population in Kenya. This created a need to explore how this expanding mobile telephone

network and related wireless technologies and services could be harnessed to support MSEs' eBusiness systems' requirements by identifying the important factors that influence successive adoption and use of wireless technologies as MSEs' eBusiness infrastructure. Mobile telephones have also become a tool of daily life for most Kenyans who use it to individually address their specific needs.

The main and the second research objectives of the study were conducted and presented in Chapter 4. The third research objective of the study was fulfilled by the findings from intra-country data analysis in Chapter 5 and in the findings of the case studies in chapter 6. The fourth research objective was conducted in chapter 4 and presented in Chapter 7.

9.2.2 The Research Questions

The study was guided by seven research questions. The findings of the study relating to each of the seven research questions are discussed in this section.

Research Question 1: How does task-technology fit influence utilization of wireless technology in implementing an eBusiness infrastructure?

According to the findings of this study as described in section 4.4.2 and 5.3, TTF positively and strongly influence utilization of wireless technology in implementing an eBusiness infrastructure in Kenyan MSEs. TTF has a significant direct influence on utilization which implies that higher TTF results in higher utilization as TTF positively affects utilization.

The study also indicates in section 4.4.1.2 that the Task Technology Fit has the following six constructs:

i. Currency
ii. Assistance
iii. Accessibility
iv. Ease of Use
v. Reliability
vi. Mobility

Research Question 2: Does Task-Technology Fit influence MSE performance?

The results of this study in section 4.4.2, section 4.4.4 and section 5.3 show that TTF had very strong direct and indirect effects on perceived organizational performance. This result suggests that the greater the TTF, the more perceived Organizational Performance will be achieved when wireless technologies are used for implementing an eBusiness infrastructure in the Kenyan MSEs. TTF indirectly influence organization performance by its influence on Usage.

Research Question 3: What is the impact of various UTAUT variables on acceptance and use of wireless technologies for implementing an eBusiness infrastructure?

UTAUT variables were represented in the research model by Social Influence and Performance Expectance (figure 3.3). The study results in section 4.4.2, section 4.4.4 and section 5.3 points out that Social Influence and Performance Expectance strongly influences usage of wireless technologies for implementing an eBusiness infrastructure. Section 7.3 and figure 7.3 show that Social influence had a much stronger positive influence on Usage than Performance Expectance.

Research question 4: What are some of the current eBusiness initiatives in Kenyan MSEs?

Based on the descriptive results discussed in section 4.2.4, section 4.2.5, and section 4.2.6, the study show that most Kenyan MSEs mostly use e-commerce systems but the use of all other advanced eBusiness solutions such as Supply Chain Management, Enterprise Resource Planning and Customer Relationship Management systems is very minimal. Most MSEs have automated internal business processes by use of WLAN, use of email, Internet access and computers. The study results in section 5.2 indicate that a good number of rural and urban MSEs have employed eBusiness solutions using wireless technologies in their business automation processes which is an indication that wireless technologies can comprehensively support eBusiness processes by providing the much needed eBusiness infrastructure.

Research question 5: Does the geographic location of the MSE necessitate implementation of an eBusiness infrastructure using wireless technologies?

From chapter 5, there are indisputable similarities between usage and perception of barriers and benefits of using wireless technologies to implement eBusiness infrastructure between the rural areas and urban centers in Kenya. The demographic features of the two areas exhibit similar characteristics though there are a number of significant differences in the acceptance and use of wireless technologies between the rural and urban areas. Usage and presence of IT infrastructure vary considerably between the two areas such as how the enterprises access their Internet and in the results of the research model parameters (figures 5.1 and 5.2). The differences in model parameters suggest that Task-Technology Fit influences performance and usage in urban areas more than the rural areas as there are other available alternative technologies for implementing an eBusiness infrastructure in MSEs for the urban MSEs to choose from while the rural MSEs have no other cheaper alternatives to accomplish their eBusiness tasks.

Research Question 6: Does utilization of wireless technology in implementing an eBusiness infrastructure result to higher MSE performance?

According to the findings of this study as described in section 4.4.2, section 4.4.4 and section 5.3, Utilization positively influence organization performance suggesting that the more a particular MSE uses the wireless technologies for implementing an eBusiness infrastructure, the more perceived Organizational Performance will be achieved. Organizational Performance was measured by evaluating the impact of usage on service delivery processes, service quality, delivery costs and efficiency. It is the presence of identifiable operational, transactional and interactional benefits. The study results also demonstrated the importance of Usage in mediating the relationship between the TTF and User Acceptance on the Organizational Performance impacts.

Research question 7: What are the barriers to utilizing wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs?

The barriers' construct in the study is a multidimensional construct and consist of Affordability, Security and Privacy Risks, and Performance Risks. Based on findings

discussed in section 4.4.2, and section 5.3, only Performance Risks had a negative significant relationship to Usage after verification of the regression results using stepwise multiple regression analysis while affordability (costs) and Security and Privacy Risks did not have the conceptualized negative effect on Usage. This is an indication that users of wireless technologies in MSEs' business processes have concerns about the Performance Risks related o use of wireless technologies to implement eBusiness infrastructure.

9.2.3 Research Design and methodology

The study is descriptive in nature and it the researcher employed both qualitative and quantitative research methodologies. The study draws upon theoretical perspectives from Task-Technology Fit, and Technology Acceptance research to examine the key factors and barriers involved in use of wireless technologies to implement an eBusiness infrastructure.

Three phases of empirical study triangulated the researcher's observations and contributed to the final findings. In phase one; the researcher interviewed forty four (44) using the interview protocol presented in appendix C. The interviews clarified what factors constituted the core constructs of the research model based on TTF and UTAUT models in a Kenyan MSEs context, as well as identified the barriers. Combing the literature review and the interview results, an enriched research model (Figure 3.3) was proposed to frame the study in the phase two. The phase two of the study focused on examining factors influencing use of wireless technologies to business transactions in Kenyan MSEs using a questionnaire based on the research model. In the last phase of the study (phase three), the researcher designed and conducted five case studies using observations and semi-structured interviews.

9.2.3.1 The Survey

The primary data collection tool was a questionnaire. To ensure the questionnaire usefulness, it was pre-tested and refined to capture data from a large number of participants in a less supervised setting.

Questionnaire Design

Due to time constraints of the participants because of the nature of the operations of their enterprises, the questionnaire was designed to elicit the required information in the shortest

time possible. The survey contained 77 items categorized in four sections. The study questionnaire used a 5-point Likert-type scale ranging from “Strongly disagree to “strongly agree”.

Questionnaire Administration

The study questionnaires were administered to 570 MSEs through personal contact by the researcher. A total of 541 participating enterprises returned their questionnaires of which eleven were incomplete or had one or two missing entries and therefore were considered invalid for the study. The survey data used for analysis was from the 530 complete questionnaires.

Data analysis

Data was summarized and coded using SPSS version 17 and Microsoft Excel 2007. The same applications were used to generate graphs and tables to illustrate the findings. Overall, the data provided adequate support for the final research model (figure 7.2).

9.2.3.2 The Case Studies

Case studies were used to investigate the factors identified in the initial research model (figure 3.3) as having the potential to influence use of wireless technologies to implement an eBusiness infrastructure. A pilot case study was conducted to test the interview protocol. Five different case studies (tables 6.1 and 6.2) were conducted to test the research model, to gain a better understanding of the relationships in the model and if possible identify any new factors. The results of the case studies confirmed the legitimacy of the proposed research model constructs in the research model.

9.2.4 The Final Research Model

In order to encapsulate the relevant variables that can comprehensively explain the use and impacts of using mobile technologies to implement an eBusiness infrastructure in Kenyan MSEs, a new model was developed to analyze adoption, use and performance impacts of wireless technologies use in MSEs as the existing models were developed before the availability and the onset of using wireless technologies in Kenyan MSEs. Wireless technologies also exhibit some unique characteristics such as mobility and a number of peculiar services such as mobile money transfer, m-banking and short message service. The

research model was made up of five constructs and each construct was measured using multiple measurement items adapted from existing literature but modified to reflect the research context of using mobile technologies for eBusiness infrastructure.

The initial model was developed based on TTF model (figure 2.3) by Goodhue (1998) and the UTAUT (figure 2.4) proposed by Venkatesh *et al*., (2003), the pilot study (section 3.4.8), and a review of the relevant literature (chapter 2). The proposed research model discussed in section 3.3 and presented as Figure 3.3 also had a construct to test for the barriers to using wireless technologies to facilitate e-eBusiness transactions.

As discussed in chapter seven, section 7.5 and presented as figure 7.3, the final revised model for appropriateness and user acceptance of wireless technologies to implement an eBusiness infrastructure, the Suitability of Wireless eBusiness Infrastructure Model (SWeBI) was developed. SWeBI presents the components of a model to represent the factors determining the use of wireless technologies as the MSEs' infrastructure of choice for eBusiness transactions and the impact of their use on the MSEs' performance. SWeBI consists of factors influencing (positively and negatively) use of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs and the effects of successful use on MSEs' performance. The development of the SWeBI model was necessary as it forms a base for any future research on use of wireless eBusiness infrastructure in MSEs in any developing country. The factors identified as influencing the use of wireless technologies to implement an eBusiness infrastructure in MSEs in SWeBI should still be valid even if the study is repeated at a later date as usage is primarily dependent on User acceptance of a technology and how a technology meets a particular business task requirement.

9.3 Conclusion

The results of this study indicate that Task-Technology Fit, User Acceptance and Performance Risks (Technological Challenges) play an important role in shaping the use of wireless technologies to implement an eBusiness infrastructure in Kenyan MSEs. The availability of wireless technologies for use in MSEs has also contributed to narrowing the Kenyan rural-urban digital divide a positive stride towards Kenya's Vision 2030 (NESC, 2007). Wireless technologies have provided suitable solutions to MSEs seeking to integrate and use eBusiness solutions in their business processes. Results also indicate that utilizing

the wireless technologies as eBusiness infrastructure, positively and significantly influence organization's performance through operational, transactional and interactional benefits.

This study contributes to technology acceptance studies by demonstrating performance expectance, social influence, task-technology fit, service costs and performance problems to be significant determinants of technology adoption and use. These findings also serve as a reminder to private investors and the Kenyan government for the need to intervene in the expansion of the mobile telephone networks to the underserved areas of the country which are more often than not considered as less commercially profitable by service providers. All the conclusions in this study have been empirically verified, have adequate reliability and validity and supported by literature. Therefore, this study research model should be a useful tool for managers, marketers and the government policy makers who would require evaluating the suitability of any new or re-engineered wireless technology for use in MSEs and targeted to a particular sector or segment of the country.

The extended research model used in this study provides more explanatory power of Usage or Utilization than both TTF and UTAUT. The inclusion of Performance Expectance and Social Influence in the extended model improved the prediction of Usage. This could be valuable to service providers and for the government for their marketing and policy development. Technical challenges in terms of Performance Risks affect the quality of service when using wireless technologies and the service providers have to handle these effectively and efficiently to make these technologies offer dependable and reliable services.

This study has identified the factors that influence the use of wireless technologies to implement an eBusiness infrastructure in MSEs. By expounding on the factors that potentially influence the use of wireless eBusiness infrastructure, the study results can assist other MSEs that are not using wireless technologies except for voice communications and are considering using other mobile telephones value added services in their business operations in making the right adoption decisions.

This study provides valuable insights into current usage and perceptions of using wireless technologies to implement an eBusiness infrastructure. The study results should be of value and interest to researchers, wireless technologies retailers and service providers, MSEs' entrepreneurs and managers as well as the government. The results could also serve as a guide to other sectors seeking to understand factors influencing use of wireless technologies

to implement an eBusiness infrastructure and the benefits accrued by using wireless technologies in organization's internal and external business processes.

The research contributes to the literature on eBusiness, business use of wireless technologies and adds to the empirical studies on technology acceptance and task-technology fit. For the stakeholders and government, this study suggests the need for policy interventions and increased investment in wireless infrastructure especially the wireless broadband. To the service providers, the need to address the concerns raised here such as the affordability and technical challenges and user support problems need to be addressed on any current or new services. The final empirically tested model can serve as a generic model for testing acceptance and appropriateness of any new wireless technologies.

The study results met its objectives, answered the research questions as set out in chapter one and also provided some unexpected findings. The results shed some light on what considerations suppliers of wireless technologies and service providers should undertake to ensure their acceptance and use as an eBusiness infrastructure in developing countries such as Kenya. This is possible by ensuring a fit between eBusiness task requirements and the functionalities of wireless technologies and related services.

For the Kenyan MSEs, wireless technologies have been a truly transformational technology. The technology has helped the MSEs to improve on their efficiency, drive growth and productivity as well as changing the way they conduct their day-to-day business transactions. The final results of the study have been used to write a paper (Kanyi and Maharaj 2010) which have been accepted for presentation at the ICT for Africa Conference 2011, to be held in Ota, Nigeria in March 2011.

9.4 Recommendations

From this study, successful use of eBusiness solutions in Kenyan MSEs requires a certain amount of essential technology and viable policies. But having a fast Internet, secure networks and efficient payment systems availed by wireless technologies is a good starting point for any MSE. Wired broadband using fiber-optic network could provide more capacity, but wireless broadband can achieve near complete coverage including hilly and rocky parts of this country at a fraction of the cost and almost the same data capacity and speed. With lower costs, wider coverage and comparable speed, it is easier for Kenya to achieve a

hundred percent broadband coverage using wireless broadband, and at a shorter time. Improved connectivity in rural areas will give the rural enterprises an equal footing with the MSEs in urban centers.

This is only possible if the government and not the commercial mobile and wireless technologies infrastructure and services providers take the leadership role in the provision of essential mobile and wireless technologies infrastructure and related technologies and services. To play the leadership role, Wireless Technologies Leadership (WT-Leadership) requires the government and its agencies to give guidance on infrastructure installations, legal and regulatory matters as well service costs and delivery. This could be achieved through subsidized infrastructure roll-out in areas regarded as uneconomic, provision of need oriented policies and effective regulation. This would then lead to increase in mobile telephones penetration through increased network coverage, low prices and effective competition.

The Kenyan government should also strive to invest in relevant infrastructure that is required for the use of wireless technologies in rural areas where commercial investments are not adequately forthcoming.

Chapter 10: Limitations and Further Research Directions

This study provides interesting insights into the key determinants of using wireless technologies to implement an eBusiness infrastructure from the MSEs' perspective. Even though the study results can be considered statistically significant, the study has its limitations that may affect how well the research study model and its findings will generalize beyond the specific conditions of this study.

10.1 Future Research Directions

While security did not have a negative effect on usage, this perception will change overtime as users of wireless eBusiness infrastructure increases. Therefore, a study testing MSEs' perception on security risks of using each of the wireless technologies in the study should be viable in not so distance a future.

Future research should focus on further testing and refinement of the new model to establish its external validity as well as testing whether the study findings results can be replicated in other contexts such as different technologies or economic sectors (such as education). It is currently unknown how well the model and its findings will generalize beyond the specific conditions of this study. Future research should include a thorough testing of the proposed research model variables to determine whether the conceptual model proposed receives further empirical support. The analysis could also be extended to include a comparison based on different organization sizes such MSEs, Medium and large organizations to see whether organization size have any significant impact on utilization.

Future research in evaluating any specific domain of wireless technologies such as wireless Internet, WLAN or Mobile Money Transfer or any other mobile telephone use related services can use an adapted version of this study questionnaire to try to test and validate the results. Future research should also differentiate wireless technologies to its specific components such as the SMS advertising, Mobile money transfer, mobile marketing or even wireless Internet and investigate them these specific technologies individually and test to see whether different results will be obtained as well as whether there are other possible factors influencing the appropriateness and user acceptance of wireless technologies to implement an eBusiness infrastructure.

10.2 Limitations of the study

Generalization of the results to other sectors or countries: This should be made carefully because only the Kenyan MSEs' sector was investigated in this study. This study is also limited in terms of comparisons due to lack of similar previous studies from other African and developing countries for cross country evaluation. However, the researcher is confident that this model will have significant applicability with similar socio-economic environments.

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Appendices

Appendix A: Questionnaire

University of KwaZulu-Natal

Mobile Technologies Survey Questionnaire

The purpose of this survey is to investigate the technological, individual and environmental factors that influence the use of Mobile Wireless Technologies in business processes (Voice communications and Short Message Services (SMS), reminders, money transfers, Wireless Networks, Wireless Internet Access) in Micro and Small Enterprises in Kenya. There are no right or wrong answers. What matters is your personal opinion. The survey should take approximately 15 minutes. Thank you for taking the time to complete this questionnaire.

Section 1: General information about the enterprise and respondent

These questions relates to basic demographic data. Write the responses that most accurately describe yourself and the enterprise.

Section 1A: The following questions relate to the organization's background

1. Name of the organization: _____
   a. Address: _____ code: _____
   b. Telephone:_____
      Email:_____
2. Location of business. Please check (✓)
   ☐ Rural Town-Nanyuki ☐ City-Nairobi
3. What is the primary industry of the enterprise or the enterprise sub-sector? Please check (✓) ☐ Tourism ☐ Manufacturing ☐ Trade
   ☐ Professional Services ☐ Other
4. Number of Employees.
   ☐ Less than 5 ☐ 5 to 10 ☐ 11 to 20 ☐ 21 to 50 ☐ More than 50
5. Number of years in operation.
   ☐ Less than 3 ☐ 3 to 5 ☐ 6 to 10 ☐ More than 10
6. Does the enterprise hold a bank account? ☐ YES ☐ NO

Section 1B: The following questions relate to the respondent's individual background

7. What is your current position in the organisation? _____
8. Gender (Please tick the appropriate gender box). ☐ Male ☐ Female
9. Age (Please tick the appropriate age bracket box).
   ☐ 18 to 24 ☐ 25 to 34 ☐ 35 to 44 ☐ 45 to 54 ☐ 55 or older
10. What is your highest academic qualification?
    ☐ High school ☐ College certificate ☐ Professional qualification such as CPA
    ☐ College diploma ☐ Undergraduate degree ☐ Postgraduate degree
11. For how many years have you been using Information and Communication Technologies?
    ☐ Less than 2 ☐ 3 to 5 ☐ 6 to 10 ☐ More than 10
12. How would you rate your skills in using Information and Communication Technologies?
    ☐*1=Beginner* ☐*2=Novice* ☐*3=Competent* ☐*4=Proficient* ☐*5=Expert*

Section 2: Current business technological infrastructure

13. How many computers are there in your enterprise?
    ☐ Less than 5 ☐ 5 to 10 ☐ 11 to 15 ☐ 16 to 20 ☐ More than 20
14. Have you connected the computers to a Local Area Network? ☐ YES ☐ NO
    If YES, it is using ☐ Wired LAN ☐ Wireless LAN ☐ Bluetooth
15. What percentages of the computers have Internet connection?
    ☐ Less than 10% ☐ 10% ☐ 20% ☐ 50% ☐ More than 50%
16. How does the enterprise access the Internet? Please check (✓) all that apply.
    ☐ A Mobile telephone to a computer
    ☐ A wireless modem to a computer
    ☐ Wireless Desktop telephone
    ☐ Dial-up connection using Landline
    ☐ Mobile devices such as phones, smart phones, Personal Digital Assistants
    ☐ Wired broadband using leased lines such as ADSL
    ☐ Wireless Broadband using Safaricom 3G technologies, Orange 3G+ technologies
    ☐ From a cyber café
    ☐ Satellite (VSAT systems - Very Small Aperture Terminals)
    ☐ Other (Please specify):_____
    ☐ We do not use Internet for now but plan to use in the future

17. What is the maximum bandwidth of your Internet connection in Kbps?

☐ Less than 500Kbps ☐ 501 to 1000 Kbps

☐ More than 1000 Kbps ☐ Not Sure

18. What is the average monthly payment for Internet access in Kenya Shillings?

☐Less than 5000 ☐5001 to 10000 ☐10001 to 20000

☐More than 20000 ☐ Not Sure

19. Does your enterprise use or plan to use within the next twelve (12) months any of the following eBusiness software applications? Please check (✓) all that apply

☐ Enterprise Resource Planning (ERP) Software

☐ Customer Relationship Management (CRM) software

☐ Sales force automation software

☐ Supply Chain Management (SCM) software

☐ E-Procurement software

☐ Other (Please specify): _____

☐ Not Sure

20. Does the enterprise do any of the following? Please tick only one (1) box on each line.

Business Activity	**Yes**	**No**	**Not Sure**
Place its orders through the Internet			
Place its orders through mobile telephones			
Place its orders through other information technology mediated networks			

21. Do the enterprise's customers do any of the following? Please tick one (1) box on each line.

Business Activity	**Yes**	**No**	**Not Sure**
Place their orders through the Internet			
Place their orders through mobile telephone			
Place their orders through other information technology mediated networks			

22. Does the enterprise use any information technology in the following business processes? Please tick one (1) box on each line.

Business processes	**Uses**	**Plan to use**	**Does not plan to use**
Internal business operations			
Maintain customers relationships			
Sales and marketing activities			
Maintain suppliers and partners relationships			

23. Can employees access enterprise's computer system remotely from outside the company, for instance from home or from a cyber café?

☐ YES ☐ NO ☐ Not Sure

24. Does the enterprise have a website? ☐ YES ☐ NO

If Yes, please give the website address (*URL*)

_____

25. If Yes, how often is it updated? ☐ Daily ☐ Once a week ☐ Once a month ☐ More than once a month ☐ After every few months ☐ Only when necessary ☐ Not Sure

26. If Yes, how is the website being used? Please check (✓) all that apply

☐ For providing information about the company
☐ For providing advanced functions such as online selling
☐ For providing advanced functions such as online buying
☐ For customers to place their orders
☐ For receiving job enquiries

27. If No, does the enterprise plan to have a website in the future?

☐ YES ☐ NO ☐ NOT SURE

28. What is your company's mobile phone connection plan?

☐ Post-paid ☐ Prepaid

29. The number of mobile telephone service providers the enterprise has subscribed to currently ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

30. Give the status of the following Mobile technologies use in your organization and personal life. Please check (✓) all that apply

Mobile Technology *(If there is any use of mobile technologies that is not in the list but currently in use within the organization, please add them)*	**Business to Business**	**Business to Customer**	**Customer to Business**	**Customer To Customer (Personal use)**
Mobile phone – Make calls				
Mobile phone – Send text messages (SMS)				
Mobile phone – Checking and paying utility bills such as the Water and Electricity bills				
Mobile phone – m-banking (checking account balance, Bank SMS alerts and notifications) or other bank transactions				
Mobile phone – Receive SMS advertisements				
Mobile phone – Send SMS advertisements				
Mobile phone – Checking product and stock prices				
Mobile phone – Business information management using calendars, reminders, contacts and to organize appointments				
Mobile phone – mobile money transfers (sending, receiving or storing money)				
Mobile phone –m-commerce (buying or selling)				
Mobile phone – Access Internet				
Mobile phone – Download ring tones, wallpapers, games				
Mobile Global Tracking System – to track employees/vehicles				
Wireless Modem – Access Internet				
Bluetooth – Connect devices and exchange information				
Wi-Fi – For your Wireless Local Area Network				
Wireless Broadband Internet Access – WiMax (Safaricom 3G, Orange 3G+ technologies)				
Internet Telephony - Voice over Internet Protocol (VOIP) to make cheaper international calls				
Wireless Desktop telephone to access Internet				
Wireless Desktop telephone to make calls				
Wireless Desktop telephone to send text messages (SMS)				

Section 3: Statements to measure suitability of using mobile technologies in organization's business processes.

On a scale of 1 (Strongly disagree) to 5 (Strongly agree), please, rate the factors that determine the use of mobile technologies in your organization's business processes. For each statement below, please check (✓) the appropriate option that best represents your view.

Statements influencing use of Mobile technologies for implementing eBusiness infrastructure 1 = Strongly disagree 2 = Disagree 3 = Undecided 4 = Agree 5 = Strongly agree		**Strongly disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly agree**
1	Mobile technologies allows me to access accurate and up to date information	1	2	3	4	5
2	I can get the information I need quickly and easily using Mobile technologies	1	2	3	4	5
3	I find Mobile technologies convenient and easy to use	1	2	3	4	5
4	Mobile technologies are not subject to frequent problems	1	2	3	4	5
5	I am satisfied with the technical support provided by the suppliers of mobile technologies	1	2	3	4	5
6	Mobile technologies allows me to perform my duties anywhere/anytime (away from my desk/office environment)	1	2	3	4	5
7	I find mobile technologies useful in my work	1	2	3	4	5
8	Using mobile technologies increases my productivity	1	2	3	4	5
9	Using mobile technologies improves my job performance	1	2	3	4	5
10	Using mobile technologies enables me to accomplish my tasks more quickly	1	2	3	4	5
11	The management supports the use of mobile technologies	1	2	3	4	5
12	Our customers/suppliers think that the enterprise should use mobile technologies	1	2	3	4	5
13	We are using mobile technologies because they are now widely used	1	2	3	4	5
14	Mobile technologies have a large, positive impact on enterprise performance	1	2	3	4	5
15	Mobile technologies have improved efficiency in the enterprise processes	1	2	3	4	5
16	Mobile technologies have helped the enterprise to provide better services	1	2	3	4	5
17	Using mobile technologies has reduced the enterprise's operational costs	1	2	3	4	5
18	It is expensive to buy good quality mobile technologies and related services	1	2	3	4	5
19	It is expensive to use mobile technologies and related services	1	2	3	4	5
20	Security concerns are an obstacle to the use of mobile technology services	1	2	3	4	5
21	There is a possibility of my information getting into the wrong hands when using mobile technologies	1	2	3	4	5
22	There are functionality (network outages such as temporary disruptions or communication failures) issues when using mobile technologies	1	2	3	4	5
23	There is high uncertainty about provider's action with errors occurring during the use of mobile technologies and related services such as money transfers	1	2	3	4	5
24	I consider using mobile technologies very positively	1	2	3	4	5
25	It is a very good decision to use mobile technologies	1	2	3	4	5
26	I am willing to use mobile technologies continuously	1	2	3	4	5

Section 4: Statements to measure how frequent the organization uses mobile technologies in its business processes.

On a scale of 1(Do not use at all) to 7 (Uses several times in a day), please, rate how the organization uses the following technologies in its business processes.

On average, how frequent do you use mobile technologies for job-related work? 1 = Do not use at all 2 = Less often than once a month 3 = Uses a few times a month 4 = Uses about once a week 5 = Uses a few times a week 6 = Uses about once a day 7 = Uses several times in a day *(If there is any use of mobile technologies that is not in the list but currently in use within the organization, please add them below)*		**Do not use at all**	**Less often than once a month**	**Uses a few times a month**	**Uses about once a week**	**Uses a few times a week**	**Uses once a day**	**Uses several times in a day**
1	Mobile phone – Make calls	1	2	3	4	5	6	7
2	Mobile phone – Send text messages (SMS)	1	2	3	4	5	6	7
3	Mobile phone – Checking and paying utility bills such as the Water and Electricity bills	1	2	3	4	5	6	7
4	Mobile phone – m-banking (checking account balance, Bank SMS alerts and notifications) or other financial transactions	1	2	3	4	5	6	7
5	Mobile phone – Receive SMS advertisements	1	2	3	4	5	6	7
6	Mobile phone – Send SMS advertisements	1	2	3	4	5	6	7
7	Mobile phone – Checking product and stock prices	1	2	3	4	5	6	7
8	Mobile phone – Business information management using calendars, reminders, contacts and to organize appointments	1	2	3	4	5	6	7
9	Mobile phone – mobile money transfers (sending, receiving or storing money)	1	2	3	4	5	6	7
10	Mobile phone –m-commerce (buying, selling or making reservations)	1	2	3	4	5	6	7
11	Mobile phone – Access Internet	1	2	3	4	5	6	7
12	Mobile phone – Download ring tones, wallpapers, games	1	2	3	4	5	6	7
13	Mobile Global Tracking System – to track employees/vehicles	1	2	3	4	5	6	7
14	Wireless Modem – Access Internet	1	2	3	4	5	6	7
15	Bluetooth – Connect devices and exchange information	1	2	3	4	5	6	7
16	Wi-Fi – For your Wireless Local Area Network	1	2	3	4	5	6	7
17	Wireless Broadband Internet Access – Safaricom 3G, Orange 3G+ technologies	1	2	3	4	5	6	7
18	Internet Telephony - Voice over Internet Protocol (VOIP) to make cheaper international calls	1	2	3	4	5	6	7
19	Wireless Desktop telephone to access Internet	1	2	3	4	5	6	7
20	Wireless Desktop telephone to make calls	1	2	3	4	5	6	7
21	Wireless Desktop telephone to send text messages (SMS)	1	2	3	4	5	6	7

Thank you for taking the time to complete the questionnaire.

Appendix B: Interview Protocol

University of KwaZulu-Natal
Interview Protocol

Demographics

The following Questions relates to the respondent's individual background
Please summarize your own background and experience in IT in your current and in other previous positions/organizations.

(1.) Job description

Owner	
Manager	
Business Unit Manager/Functional Area Manager	
Other	

(2.) What is you main functional role

Administrative/General management	
Business development	
Information Technology	
Other	

(3.) Number of years experience in use of computers, email and Internet
(4.) Number of years experience in use of wireless technologies
(5.) Number of years experience in use of eBusiness applications

The following Questions relates to the enterprise's background
(6.) Please describe your enterprise's main business classification

Tourism		
Manufacturing		
Trade	Wholesale	
	Retail	

(7.) Please choose, from the following, the wireless technologies that you use or plan to use in the next 12 Months in your business operations? Please check (✓) all that apply.

Mobile Phone	Voice Communications	
	Data and Internet	
	M-Payments	
Personal Area Network-Bluetooth		
Wireless Local Area Network		
Wireless Broadband-Hot Spots		
Internet Telephony		

Interview Question 1
Question 1.1 to 1.6 will be aimed at assessing the task-technology fit

1.1 The following questions relate to the fit between the technology and the tasks it supports. Fit refers to the degree to which a technology assists an individual perform their portfolio tasks.

1.1.1 Businesses all over the world are now using wireless technologies to conduct their operations. Some of the applications of wireless technologies include Mobile payments, Wireless Local area networks, wireless Internet access and Internet telephony.
Please comment on the following statement with respect to use of wireless technologies in your organization

- **Systems reliability:** Dependability of the technology
- **Accessibility of data:** Availability of the required data
- **Ease of use and training:** Ease of doing what is required using the technology
- **Quality:** Quality of data, voice or service

	Reliability	**Accessibility**	**Ease of use/training**	**Mobility**
Voice Communication				
SMS/Text Messaging				
Accessing the Internet				
Mobile Payments				
Local Area Network				
Internet telephony(VOIP)				

1.2 How does wireless technology fit the enterprise eBusiness infrastructure requirements?
1.3 What are the benefits of using wireless technologies to implement eBusiness infrastructure in your enterprise?
1.4 What are the key challenges/barriers to using Wireless technologies to implement eBusiness infrastructure in your enterprise?
1.5 Which business functions do you expect huge impact due to use of wireless technologies to implement eBusiness infrastructure in your enterprise?

Sales and marketing	
Purchases and procurement	
Intranet services	

1.6 Is there a need for policy actions to stimulate the provision of wireless technologies in rural areas in Kenya?

Interview Question 2
Question 2.1 to 2.2will be aimed at

- Validating the UTAUT variables on acceptance and use of wireless technologies for implementing eBusiness infrastructure

2.1 Please comment on how the enterprise rates the following UTAUT component.

2.1.1 **Performance expectancy:** How do you rate wireless technologies in implementing eBusiness infrastructure?

Usefulness	
Faster in accomplishing the task	
Increased productivity	

2.1.2 **Social influence:** How has the following group of people influenced the decision to implement eBusiness infrastructure using wireless technologies

Customers	
Suppliers	
Management	
Trading partners	
Government incentives	

2.1.3 **Facilitating conditions:** How has the environment made it possible to implement eBusiness infrastructure using wireless technologies

Management has availed the necessary resources	
The staff have the necessary knowledge	
The systems are compatible with existing systems	
Technical support is available when required	
Management supports the initiative	

2.2 What is the attitude of the employees and management towards the use of wireless technologies to implement eBusiness infrastructure

Interview Question 3
Question 3.1 to 3.6 will be aimed at assessing the Enterprise's eBusiness initiatives

3.1. The term eBusiness refers to buying and selling of goods and services, servicing customers, collaborating with business partners, and conducting electronic transactions within the organization

3.1.1. Please comment on how the enterprise uses the following eBusiness components

Enterprise Resource Planning (ERP): Software which provides integrated functions for major business functions such as production, distribution, sales, finance and human resources management

Supply Chain Management (SCM) is the collaborative use of technology to enhance B2B processes and improve speed, agility, real-time control, and customer satisfaction.

Customer Relationship Management (CRM): Tools and techniques, through which an organization can gather, store, analyze and learn from vast amounts of customer data available to it

Enterprise Application Integration (EAI) is a business term for the plans, methods and tools aimed at modernizing, consolidating and coordinating the computer applications in an enterprise

Collaborative Commerce is the use of digital technology that enables companies to collaboratively plan, design, develop, manage and research products, services and innovative EC applications

Sales Force Automation (SFA) is software that automates the tasks performed by sales people in the field, such as data collection and its transmission

Does your enterprise use or plan to use within the next twelve (12) months any of the following eBusiness applications

Enterprise Resource Planning	
Supply Chain Management	
Customer Relationship Management	
Enterprise Application Integration	
Collaborative Commerce	
Sales Force Automation	

3.2 Does your enterprise have a website?
3.3 What does the enterprise use the website for?
3.4 How is the information on the web site maintained and updated?
3.5 Does your enterprise currently employ persons primarily to take care of its eBusiness infrastructure?
3.6 Identify any other eBusiness activities in your enterprise.

Interview Question 4
Question 4.1 to 4.4 will be aimed at assessing the drivers and the key challenges to implementing eBusiness infrastructure using wireless technologies

4.1 Please indicate the benefits of implementing eBusiness infrastructure using wireless technologies

Mobility	
Increased reliability	
Reduced installation time	
Long term cost savings	
Low cost, quality communication	
Easier and faster money transfers	
Increased employee productivity	
Data availability	
Installation in difficulty to wire areas	
Easy to learn	

4.2 Please indicate the barriers to implementing eBusiness infrastructure using wireless technologies

High initial start up costs	
Security concerns	
Legal problems or complications involved with M-Payments	
Maintenance costs	
The enterprise is too small to benefit from any eBusiness activities	
Using wireless technologies does not reduce the costs of doing business	
eBusiness technologies are too expensive to implement	
Suppliers and customers are not ready for eBusiness	
It is difficult to find employees with necessary skills	

4.3 How has these barriers been overcome?

Interview Question 5

Question 5.1 and 5.2 will be aimed at assessing the impact on enterprise performance, employee's satisfaction and productivity by implementing an eBusiness infrastructure using wireless technologies.

5.1 Please indicate the impact on enterprise performance brought about by implementing an eBusiness infrastructure using wireless technologies

5.2 Please indicate the impact on employee's productivity and job satisfaction brought about by implementing an eBusiness infrastructure using wireless technologies.

Employee's Productivity	
Employee's Job satisfaction	

Appendix C: Case study Framework

University of KwaZulu-Natal

Case Study Framework

Demographics

The following Questions relates to the respondent's individual background
Please summarize your own background and experience in IT in your current and in other previous positions/organizations.

(1.) Demographics

Position	
Number of years in the enterprise	
Level of ICTs expertise	
Other	

The following Questions relates to the enterprise's background
(2.) Please describe your enterprise's main business classification

Tourism		
Manufacturing		
Trade	Wholesale	
	Retail	

The following Questions relates to the Wireless technology to be studied
(3.) Please choose, from the following, the wireless technologies that you use in your enterprise operations? Please check (✓) all that apply.

Mobile Phone	Voice Communications	
	Data and Internet	
	SMS advertising	
	M-Payments	
Personal Area Network-Bluetooth		
Wireless Local Area Network		
Wireless Broadband-Hot Spots		
Wireless Internet – Modem		
M-banking		
Internet Telephony		

The following Questions relates to the research model in relation to Wireless technology to be studied

Factor		**Expected Influence**	**MSE Response (**effect on usage is considered high, moderate or low**)**
Task-Technology Fit		Positive	
Acceptance	*Usefulness*	Positive	
	Social Influence	Positive	
Barriers	*Affordability*	Negative	
	Security	Negative	
	Performance risks	Negative	

What are the Organization Performance impacts as a result of using the Wireless technology in the study?

No.	Organizational performance impacts

What influences the use of the Wireless technology in the study?

No.	Factors influencing use of wireless technologies

What are the challenges experienced while using the Wireless technology in the study

No.	Technical and operational challenges

Issues relating to the use of the wireless technology noted from observations and any documents availed in the course of the study.

No.	Other important issues

Appendix D: Survey Data and Data Analysis Procedures

D.1 Research model Regression analysis

a) TTF on Organizational Performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.580[a]	.337	.329	.58569

a. Predictors: (Constant), Task_Fit

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.118	.211		5.302	.000
	Task_Fit	.715	.050	.580	14.243	.000

a. Dependent Variable: Performance

b) Usage on Organizational Performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.419[a]	.176	.171	.65102

a. Predictors: (Constant), Usage

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.106	.300		3.682	.000
	Usage	.643	.064	.419	10.010	.000

a. Dependent Variable: Performance

c) **TTF on Usage**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.516[a]	.267	.258	.38251

a. Predictors: (Constant), Task_Fit

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.245	.141		22.985	.000
	Task_Fit	.338	.034	.516	10.056	.000

a. Dependent Variable: Usage

d) **Acceptance on Usage**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.475[a]	.226	.220	.39227

a. Predictors: (Constant), Acceptance

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.240	.137		23.696	.000
	Acceptance	.334	.032	.475	10.428	.000

a. Dependent Variable: Usage

e) Barriers on Usage

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.411[a]	.169	.161	.40688

a. Predictors: (Constant), Barriers

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.123	.080		51.668	.000
	Barriers	.146	.021	.411	6.835	.000

a. Dependent Variable: Usage

f) Stepwise Multiple regression for the Barriers

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.377[a]	.142	.140	.41185
2	.409[b]	.167	.164	.40611

a. Predictors: (Constant), Security Risks 1

b. Predictors: (Constant), Security Risks 1, Performance Risks_1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.181	.054		77.909	.000
	Security Risks 1	.130	.014	.377	9.341	.000
2	(Constant)	4.365	.070		62.316	.000
	Security Risks 1	.166	.016	.480	10.125	.000
	Performance Risks_1	-.084	.021	-.190	-4.005	.000

a. Dependent Variable: Usage

D.2 Amos 5.0 Research Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	14	4.012	1	.045	4.012
Saturated model	15	.000	0		
Independence model	5	568.616	10	.000	56.862

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.007	.997	.955	.066
Saturated model	.000	1.000		
Independence model	.112	.631	.446	.420

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.993	.929	.995	.946	.995
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

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

NCP

Model	NCP	LO 90	HI 90
Default model	3.012	.045	13.307
Saturated model	.000	.000	.000
Independence model	558.616	484.177	640.459

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.008	.006	.000	.025
Saturated model	.000	.000	.000	.000
Independence model	1.075	1.056	.915	1.211

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.075	.009	.159	.198
Independence model	.325	.303	.348	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	32.012	32.333	91.832	105.832
Saturated model	30.000	30.344	94.093	109.093
Independence model	578.616	578.730	599.980	604.980

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.061	.055	.080	.061
Saturated model	.057	.057	.057	.057
Independence model	1.094	.953	1.249	1.094

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	507	875
Independence model	18	22

Appendix E: Invitation Letter for the Survey

University of KwaZulu-Natal
School of Information Systems & Technology
Survey Cover letter

January 2010

Dear Respondent,

Purpose: You are invited to participate in a study on the implementation of eBusiness use of Mobile wireless technologies in business processes. Your participation in this survey is voluntary. You may refuse to participate or withdraw from the survey with no negative consequence.

The study seeks to investigate the technological, individual and environmental factors that influence the use of mobile wireless technologies in business processes such as payments, networks and Internet access in Micro and Small Enterprises (MSEs' employs 1-50 employees) in Kenya. The applications of mobile wireless technologies in business processes include Mobile money transfers (such as M-Pesa, Zap, YuCash), Local Area Networks (Such as Wi-Fi), and mobile wireless Internet Access. The eBusiness applications in an enterprise involve all application of Information and Communication Technologies to the operations and management of business processes within and between organizations and with individuals using Information and Communications Technologies (ICTs). Also some background and demographic questions are requested in order to profile the demographic characteristics of those involved in this study.

Confidentiality: I would be most grateful if you would participate in this study by filling in the questionnaire. I do assure you that any information you provide will be kept strictly confidential and will not be attributed to you, entrepreneur or the enterprise. If you are willing to help, and in order to ensure that the results of the study are accurate as possible, I would be most grateful if you could answer all questions fully and to the best of your ability and return the questionnaire. All data sources will be treated as confidential and will be used for research purposes only. The majority of the data will be reported in statistical form and no individual respondents will be identified. If there is any further enquiry required, I may arrange for a follow-up interview at a time convenient for you. At your request a summary of the results of the study can be made available to you through email.

Would you like to receive a summary of the study results? Yes ☐ No ☐

If you have any queries about your participation in this survey feel free to ask me. I can be contacted on 0722-309076 or the following email address is: pkanyi@daystar.ac.ke or kanyiwamuyu@yahoo.com

Many thanks for your assistance in this regard.

Sincerely,

Patrick Kanyi (Researcher)

Appendix F: Consent form for the Survey

University of KwaZulu-Natal
School of Information Systems & Technology
Consent Form

January 2010

PhD Information Systems & Technology Research Project

Researcher: Patrick Kanyi (0722-309076)

Supervisor: Prof. Manoj Maharaj (+27 (0) 31 260 8023)

Postgraduate Administrator: Ms Nadia Allay (+27 (0)31260 7264)

CONSENT

I_____ (*Name of participant: Optional),* the participant, hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire. I agree that information and research data gathered for the study will be used in the analysis of the use of wireless technologies to implement an eBusiness infrastructure by Kenyan MSEs, and will be used in aggregate statistics. No personal identifying data of myself as the participant nor identifying data on the enterprise will be made.

_____ _____

Signature of Participant Date

Appendix G: Ethics Clearance Letter

Research Office, Govan Mbeki Centre
Westville Campus
Private Bag x54001
DURBAN
4000
Tel No: +27 31 260 3587
Fax No: +27 31 260 4609
Ximbap@ukzn.ac.za

30 November 2010

Mr. PK Wamuyu (208530490)
School of Information Systems & Technology

Dear Mr. Wamuyu

PROTOCOL REFERENCE NUMBER: HSS/0318/09D
NEW PROJECT TITLE: The Suitability of Wireless Technologies for Implementing an eBusiness Infrastructure in Kenyan Micro and Small Enterprises

APPROVAL AND CHANGE OF DISSERTATION TITLE

I wish to confirm that ethical clearance has been granted full approval for the above mentioned project:

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach/Methods must be reviewed and approved through an amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

Best wishes for the successful completion of your research protocol.

Yours faithfully

.....
PROFESSOR STEVEN COLLINGS (CHAIR)
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

cc. Supervisor - Prof. MS Maharaj
cc. Mrs. C Haddon