Mobile Phones and E-Commerce among Micro and Small Enterprises in the Informal Sector: An Empirical Investigation of Entrepreneurship in Nairobi

By

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DECLARATION

This thesis is my original work and has never been submitted for a degree in any other University

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DEDICATION

I dedicate this thesis to my late parents: Rev. Timothy Litondo and Rev. Susie Litondo

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DEFINITION OF TERMS

ICTs – Information and Communication Technologies, which in this study refer to mobile phones, computers and internet.

Adoption – The sequence of stages that an individual or firm goes through in the process of accepting a product or an innovation, namely the stages of product awareness, interest, evaluation, trial and use.

Diffusion – The manner in which the product, innovation or practice is disseminated in a market or population. The study of diffusion deals with how, why and at what rate a new idea and technology spreads through markets, cultures, and population. In this particular study e-commerce diffusion is the process through which the proportion of MSEs adopting mobile phones and using the phone to conduct business increases.

E-commerce – Commercial activities conducted through electronic devices, in this study mobile phones.

E-commerce Readiness – The degree of preparedness for e-commerce adoption or diffusion, proxied by such factors as literacy level, access to electricity, mobile phones and computer infrastructure

Mobile Phone – Mobile phone or cell phone is an electronic device used for mobile telecommunication over cellular networks of specialized base stations known as cell sites.

ABSTRACT

Lack of employment has pushed many people into self employment in the informal sector in Nairobi and Kenya at large. Micro and small enterprises (MSEs) are recognized by the government for their contribution to the GDP. Information and Communication Technologies (ICTs) are assisting the operators of MSEs in this sector to become more entrepreneurial. The ICT that is widely used in the sector is the mobile phone. Studies done on the usage of ICTs among MSEs have mostly concentrated on the roles of computers and internet usage, and given contradicting results on the benefits of using these technologies in e-commerce. Evidence on the role of mobile phones among MSEs in Kenya is lacking, especially, the evidence on factors facilitating and preventing their adoption, and the effects of the adoption on the performance of an MSE.

This thesis analyzed the determinants of mobile phone possession, the extent of its usage in e-commerce, and the impact of mobile phone usage on the performance of an MSE. The hypotheses that were tested and strongly rejected were: a) e-readiness factors that is, characteristics of the owner, the attributes of the firm and the environment under which the firm operates, have no effect on the adoption of mobile phones and their usage in e-commerce; and b) the adoption of mobile phones and their use to transact business has no effect on the performance of an MSE. Data for the study was collected from the 8 divisions of Nairobi Province. Three models were estimated using these data, namely, the logit model, the probit model and the LPM (linear probability model).

The main findings of the thesis are as follows: a) the majority of MSEs in Nairobi's informal sector are poor although a few of them had sales running into millions of Kenya shillings; b) the sector is dominated by literate people, the majority of whom were male operators; c) many of the operators had mobile phones, and they used them for business transactions; d) each MSE paid a daily fee of 20 Kenya shillings to the City Council officers; e) the key readiness factor influencing the possession of the phone is electricity; f) education has a strong influence on the usage of the phone for e-commerce; and g) mobile phone possession and usage for e-commerce are highly associated with sales turnover and with employment creation within the informal sector.

It is recommended that MSEs be categorized by the value of items sold and not the number of employees. A clear distinction should be made between MSEs in the informal sector and those in the formal sector. Further, a conducive, operating environment which accommodates electricity needs to be provided. Computer training and innovations associated with the usage of mobile phones should be encouraged and facilitated among MSEs to enhance their performance. Research on business start-ups and innovations due to mobile phone usage should be carried out. Finally, research on specific transactions of mobile phone usage in e-commerce needs to be conducted.

CHAPTER ONE: INTRODUCTION

1.1 Background

The Kenyan economy has over the recent decades gone through substantial liberalization and changing economic opportunities, which has led many organizations to either down-size or retrench their employees, forcing them into the informal sector. Lack of employment alternatives has pushed many people into self employment activities which largely form the micro and small enterprises (MSE) sector in the country. This sector is not clearly defined or understood in Kenya and in other developing countries. According to Stevenson and St-Onge (2005), a micro enterprise is one having not more than ten employees including the owner, while a small enterprise is the one having eleven to fifty employees. The Kenyan Government recognizes the contribution of the small enterprises to the Kenyan economy. It has come up with the department of micro and small enterprise development. The department is a result of the merger of the division of small scale & Jua Kali (hot sun) enterprises and the directorate of applied technology. This department is responsible for the formulation and implementation of policies and strategies for the development of the MSE sector. Although huge amounts of money have been spent on MSEs through projects and programs in recent years, their impact on survival and development of the enterprises has been low, as their mortality rate remained high (Government of Kenya, 2005).

Three national baseline surveys have been conducted on the MSEs in Kenya (Government of Kenya, 2005). The first in 1993 provided the first statistically valid estimate of the size of MSE sector in Kenya and its contribution to employment in the country. The second survey was in 1995 and its main focus was to measure the sector's contribution to household income. The last survey conducted in 1999, made significant contribution towards understanding the nature of jobs created and incomes generated in the informal sector. The Expert Group on Informal Sector Statistics (Delhi Group) in 2005 argued that there were a lot of inconsistencies in the trends and structures of MSE sector described in the three baseline surveys carried out in Kenya, which is a major concern for all users of the results from the surveys. Since the last survey, many changes have taken place in the Kenyan economy due to the adoption and diffusion of information and communication technologies, which have also affected the MSE sector. The post election skirmishes of 2007/2008 adversely affected the

MSEs in the informal sector as many micro businesses were displaced by violence and by the slow down of the economy.

Informal sector is a vital source of employment and income for the poor and a seedbed for local entrepreneurs since it is easy to enter and requires little money and skills (CBS, 1999, Nwaka, 2005; Florez, 2003). Nwaka (2005) states that, in Nigeria the urban informal sector thrives because of flexible rules and regulations. The main policy challenge faced in the sector is how to support and regulate the sector in order to promote employment, productivity and income for the poor while ensuring a safe and healthy environment. Mitullah (2006) argues that the dilemma in many countries is whether to promote the informal sector as a provider of employment and incomes or to seek to extend regulations and social protection to it, which might reduce the capacity to provide jobs and incomes for an expanding work force. Chattopadhyay (2005) notes that in India the sector is dominated by non-waged and unorganized workers engaged in precarious work processes and labour arrangements in business which in many cases are unregulated and unregistered, with inadequate safety and health standards. The situation of Kenya's informal sector is quite similar to the Indian case just described.

1.2 Information and Communication Technologies

The ICT is an umbrella term for communication devices and applications, such as print media, radio, television, mobile phone, computer hardware, computer software and network systems. It encompasses both traditional and new technologies which have converged to give efficiencies in information processing and communication. Examples of ICT convergence is the crossing of photocopier machine and telephone leading to the creation of the fax machine, and the convergence of the computer and the telephone resulting in the upsurge of the internet. ICTs have been defined as electronic means of capturing processing, storing and communicating information (Heeks, 1999).

Initially, the ICT of interest in this study was the internet, but after exploration, the relevant ICT for MSEs in the informal sector was the mobile phone. Tandon (2002) argues that most micro and small entrepreneurs have no option but to remain in the informal sector and this influences the kind of ICTs they are willing to invest in and this investment usually begins

and ends with a mobile phone. He further states that those firms whose markets extend beyond the immediate community may consider investing in wider range of ICTs to support both communication and computerization. The business owners in the informal sector that are using mobile phones for e-commerce are considered, in this study to be entrepreneurs, since many business innovations are associated with mobile phone adoption. For example, the usage of the phone to pay for good and according to Drucker (1985) entrepreneurs search for sources of innovation, and changes that indicate opportunities for successful innovation.

The Kenyan government recognizes that information and communication technologies are an engine of development and economic growth. The government is thus striving to provide an environment that can enable and sustain the development and growth of ICTs in the country. In the Development Plan (2002-2008), the Government spelled out its plan for developing an ICT literate population, through retraining and skills building that will place special emphasis on the information sector and the current workforce (Government of Kenya, 2002-2008). The strategic focus of Kenya's ICT strategy for economic growth is to simultaneously target the development of the ICT sector, and to use ICTs for employment creation, poverty reduction, as well as making it a broad-based enabler for economic recovery and the achievement of national development goals (Government of Kenya, 2006). It should be understood that when the Kenyan Government talked of ICTs in the development plan, the focus was on computers and the internet; not so much on the mobile phones and that is the reason why an ICT literacy society was emphasized. There are many mobile users in Kenya who are not computer literate. Nevertheless, this knowledge is necessary for complex mobile business transactions since computer technology is the platform for mobile phone applications. Many users are unaware of this platform, and mobile phone service providers have made the role of computers in mobile telephony invisible to users.

Samiullah and Srinivasa (2002), note that the role of ICTs in combating the rural and urban poverty and achieving sustainable development is the subject of increasing debate and experiments, since there is the problem of the urgent basic needs fulfilment. This has led to doubts as to whether ICTs should be priorities for development agencies or for developing countries themselves. They also give the other side of the coin that addressing the information and communication needs of the poor and creating information rich societies is an essential part of tackling poverty. Poor people will benefit from improved flows of information

throughout the society. Information can improve the effectiveness of government, markets and institutions that affect the poor. ICTs have an enormous potential as tools for increasing flows of information and empowering poor people (Samiullah and Srinivasa, 2002). According to Diga (2008) mobile phones are not clearly identified by most international agencies as tools for development, while they have become long term economic investment for the disadvantaged. She further states that many people across Africa are investing in mobile telephony before meeting the needs of improved sanitation, water, health, housing and education. Hence, households are choosing to address communication needs instead of basic needs. Mobile phones are regarded as a catalyst for productivity, networking and information gathering; and this minimizes the need to travel or to have a face-to-face meeting to complete business deals (Melchioly and Saebo, 2010).

Work carried out by United Nations Conference on Trade and Development (UNCTAD) established that there is little doubt about the acceleration in social change that ICTs can produce, or the profound changes they can create in the structure of the economy. The report states that whether ICT will increase or reduce the capacity of developing countries to close the multiple gaps that separate them from the industrialized world will largely (although not exclusively) depend on the environment in which the changes take place and the attitudes of the actors implementing them towards ICT innovations. Wolf (2001) adds to this by saying that the decision to adopt ICTs is determined not only by the enterprise characteristics, but also by the characteristics of the entrepreneur, and the environment the enterprise operates in. The challenge in developing countries is how to harness ICTs, to ensure that the technological innovations are used to create economic opportunities for small businesses. These opportunities if taken up by individuals should help to fight poverty as well as provide a material basis for implementing strategies to cure other social ills. It is through their applications in the production and service delivery that ICTs are most likely to bring about improvements in the living standards of people in developing countries (UNCTAD, 2002).

The interesting thing about the mobile phone as a popular ICT in Kenya is that it is used by both the poor and the rich. The poor are able to cut costs on transportation by using short messaging services (SMS), and even use the mobile for banking transactions. Some of the benefits of a mobile phone as listed by Silarszky et al (2008) are as follows: a) GDP growth – an increase of 10 mobile phones per 100 people increases GDP by 6%; b) job creation –

employment is generated by operators and also retailers through the sale of, for example, air time, handsets and sim cards; c) productivity – assist in start up of new businesses, employment search, entrepreneurialism, i.e. innovations, mobile banking and reduction of transaction costs; d) tax revenue – direct taxation on operators; and e) market efficiencies.

The Kenyan Government recognizes that Kenya lies on the unfavourable side of the digital divide and has made it a priority for public, private and NGO sectors to master the use of ICTs (Government of Kenya, 2002). The government realizes that the world is now a global village, and ICTs are what are making this possible. Duncombe et al. (2006) noted that there is a risk in ignoring ICTs; for example, firms that do not use ICTs would be at a disadvantage with respect to competitors who are utilizing ICTs. The Ministry of Information and Communication is beginning to lay out a platform for ICTs. There is an emphasis of having the population computer literate by integrating computer classes in the school curriculum and also getting government ministries computerized. The government has also shown commitment to reforms and liberalization of the communication sector. More operators such as Safaricom and Zain have entered communications markets that were previously a preserve of the Telkom Kenya (Government of Kenya, 2004).

Diffusion of mobile technology in the Kenyan society is advancing at a fast rate, meaning that policy makers must keep up with these developments, especially in the business sector. The government has recognized this and is formulating policies to cover not only the computer usage, but also mobile usage in all sectors of the economy. Computer literacy is good for the society because, as mentioned before, this is the platform for mobile phone applications, and therefore for any MSE to exploit the enormous capabilities of mobile usage, the operators must be computer literate.

There are also policies and strategies for fast tracking ICTs in the Kenyan economy. The most notable are: information and communications technology sector guidelines of 2006; Sessional Paper No. 1 of 2005; National Information Technology ICT strategy for Education and Training of 2006; the E-Government Strategy for 2004, the Economic Recovery Strategy on Wealth and Employment Creation 2003-2007, and the most recent, Vision 2030. The government is also in the process of laying out broad bandwidth cables throughout the country. The above policies were based on internet and computer usage, but they can also apply to mobile telephony since it is part of ICTs. The broad bandwidth is an important

infrastructure to mobile users, as it can open up avenues for many transactions, including downloading business information from the internet using a mobile phone. This is where computer literacy plays an important role. The technology of third generation mobile phones (3Gs) that are currently on the Kenya market is very similar to that of a computer and they require broad bandwidth for a variety of applications, such as access to the internet, watching of television, working with spreadsheets and transmitting pictures of goods via the mobile phone. They can also accommodate mobile tracking software, meaning that if one loses the handset, it can be tracked down and recovered.

The first generation (1G) used analogue technology which could not transmit data, but the second generation (2G) mobile phones also called digital mobile communication are widely spread in the Kenyan economy and allow for data transmission thus paving way for Short message services (SMS) and voice communication which is digitized for transmission. The 3G mobiles allow for fast data transmission and at present use the satellite for transmission which is very expensive and slow and some applications on the phone do not work in many parts of the country except in Nairobi. The emerging of broad bandwidth will reduce the cost of transmission tremendously, and therefore many MSEs will be able to enjoy internet applications such as e-mail and business websites via their mobile phone handset at affordable prices. Moreover, these applications will be possible around the country since the cable is being laid in every corner of the country. ICTs are a prerequisite for e-commerce. Although the internet has been considered to be the major ICT for e-commerce (UNCTAD, 2003) mobile phones are becoming very important components of ICTs for e-commerce among micro and small enterprises in Kenya. It should be noted that before ICTs can be used by an MSE to transact business, the MSE has to adopt them. Some of the readiness factors that this study analyses include access to electricity, distance to a mobile phone repair shop, distance to a mobile phone shop, distance to the tarmac road, age of both owner and business and education of the owner of business.

1.3 Electronic commerce and entrepreneurship

Electronic commerce or e-commerce refers generally to all forms of electronic transactions relating to commercial activities by organizations and individuals that are based upon the processing and transmission of digitized data, including, text, sound and visual images (OECD, 1997). E-commerce involves sales of goods and services over net-works or via

phones by businesses, individuals, governments or other organizations and it builds on traditional commerce, adding the flexibility and speed offered by electronic communications (Duncombe et al., 2006). From the above descriptions, one can clearly see that e-commerce involves usage of ICTs in conducting business. Results of a third annual e-commerce study by Cisco Internet Business Solutions (IBSG) presented in June 2008 noted that mobile phones represent a major growth opportunity for retail industry by providing new purchasing channels for consumers. Further the new technologies help retailers to provide unique satisfying e-commerce experience by using short message services (SMS) to communicate promotions, provide a two-way service for customer's questions, and item availability and delivery dates. E-commerce may involve selling directly from business-to-business (B2B), business-to-consumer (B2C), or business-to-government (B2G) (O'Brien, 2002; Dewan, 2001; Duncombe et al., 2006). It can also be conducted between consumers (C2C), consumer-to-business (C2B), and government-to-business (G2B) (Dewan, 2001).

According to Mann et al (2000), there is no universal definition of electronic commerce since electronic market place and its participants are numerous, and their complex relationships are evolving rapidly. They further state that the best way to understand e-commerce is to understand the elements of infrastructure, how it affects the traditional market place, and the different ways in which electronic commerce is manifested. New forms of entrepreneurship have begun to emerge from synergies between ICT development and the changing paradigm of economic transactions, whereby virtual teams consisting of geographically distributed individuals who interact through interdependent tasks are led by common entrepreneurial interests and goals (Matlay and Westhead, 2005).

Schumpeter (1934) describes entrepreneurship as a process of creative destruction whereby new firms, technologies, or modes of commerce displace the old established order. The Schumpeterian school of thought puts an entrepreneur in the centre of innovation, technological growth and economic development. Schultz perceives entrepreneurship as the ability to adjust or reallocate resources in response to changing circumstances. Therefore, entrepreneurship is a human behaviour that can be adapted by anyone such as a businessman, a farmer, a housewife or a student (Klein and Cook, 2006). The Schumpeterian theory as asserted by Jones and Wadhwani (2006) emphasizes that empirical study of entrepreneurship should be looked at in retrospective because it is best understood in the changes taking place

in the industries, markets, societies, economies and the political system. Mobile phone technology has had a revolutionary impact on the Kenyan society. Furthermore, poor infrastructure and poverty have sparked unique innovation in mobile phone applications which are recognized globally. The case in point is M-Pesa money transfer services (Warah, 2009). Entrepreneurship is operationalized by the usage of mobile phones for business transactions. This ascribes to the Schumpeterian school of thought whereby entrepreneurship is the process of using new technologies to replace the old ways doing business.

Mobile phones can be used in B2B, B2C and C2B e-commerce. B2B in the retail industry would involve, the ordering of goods using a mobile phone from other business operators in order to sell. A mobile phone can also be used to communicate to customers (B2C) in a case where a customer misses an item and after restocking the item the owner of the business contacts the customer via the phone. In the service and manufacturing industries, B2C and C2B e-commerce can be practiced in addition to B2B e-commerce whereby a mobile phone is used to order raw materials and other items that are used in processing. The business owners in manufacturing can use the phone to communicate to customers to alert them when the goods are ready (B2C), and customers also use the phone to make inquiries on the status of their goods (C2B). The same can apply to the service industry, mostly in the tailoring where customers could use the mobile phone to find out if their clothes are ready (C2B) or the business owner alerts customers when their clothes are ready (B2C), and in hair dressing where the a customer would use a phone to book for an appointment (C2B).

Generally all the above mentioned types of e-commerce, although based on the internet, are possible with a mobile phone; it all depends on the type of business transaction and entrepreneurial initiatives of the operator. For example, an operator can send a message via a mobile phone with the picture of the product on offer to a customer. What should be noted is that communication takes place either via short messaging services (SMS) of the mobile phone or direct calling, and many affordable phones on the Kenya markets have cameras. Duncombe et al., (2006) state that e-commerce is not just about using new technologies, but it can also help to support profitable business relationships and assist in effective management of businesses by improving internal business efficiency and an emergence of new products and services. ICTs are making businesses to become innovative in the way they contact businesses. The entrepreneurial activities of businesses operators brought about by these

emerging technologies cannot be exhausted since they evolve with the introduction of new technologies.

According to the UNCTAD, E-commerce Development Report of 2001, the international community seems to be of the opinion that e-commerce should be given priority in poverty-reduction strategies. The report states that there are many success stories about how particular communities, enterprises or governments in developing countries have used e-commerce to create new economic opportunities. Therefore, developing countries can profit from the opportunities provided by e-commerce for exploiting competitive advantages that were not usable in the "old economy." E-commerce gives medium and small enterprises (MSEs) the ability to access international markets that used to be difficult to enter due to high transaction costs and other market barriers. Thanks to e-commerce, entrepreneurs in developing countries can access cheaper, better-quality trade-related services (for instance, finance or business information), thus escaping the high prices for these services that are charged by local de facto monopolies (UNCTAD, 2001). It should be noted that when many business schools feature entrepreneurship in the curriculum, the phenomenon under investigation is usually small business management (Klein and Cook, 2006).

1.4 E-commerce adoption by Micro and Small Enterprises

A study conducted in Kenya by Mitullah and Odek (2002) discovered that many small and micro enterprises are using mobile phones for business transactions even in this era of globalization. This discovery was made before the introduction of internet enabled mobiles, and therefore gives the impression that mobile phones cannot be used for international business transactions. The mobile service providers in Kenya have made it possible for international money transfers at very affordable charges. Results from a survey done in Ghana by Frempong and Essegbey (2006) concluded that formality plays an important role in the type of ICT facility used by MSEs. The ownership of fixed lines computers and fax and internet belonged to the formal category, while the usage of mobile phones was more pronounced in informal MSEs. The reasons given were that most informal sector players operate in temporary and makeshift structures, most often sited at unauthorized places, therefore the nature of such structures require ICTs that can be carried along when the business relocates.

Diffusion of ICTs is a first step in taking MSEs across the threshold of full ICT use. Duncombe et al. (2006) came up with a step-by-step approach that could minimize the risk of MSEs adopting e-commerce as follows: a) the first step consists of simple messaging mobile communication; b) in the second step computers are introduced and information can be exchanged via the internet; c) in the third step company information is published using the web; d) the fourth step advances to interactions via the web; e) the fifth step extends the interactions to e-commerce transaction; f) the final step is where the full utilization of ICTs is realized, in this step businesses are linked electronically and business processes are streamlined by networking. Most of the MSEs in Kenya, as this study indicates are at the first step; they have not advanced beyond this stage and yet many e-commerce transactions are taking place. Contrary to Duncombe et al (2006) substantial e-commerce can occur at the first stage of the ICT progression.

Tandon (2002) argues that barriers to e-commerce adoption are spread very unevenly leading to some MSEs having strong e-commerce opportunities while others have none. He further states that e-commerce in developing countries is characterized by: a) very uneven distribution of infrastructure; b) uneven distribution of ICTs access capabilities between various social groups; d) large portions of mobile phones are not internet-enabled; e) lack of large mass of local customers using or with potential to use e-commerce; f) absence of e-commerce culture, for example, dislike of operational transparency, and preference for personal contact in commerce. Contrary to Tandon's assertion, mobile phones are owned by the majority of citizens in Kenya and the developing world at large, and therefore, it would be safe to assume that local customers use or have the potential to use them for e-commerce. A valid allegation for MSEs within the informal sector is the lack of internet enabled phones; although the question here should be: given that they trade mostly with local customers, do they need internet enabled mobile phones which are complex and expensive?

Findings of a study undertaken by Mutullah (2006) on assessment of the e-readiness of small and medium sized enterprises in the ICT sector in Botswana, with special emphasis to information access indicated that the majority of the MSEs were small-sized and were largely not e-ready to participate in the global electronic business environment. The reasons cited were lack of awareness, inadequate policy and legislative framework, poor

telecommunication and electricity infrastructures, poor e-commerce infrastructure, inadequate government support, lack of access to credit, investment barriers, and the lack of ICT skills.

The above assessments are based on computer technology and not mobile telephony. Nonetheless, they also apply to mobile phone usage for e-commerce. According to Biggs and Kelly (2006) converging ICTs, in this case, computer and mobile technologies are an enabler of socio-economic development. However, socio-economic development is not going to happen automatically just by stimulating local businesses, reforming the government to facilitate entrepreneurship or improving the education level of the population. Most of Sub-Saharan Africa (SSA) has real obstacles that are usually ignored in ICT programmes, if they are not identified and included in a strategic plan may be magnified and may result in a lower level of socio-economic development.

A study carried out by Opiyo and K'Akumu (2006) on the ICT applications in the informal sector in Kenya concluded that there is need to prevent further marginalization of the informal sector by availing ICT services which are mixed appropriately and also properly allocated, since this would enable them to access markets and other business information that can assist them to make their economic activities more vibrant. They further suggest that there is a need to comprehend and acknowledge the drivers and pressures leading to the adoption of new technologies such as ICTs in the lower ends of the informal sector which have been neglected in the literature. Chowdhury and Wolf (2003) suggest that investigations are needed to reveal the complementary factors that impact on the links between ICTs and MSE's performance and may provide additional impetus for investments.

Empirical findings of a study on the use of ICTs and their impact on performance of small-scale and medium-scale enterprises in Kenya, Uganda and Tanzania suggested that investment in ICT has a negative impact on labour productivity, and a positive one on general market expansion; however, no significant impact on enterprises' returns was found nor was it found to determine enterprise exports (Chowdhury and Wolf, 2003). Most of the arguments above are based on internet as the ICT being used for e-commerce, while this study's focus is on mobile phone adoption and usage for business since very few MSEs in the informal sector in Nairobi have access to computers. A study done in Tanzania by Melchioly and Saebo (2010) noted that productivity gains from the utilization of mobile phones can be substantial for reducing operation costs and improving revenue, and this can be realized through a range

of factors, for example, number of employees reliant on mobile phones and revenue or time saving made by the use of mobile phones.

1.5 Statement of the Research Problem

Entrepreneurship is the driving force behind the formation of micro and small enterprises (Naude, 2010). Further, mobile phones can improve the management of MSEs and make them competitive in domestic and foreign markets (Melchioy and Sabeo 2010). However, evidence on this role of mobile phones among MSEs has hitherto been lacking. The basic question underlying the formulation of this study was whether or not the use of ICTs, in particular a mobile phone, improves performance of MSEs. Specifically there was need to understand how mobile phone adoption affects a firm's sales and employment. Since a firm must have access to phones in order to use them, there is need to identify the factors that prevent or facilitate adoption of mobile phones among MSEs. The factors influencing the adoption of mobile phones and their use and impact among MSEs had previously not been studied in Kenya.

This study fills this knowledge gap by providing empirical evidence on the effects of enterprise characteristics, owner characteristics and the environment in which the firm operates on adoption and usage of mobile phones in business transactions.

1.6 Objectives of the study

The main objective of this research was to establish the determinants of e-commerce among the MSEs in the informal sector in Kenya.

Specific objectives of the thesis were to:

1) Determine the extent to which mobile phones are being used to conduct business transactions within the lower ends of the informal sector in Nairobi.
2) Analyze determinants of mobile phone possession among MSEs in the informal sector
3) Analyze determinants of mobile usage for e-commerce in the informal sector
4) Analyze the impact of mobile phones on performance of MSEs in the informal sector in Nairobi, controlling for effects of other variables such as personal characteristics of the owner and attributes and locations of the firm.

1.7 Study Justification

Entrepreneurship is rarely considered a single coherent field but rather part of different topics (Jones and Wadhwani, 2006), hence, the study of entrepreneurship in conjunction with mobile phone usage for e-commerce among MSEs in the informal sector. Many theories on how e-commerce adoption can propel MSEs to create wealth and fight poverty have been documented (Matlay and Addis, 2003; Gibbs and Kraemer, 2003). There is also a general belief that once the country is ready for an ICT, including mobile phone possession, the relevant ICT will automatically spread in the society. The Kenyan Government is striving at having an e-literate economy by integrating computer studies in school curriculum and developing the ICT villages in rural areas. Evidence is therefore required on the effects such efforts have on the economy, especially in the informal sector where most of the people earn a livelihood.

1.8 Study Hypotheses

Two hypotheses are tested in this thesis, namely:

a) E-readiness factors, as broadly defined by Wolf (2001) have no effect on adoption and usage of mobile phones by MSEs in e-commerce.
b) The adoption of mobile phones and their use to transact business have no effect on performance of MSEs.

Both hypotheses are strongly rejected by the evidence generated in this thesis.

1.9 Structure of the Thesis

Chapter one is the introduction to the thesis; it briefly describes the MSE sub-sector in Kenya. The chapter also defines Information and Communication Technologies (ICTs) and emphasizes that mobile phone is the only relevant ICT used for business transactions among MSEs in the informal sector in Nairobi. Theories and discussions on the utilization of ICTs by MSEs are presented. The problems that led to the survey and the objectives of the thesis are stated. Finally, the justification of the study and the hypotheses are discussed.

Chapter two discusses theories on the informal sector in developing countries. It starts with literature descriptions of the informal sector and narrows down to Nairobi informal sector, followed by diffusion of ICTs in the informal sector. The chapter concludes by stating the technological revolution presented by mobile phones within the informal sector.

Chapter three contains the literature review which begins by a presentation on theories of entrepreneurship followed by the definition of e-commerce and e-commerce readiness. Theories and models are used to inform discussion of e-commerce and e-commerce readiness factors. Literature on mobile phones and e-commerce is also provided. Finally the literature is summarized and the knowledge gap that this study fills is pointed out.

In *Chapter four* the research problem is conceptualized. The theoretical framework and the models used to analyze the problem are introduced in this chapter. Discreet choice models are presented, specifically the logit and probit models. The linear probability model is also briefly discussed. These models were used because either the owner of an MSE possesses a mobile phone or not, and on condition of possession, either uses it for business or not. The question posed here is: does mobile usage improve performance of MSEs?

Chapter five contains the descriptive statistics. It begins by presenting field observations and my perceptions of the MSEs that were investigated. A brief description of each location visited is noted. Two tables are presented in this chapter. Table 5.1 presents summary statistics, while correlation of selected variables is shown in Table 5.2. The discussions on the main features of the enterprises, profiles of enterprise owners, infrastructure supporting the enterprises, types of premises and finally correlations of selected variables are presented.

Chapter six shows estimation results from the linear probability model (LPM), the logit model and the probit model. The variables of interest and the control variables are stated. The results are investigated for their significance using the *t*-statistic and *z*-values for individual coefficients and the p and X^2 values for the joint effects of all the variables in the model. Five tables illustrate the results; Table 6.1 has the estimates of the factors influencing the possession of a mobile phone; Table 6.2 the determinants of mobile usage for e-commerce; Table 6.3 the effects of mobile phone on the probability of sales increasing controlling for other variables; Table 6.4 the impact of mobile phone on sales amounts, controlling for other factors; and Table 6.5 the effect of the mobile phone on employment, controlling for other covariates. Finally, the chapter summarizes key hypothesis.

Chapter seven presents the summary of key findings of the thesis and their policy implications. It also presents and discusses policy recommendations and theoretical implications of the study.

CHAPTER TWO: INFORMAL SECTOR – ICT AND E-COMMERCE

2.1 Introduction

The informal sector in Kenya is dominated by micro and small enterprises (MSEs) (Mitullah, 2006). According Chattopadhyay (2005), urban informal sector can be characterized as a range of economic units in the urban areas which are mainly operated by individuals either alone or with assistance of members of the same household. There is no consensus on the definition of urban informal sector because of its heterogeneous activities (Florez, 2003). The Kenya Economic Report of 2009 argues that cross country comparison of MSE is challenged by different definitions of the sector in different countries, and the informal nature of operations of many MSEs. However, Macharia (2007) asserts that although the informal sector is heterogeneous in character, there are some general characteristics of the sector that should be appreciated. For example, low initial capital requirements investment resources come from the entrepreneur or members of the extended family rather than an institution; and the operators rely on friends and personal expertise in the case of business plans and advertisement because the traders rarely engage institutional experts. Many firms in the informal sector do not grow due to the small size nature of their activities, makeshift structures, reliance on unskilled labour, lack of security, poor infrastructure, lack of access to credit and unfavourable regulatory framework (Atieno, 2006).

Bocquier (2005) divides informal sector into two, namely, the upper tier and lower tier informal sectors. Employees of the upper tier sub-sector have their salaries recorded in a logbook or other forms such as, payment voucher or a receipt; and even though the law protection is weak for this group, they can resort to the law if the need arises, but they do not have any heath, retirement or other benefits. Employees of the lower tier category do not have salary records kept, therefore, cannot resort to the law if aggrieved. The sector is crucial to the Kenyan economy, as it contributes to GDP, creates employment and value addition in manufacturing; because of low capital requirements in business start-up, it has the potential of reducing poverty (Kenya Economic Report, 2009). However, little quantitative information exists as to the effects of the informal sector, specifically, the lower sub-sector on the economy.

A summary of the urban informal sector climate analysis in Kenya asserts that informal employment contributes to approximately 34% of GNP in the country, and is increasing ten times that of the formal economy at just over 16% (World Bank, 2006). The report further states that informal firms do not bear the costs of regulations associated with labour, customs, safety, consumer protection or other regulations which can be significant. The sector accounts for 87% of all new jobs and 77% of the total number of employees (Kenya Economic Report, 2009). According to Bocquier (2005) many labour economists see the informal sector growth in Africa as a logical sequence of the economic downturn the continent is facing since the structural adjustment programs (SAPs). He further states that the impact of these programs on public employment sector in is clear, but not on the private sector, in particular the informal sector where there are no answers from available sources.

Atieno (2006) asserts that the ongoing reforms in the public sector, specifically retrenchment, and restrictive government employment have reduced formal sector employment, and thus making the informal sector an important source of livelihood for the majority of Kenyans. However, Bocquier (2005) argues that despite the economic crisis in Kenya, there has been no direct transfer of employment from the formal to informal enterprises, but rather, there has been informalization of the formal sector, as more formal enterprises are informally contracting employees. He further notes that retrenchment has had marginal effects on the labour market as it mainly concerns older employees who form a smaller part of informal labour force. There exists a strong symbolic linkage between the formal and informal sectors, with people switching between the two, even in one working day, e.g., professionals in the formal sector operating MSEs in the informal sector (Macharia, 2007). Mitullah (2006) notes that majority of workers in the informal sector are transitory and operate across the formal and informal economy, which contradicts the view by many reports (see e.g., KENYA ECONOMIC REPORT, 2009) that the sector has a high mortality rate.

According to Bigsten et al (2004), there are no significant productivity differences between informal and formal African firms in Kenya; therefore, this has led to weak incentives for African informal firms. However, higher investments and larger exports are needed in order for Kenya to achieve economic take-off through an efficient formal sector. They suggest that policies in Kenya should aim at integrating the formal and informal sectors by improving infrastructure, capacity building, credit delivery and supporting networks. One of the policy

interventions in Kenya is to increase the number of formally registered MSEs to 25% per annum (Kenya Economic Report, 2009). Mitullah (2006) argues that the concept of informal sector needs to be re-examined given that the majority of the population in Kenya as in many other African countries, survives on the informal sector. Further, there is nothing informal about the sector; what is lacking is an enabling environment required to facilitate those operating within the sector to move to a high level of formality, the so called formal sector.

According to the Kenya Economic Report (2009) the informal sector faces the following challenges: a) harassment by local authorities; b) a large proportion of survivalist enterprises and weak growth; c) poor quality of jobs due to informality of activities undertaken in the sector, low value activities and productivity; d) high mortality rates, whereby almost half of MSEs die within the first three years of business start-up; e) slow rate of capital formation and little investment in the manufacturing firms; f) saturated markets and stiff competition from cheap imports from countries such as South Africa, Egypt, China, Taiwan and Singapore; g) loss of intellectual property when inventions fall in the hands of foreigners who go ahead to claim intellectual property rights; and h) little coordination among different government agencies with MSE-related responsibilities. Most MSEs operate on premises that are not set aside for trade and are not provided with infrastructure and services. For example, they lack access roads, adequate power, water, sanitation and waste disposal and lack of storage facilities (Mitullah, 2006). Under the Vision 2030, the Kenyan government aims at a considerable shift in the manner in which Kenya deploys her resources to acquire the necessary capacity and access to infrastructure services such as, energy, water, and sewerage by firms and citizens in their wealth creation efforts (The Government of Kenya, 2007).

2.2 Informal Sector in Nairobi

Mitullah (2003) argues that the livelihood of most inhabitants of Nairobi comes from the informal economic activities. Bocquier (2005) contradicts this view by arguing that Nairobi remains one of the most formal urban labour markets in Sub-Saharan Africa, excluding South Africa, and that most urban income comes from the formal sector. It should be noted that Bocquier uses data only up to 1999, many changes have taken place since then, for example, increase in unemployment due to downsizing in organizations. According to Macharia (2007) there exists a conflict for urban space in Nairobi between the informal economy representing the working class, and the formal economy belonging to those who own the means of

production. The formal sector is recognized by the state and therefore, continues to yield privileges and preferences that the informal sector cannot afford to take for granted, and has had to fight for recognition as a sector that is making positive contribution to the economy. Mitullah (2006) notes that many attempts at addressing the informal sector have tried to formalize the sector, and therefore failed to recognize the fact that those operating within the sector have their own dynamics that require policy, legal, infrastructure and service support.

Macharia (2007) argues that it is important to note that among the traders in the informal sector, there are individuals who are well-off economically, mostly professionals and civil servants who have businesses in the informal sector, or entrepreneurs who have been forced by a changing political climate to exit the formal sector. Despite its limitations, the informal sector has become increasingly important in the Kenyan economy as a source of employment and income (Atieno, 2006). According to Kamunyori (2007) the informal sector activities in Nairobi, such as street vending provide nourishment for urban families and contribute substantially to the economy, and therefore, it is necessary to understand how the local government, formal businesses and street vendors can work together.

A study by Muraya (2006) on small-scale enterprises in the neighbourhoods in Nairobi revealed that government interventions and donor funds enable these enterprises to attain their potential. However, there were biases in support; more assistance was provided to enterprises located in neighbourhoods that had security of tenure and open space for development. Nevertheless, the study demonstrated that installation of basic infrastructure and elimination of rigid regulations and threat of demolition of business structures, improves the performance of the firms. According to Mitullah (2003) the creation of jobs within the informal sector in Nairobi is not necessarily dependent on direct public expenditure and commitment of public investment in advance, and despite the growth of the sector, unemployment is particularly widespread among young urban dwellers. Many of the operators in the informal sector in Nairobi argue that the Government should not stop citizens from undertaking productive activities simply because they are operating in the informal sector. Nonetheless it should assist this sector and enhance its ability to help the overall poverty alleviation effort (Macharia, 2007). There are concerns by the High Commission on Legal Empowerment for the poor on how entrepreneurial innovations and creativity can be channelled into the creation of decent jobs within the informal sector Mitullah (2006).

2.3 Key ICT Issues in the Informal Sector

The study by Opiyo and K'Akumu (2006) on ICTs in the informal sector in Nairobi concluded that ICTs provided in the informal sector should be the ones demanded by the entrepreneurs and that they should be located strategically for optimal utilization, so as to avoid loss of man hours by operators searching for services. They further recommend that a special focus of the ICT strategy should be to demystify and promote diffusion of ICT as a general-purpose technology to the informal sector. According to Moyi (2003) entrepreneurs in the informal sector in Nairobi perceive further marginalization by more modern technologies in addition to traditional factors that have marginalized the MSE sector.

It should be noted that as mentioned in chapter one, the technology that most studies refer to as ICTs in the informal sector is the internet and the computer system. However, Banks (2008) argues that many books do not touch on informal sector development growth made possible by the use of mobile phones, as the phone has made African entrepreneurs to start finding their way in the changing economy without having to rely on donor agencies. He further states that as many people become connected, future studies of Sub-Saharan Africa and its economies will find it harder to ignore the growing influence of mobile technology and the power and spirit of African entrepreneurs to capitalize on it by growing an efficient economy.

According to the entrepreneurial programming and research on mobile phones (EPROM) report of 2009, Africa, with Kenya on its forefront, is currently the fastest growing mobile phone market in the world. A new report by Communication Commission of Kenya (CCK) says that the number of mobile phone subscribers went up by 34% to 17.4 million at the quarter ending June 2009 as compared to 12.9 million subscribers as of June 2008 (Government of Kenya, 2009). There are four licensed mobile phone operators in the Kenyan market, namely, Safaricom, Zain, Telkom's Orange and Essar's Yu. A research by Synovate/Steadman Group for FinAcess, 2009 said that 47.5% of all Kenyans had mobile phones, with the rate rising to 72.8% in urban areas, and 80.4% in Nairobi. 37.1% among those having mobile phones send airtime or credit to other users, while 43.1% send text messages and 17.9% used phones for money transfers. The boom of mobile phones in Kenya is credited with the creation of new jobs in the informal sector; it has been said that an additional ten mobile phones per a 100 people increases a developing countries GDP by 0.6

percent (EPROM, 2009). The Kenyan Economic report of 2009 notes that in 2006, there were 18.47 mobile phone subscribers to every 100 inhabitants compared to 7.89 internet users per 100 inhabitants.

2.4 E-commerce Diffusion

According to Duncombe et al. (2006) there are many small and micro enterprises in developing countries, and more than 90% of all firms in developing countries are micro and small enterprises and contribute 80-90% of all employment. They are also significant in wealth creation; therefore, MSEs in developing countries need to compete more effectively in order for them to further boost domestic economic activity and contribute toward increasing export earnings. Mobile phones in Kenya are being used for e-commerce in the informal sector and they are capable of being utilized for international trading and payments. Small business internet commerce (e-commerce) is defined as "the use of internet technology and applications to support business activities of small firms (Poon, 2002). Third generation (3Gs) that are in currently on the Kenyan market can connect MSEs to the internet. Research needs to be done in order for one to conclusively say that the phones have been adopted by MSEs in Kenya and they are being used for e-commerce.

Studies by Al-Qirim (2003), Al-Qirim and Corbitt (2002) revealed that organization size emerged as a strong motivator for e-commerce adoption. Large MSEs are more capable of adapting e-commerce technologies than small MSEs (Al-Qirim and Corbit, 2004). Tigre (2003) supports this theory by saying that in Brazil, small firms face more barriers in adopting e-commerce than large ones, and one of the reasons given is that customers of small businesses do not use ICTs as much as the ones of large firms. Evidence shows that large firms as opposed to small firms are able to visualize e-commerce increasing the number of distribution channels (Tigre, 2003). The above arguments are clearly based on the internet. In contrast, this study discovered that mobile phones in Kenya constitute the technology that is enabling micro businesses to participate in e-commerce, and to improve their performance.

Limited human resource means either fewer available employees or employees without appropriate skills (Al-Qirim and Corbitt, 2004). However, a survey done by Tigre (2003) revealed that 70% of Brazilian MSEs already had a website, and used the internet as much as large firms for applications such as advertising, marketing and online purchasing. However,

in Kenya, the majority of small businesses are using mobile phones for business transactions (Mittulah and Odek, 2002). Small firms normally pay lower wages and according to Tigres (2003), finding staff with e-commerce expertise is a problem affecting firms that traditionally pay low salaries and are less innovative. Zhu et al. (2002) support this hypothesis by noting that firms with higher levels of competence, mainly large firms, are indeed more likely to adopt e-commerce. According to CSK (2003) wages in Kenya are generally low and this extends to the ICT sector, therefore, diffusion of internet-based e-commerce is likely to be low there. The expertise being referred to by the above authors is in computer technology. A person does not require expensive training to be able to use a mobile phone for business transactions. It was illustrated in chapter one that all the models of e-commerce, e.g., B2B, C2B and B2C apply to the usage of the mobile phone, and that is happening in the MSE sub-sector in Kenya without much training. For example, if an operator calls a customer using a mobile phone, that is B2C.

Poon and Swatman (1997) found that MSEs did not use the internet strategically to gain a competitive advantage. According to them, this could be because of the different perceptions about e-commerce advantages. Most MSEs did not anticipate real benefits (direct sales and tangible profits) in the short term due to difficulties in selling their products over the net. This is supported by D'Cruz and Hussain (2001) who state that in Ukraine, most MSEs are yet to realize significant benefit from internet-based e-commerce adoption, meaning that larger competitors still have an advantage. MSE in Kenya have benefited from mobile-based e-commerce as this study and others in this thesis have shown. According to the Centre for Research on Information Technology and Organizations (CRITO) (2002), online sales are the least diffused, especially in small manufacturing firms. The three barriers given are: selling online involves obstacles concerning privacy and security issues that require permanent investments in data security solutions; most customers do not use the internet for buying, especially the final user; online sales require organizational changes and integration with internal systems. As mentioned earlier on in this section, studies need to be done in order to ascertain if 3G phones have diffused into the Kenyan informal sector, and to find out if the mobile users are facing the same problems mentioned by CRITO.

Jutla (2004) notes that in order for e-commerce to enable their MSEs, governments around the world must build support infrastructure for e-commerce since a significant percentage of

economic growth in most countries come from the small and medium sized enterprises. In Canada, 60% of economic output comes from MSE sector, which is also responsible for 80% of national employment, and offers 85% of new jobs (McClean et al., 2003). The infrastructure required for mobile usage in e-commerce is already in place in Kenya, and this is the reason why the phones are being used in the sub-sector.

Internet-based e-commerce diffusion is problematic even in developing countries. MacGregor & Vrazalic (2000) note that new research results show that regional MSEs in developed countries have low e-commerce adoption rates, and that strategic allowance by MSEs play a key role in overcoming the low adoption rate. Even in USA and UK, only large firms can afford to invest in e-commerce. Ruikar (2006) cites an example of a survey on the construction industry in UK which predicted that 50% of businesses in the industry would be based on e-commerce, yet three years later this prediction was lowered to 22. When the internet was first introduced in Japan, it imitated what was happening in the USA. Gradually, they incorporated the internet in their daily lives and created a unique model that works in their culture. The model was based on mobile phones, internet and multimedia kiosks (Fitzsimmons and Okada, 2002).

Oyelaran-Oyeyinka and Lal (2006) analyzed the role of institutional infrastructural and collective learning in adoption of new technologies in clusters in Kenya and Ghana which were mainly dominated by micro and small enterprises. The findings of the study suggested that policy measures should be taken by governments in developing countries to improve the performance of MSEs. Kinyanjui and McCormick (2002) focused their studies on B2B commerce in the garment industry in Kenya. The employment size of the firms ranged from 40 to 2500. The results showed that at the time of the study, e-commerce was not firmly established in the sector. They concluded that despite the many assertions about the benefits of B2B commerce in developing countries, the empirical evidence did not support this, as there was evidence of continuation of the many traditional trading practices that rely on personal contacts. Studies need to be carried in Kenya to establish the extent to which medium and small enterprises are using mobile phones for e-commerce. The findings mentioned in this thesis are mainly on micro and small enterprises. Small and medium enterprises can afford to use computers and the internet, and therefore, it is not clear if they have adopted mobile phones or not, but it would be safe to assume that they have, since many

organizations in Kenya are communicating to customers via mobile phones, for example, the banking industry.

Empirical findings of a paper that assesses the use of ICTs and their impact on economic performance of small and medium scale enterprises of Kenya, Uganda and Tanzania by Chowdhury, and Wolf, (2003) suggested that investment in ICT has a negative impact on labour productivity and a positive impact on general market expansion. They also discovered that such investment did not have any significant impact on enterprise return, nor does it determine enterprise export. They recommended for further investigations to reveal the complementary factors that impact on links between ICTs and MSEs performance. Matambalya and Wolf (2001) studies on the role of ICT for performance of MSEs had also discovered that ICTs had a negative impact on productivity; however, the use of fax machines that gave a manager access to formal information had a significant positive relationship with productivity in both countries. The mobile phone has been found to improve the performance of MSEs (Donner and Escabori, 2009), and investing in a mobile phone is not a constraint to small business owners.

2.5 Mobile phone and Entrepreneurship

There are several innovations and technical changes taking place within the informal sector in Nairobi because of the usage of mobile phones for e-commerce. According to Shane et al. (2003) entrepreneurship drives innovation and technical change and therefore, generates economic growth. Furthermore, entrepreneurship is a process whereby new knowledge is converted into products and services. Once a toy for the rich, mobile phones have evolved in a few short years to become tools of economic empowerment for the world's poorest people. They compensate for inadequate infrastructure, such as bad roads and slow postal services by allowing information to move more freely, making markets efficient and accelerating entrepreneurship. Further, this has direct impact on economic growth; more than 4 billion handsets are now in use worldwide and three-quarters of them are in the developing world (The Economist, 2009).

A study done by Wawire and Nafukho (2010) on the management of women groups' MSEs in Kakamega district, did not investigate the usage of mobile phones in e-commerce while computers which are not popular with MSEs were explored. According to Mwaura (2009) micro

enterprises in Kenya use mobile phones for both business and social purposes; which has increased profits in business and enhanced social networks. A study carried out by Frempong (2009) on the contribution of mobile phones on MSEs in Ghana discovered that mobile phone usage had an impact on the ease of contact with customers and suppliers. The mobile also reduces transport costs and increases profitability of a firm. He further suggests that there was an urgent need for the development of innovative services to meet the challenging needs of the enterprise.

There are several innovations in mobile telephony that are assisting MSEs in the informal sector. For example, the introduction of mobile phone money transfers is transforming the informal sector in Kenya. Majority of the Kenyan population does not have banking accounts. Therefore the introduction of mobile phone banking services such as M-Pesa and ZAP, provide an e-commerce platform whereby the mobile assists operators in the informal sector to complete simple financial transactions since many poor people in Kenya possess mobile phones (Mwaura, 2009). Across the developing world, there are corner shops whereby people buy vouchers to top up their airtime, mobile-money services also allow these small retailers to act like bank branches. They can take your cash, and (by sending a special kind of text message) credit it to a mobile-money account. Money can then be transferred (again, via text message) to other registered users, who can withdraw it by visiting their own local corner shops. Money can even be sent to people who are not registered users; they receive a text message with a code that can be redeemed for cash (The Economist, 2009).

Mobile phone banking in Kenya has demonstrated that where the formal sector fails the poor and the marginalized, technological innovations can come to their rescue in very successful ways (Warah, 2009). EPROM (2009) cites community payphones as another unique innovation in developing countries. Entrepreneurs own payphones for which they buy airtime from mobile phone subscribers and consequently sell services to local people who do not own phones; in Kenya as reported by Communication Council of Kenya (CCK), 5000 community phones had been established by the end of 2004. In Kenyan slums and villages where electricity supply is either non-existent or erratic, phone charging MSEs have sprung up whereby entrepreneurs allow mobile phone users to charge their phone at a small fee while they wait (Warah, 2009).

The results of a study carried out by Mwangi (2006), on the impact of mobile phone technologies on MSE/Jua Kali showed that mobile phones are perceived as tools used to mediate activities of

micro-entrepreneurs. The study further concluded that mobile phones in urban settings are used to enhance business, while in rural areas; they are mainly used for social networking and communication. However, EPROM (2009) argue that the Kenyan Agriculture Commodity Exchange (KACE) provides growers in rural areas with up-to-date commodity information via short message services (SMS) which allows farmers to access daily fruits and vegetable prices from dozens of markets. This has greatly increased the earnings of farmers as they have access to information about potential buyers and prices before making trips to urban centres to sell their produce. In Africa, bad roads, poor communication infrastructure, lack of electricity, rigid rules for formal banking and endemic poverty may have hampered economic growth and development, but mobile phones have provided partial solutions where none existed previously (Warah, 2009).

In contrast to the developed world, mobile phones in the informal sector are used for a wide variety of tasks, from sending money to family members to buying goods from the market. Further, Kenyan business persons and farmers and labourers are finding new uses for the mobile phone, thought of by the west as a tool for voice communication; and are coming up with innovative methods of solving their own problems. For example, contract workers such as casual workers at building sites can now give potential employers their mobile numbers instead of making long trips to the construction site only to find out that no work is available on that particular day (EPROM, 2009). According to Donner and Escabori (2009), there is significant potential for a mobile phone to increase productivity of MSEs. However, current supporting evidence is scarce, methodologically heterogeneous, and economically unreliable. For example, there is a difference between using a mobile phone to checkout market situations and using it to by-pass middlemen. It is thus important to rigorously examine patterns of mobile use by MSEs. Mobile phone business has had a great impact on employment in the informal sector; however, documentation of this evidence in the literature is rare. For example, the Ugandan Communications Commission noted that while the formal ICT industry in the country employed a little over 6,000 people in 2007, informal sector employment in was estimated at 350,000 people (Warah, 2009), but the role of ICTs in creation of this remains largely unexplored.

CHAPTER THREE: LITERATURE REVIEW

3.1 Entrepreneurship

Entrepreneurship is a complex subject of study since its characteristics, dynamics, determinants and manifestations differ across regions and countries. According to Desai (2009) developing countries directly or indirectly categorize entrepreneurial activities into: a) formal/informal – the distinction between formal and informal entrepreneurs is determined by registration status and not by the nature of business; b) legal/illegal – the separation of activities that are legal and illegal is a source of confusion in the research on entrepreneurship. "Legal" applies to activities that are permitted, while illegal entrepreneurs engage in illegal activities, such as selling goods in prohibited areas. Entrepreneurs may be legal with registered firms while their activities are illegal. For example, an entrepreneur in a registered office lending money at above market interest rates to borrowers without access to, or official banking system; and c) necessity/opportunity – necessity entrepreneurs engage in entrepreneurship to avoid unemployment, whereas opportunity entrepreneurs pursue a recognized opportunity for profit. Developing countries have a high rate of entrepreneurs as compared to developed economies.

Classic literature describes an entrepreneur as: a) the prime mover of economic development (Schumpeter, 1934); b) persons with high need of achievement (McClelland, 1961); c) owners of factors of production (Say, 1971); d) people alert to profit opportunities (Kirzner, 1985); e) persons who bear consequences of making decisions under conditions of uncertainty (Knight, 1971); f) people who always search for change , respond to it and exploit it as an opportunity (Drucker, 1994): and g) an individual with the ability to deal with disequilibria (Schultz, 1980). He further states that education is a major determinant of entrepreneurship. Nonetheless, Jennings (1994), states that it is not necessary to define entrepreneurship since the field of entrepreneurship needs multiple paradigms that are different because entrepreneurship research serves a variety of purpose. However, this research is mostly informed by the Schumpeterian school of thought which places an entrepreneur in the centre of technological change and economical development, Drucker (1985) who states that innovation is finding a new and better way of doing things and Kirzner (1985) who asserts that an entrepreneur is alert to business opportunities.

Schumpeter (1934) says that an entrepreneur is someone who is innovative and creative and innovation occurs when the person introduces a new product, new product methods, new markets and new organizations. Drucker (1985) outlines five principles that can help an entrepreneur to take advantage of a new innovation. First, one has to analyze of the opportunity at hand. Second, evaluate the opportunity to see if people are interested in using the invention. Third, the innovation must be simple and clearly focused on specific needs in order for it to be effective. Fourth, effective innovations start small and appeal to limited market. The product or service should require little money and a few people to produce and sell it. As the market grows the organization has to improve on the processes in order to be competitive. Finally, the entrepreneur should aim at market leadership right from the start. Kirzner's entrepreneur is very similar to the one found in the informal sector. He does not require capital, but sees an opportunity, in this case the usage of mobile, exploits the opportunity quickly ahead of other people and uses it for economic gains, thus improving the performance of an enterprise. An entrepreneur in this study is a person using information and communication technologies (ICTs), in this case mobile phones, to transact business. Specifically, using Shane and Ventakatraman's (2000) definition, an entrepreneur is a person who seizes the opportunity presented by mobile phones, and exploits their potential to improve the performance of the business.

3.2 Information Communication Technologies (ICTs)

Electronic commerce (e-commerce) is one of the applications of Information Communication Technologies (ICTs). According to Kashorda and Wagacha (2007), ICTs is the convergence of computing (software and hardware), telecommunications (wireless, fixed lines, internet), and broadcasting. This convergence is here with us in Kenya and all over the world. Some of the applications of ICTs are: - mobile phone short messaging services (SMS) applications in banking, i.e. m-banking, database inquiry by mobile phones, for example, Kenya Power bill inquiry; Internet radio, mobile phone money transfer, internet television and voice over internet protocol (VoIP). Mobile phone is the most popular ICT used among small businesses (Economic Forum, 2005). A study by Mitullah and Odek (2002) which was based on the internet discovered that a significant number of MSEs in Kenya are ignorant of ICTs and are unaware of their importance in conducting business, even in this era of globalization. Four critical issues which were likely to pose challenges to the successful utilization of ICTs as

documented by Mitullah and Waema, (2005) are: a) ICT human capacity constraint, that is, the human technical and managerial capacity was inadequate; b) change management strategy - the capacity to manage the change needed for e-governance was lacking; c) funding - the amount of resources required for the change was huge, yet the resources allocated were negligible; and d) access to ICT - this posed a lot of challenges among the urban poor and rural and remote areas where the majority of the population lives These findings are based on the internet and may not apply to the use of mobile phones.

3.2.1 Concept of E-commerce

Electronic commerce or e-commerce is a term used to describe all commercial and related commercial activities facilitated through the use of information technology and network technologies such as internet, extranet and intranets and mobile phones, i.e. ICTs. E-commerce refers generally to all forms of electronic transactions relating to commercial activities by organizations and individuals that are based upon the processing and transmission of digitized data, including, text, sound and visual images (OECD, 1997). E-commerce involves sales of goods and services over wired and wireless networks, by businesses, individuals, governments or other organizations and it builds on traditional commerce, adding the flexibility and speed offered by electronic communications (Duncombe et al., 2006). Second generation (2G) and third generation (3G) mobile phones, which are widely available on the Kenyan market all transmit digitized data over wireless networks and are used for commercial activities in the informal sector of Nairobi.

According to O'Brien (2002) and Dewan (2001), in today's business processes, e-commerce has a variety of applications that can be grouped into five categories. The first category is business to business (B2B) which is direct market links between businesses for example, Intel Company selling computer chips to other businesses. A company selling photocopiers is also likely to be engaged in B2B e-commerce or a manufacturer selling goods to a retail store is also practicing e-commerce. The second category is business to consumer (B2C) and it deals with retailing to customers using electronic methods. Products or services are sold from a firm to an individual rather than to another firm. The customer volume of transactions is low, but the number of customers serviced is large, therefore, a lot of advertisement is required. The third category which is consumer to consumer (C2C) does not form a very high portion of web-based commerce. It brings together consumers especially in auctions or matrimonial

sites. This category usually involves a third party, for example, a university having a website where students would sell old books and other items to other students. It depends a lot on many people visiting the site.

The fourth category which is business to Government (B2G) on the other hand recognizes that public procurement, trade procedures and customers require direct link between companies and the government processes to facilitate business activities. Most of the transactions are non-commercial online interactions between local and central government and the commercial business sector. Some transactions could also be from government to private individuals (G2C). The final category is consumer to business (C2B) is the type of e-commerce where the consumer places an estimate of the amount of money he is willing to spend on a particular service and businesses can respond with an offer to the customer. An example is airlines or hotels that can offer services within a customer's specified limit. It should be noted that all of the above models of e-commerce are based on internet use, but the same applies to the usage of mobile phones. For example, when a customer uses a mobile phone to order an item from a manufacturer, the person is practising C2B e-commerce.

3.2.2 Benefits of E-Commerce

According to the UNCTAD report of 2002, e-commerce does not cure the ills of an economy instantly; therefore, there should be no excessive expectations of what it can do to facilitate development. Lack of awareness is often the reason why some doubt the relevance of e-commerce or ICT in the developing countries. The report also states that the importance of ICT for development does not necessarily lie in the size of the ICT sector, but in the diffusion of these technologies to enable people and organizations in a society to work more efficiently and effectively. Levels of productivity in developing countries are very low, and therefore, the adoption of ICT and e-commerce can assist these countries to immensely, improve labour productivity (UNCTAD, 2002). The report was published when first generation (1G) mobile phones that used analogue technology were on the Kenyan market and out of reach for many people in the informal sector, but by the time of this study, the price of phones has gone down tremendously and many poor people can afford phones that can be used for many e-commerce transactions.

Gibbs, et al (2003) studied the adoption of e-commerce in ten countries, some of which were, Brazil, Denmark, France, Mexico, Singapore, Taiwan and South Korea. The article was based on case studies from these countries. Their findings show that in Denmark, instead of a production-led approach, aimed at stimulating domestic software and hardware production, the country pursued a demand-oriented approach focused on promoting the wide spread of e-commerce in the Danish society. In South Korea, the matching of supply and demand is the most important factor in the fast diffusion of broadband. The fierce infrastructure in competition South Korea led to quality services at a low fixed price. In Mexico, the actual extent of e-commerce use was low, hindered by low income levels of most households in Mexico, and the majority of businesses were very small, lacking resources to invest in computers. In addition, firms lacked the business culture to go online. With the diffusion of mobile phones in Kenya, the necessary hardware that is accessed by users is the handset, while service providers, young people and organizations are coming up with software that is tailored to local applications. For example, mobile banking, utility bill enquiry, voter register enquiries, price enquiries for farmers, sharing of airtime, borrowing of airtime and money transfer services. The broad bandwidth cables are in the process of being laid out in the whole country, there is rural electrification for areas that initially did not have electricity. The phones are affordable to many people and the fierce competition among mobile phone subscribers has reduced airtime charges tremendously.

Gibbs et al. (2003) also found that although Taiwan is one of the world's leading producers of information products, it lagged behind advanced countries in the application of ICTs. In France, many internet-based business models did not fit the French distribution channels. These findings show that e-commerce development paths can be differentiated among nations, because both needs and solutions differ according to uniqueness of countries. Brazil's highly uneven income distribution was a major barrier to B2C e-commerce diffusion. Government policy initiatives in liberalizing the telecommunications service sector and in promotion of technology entrepreneurship was slow in Singapore and this was affecting B2C commerce. Although Kenya does not manufacture mobile phones, their application is high and the phone is used by both the rich and the poor, and the telecommunication sector has been liberalized, whereby, in addition to Telekom, there is Safaricom, Zain and Yu.

Gibbs et al.(2003) further concluded that B2B is driven by global competition that push e-commerce to their global suppliers, while, B2C is pulled by consumer markets which are mainly local, and therefore, divergent. That is, while all consumers desire convenience and low prices, consumer preferences and values, national culture and distribution systems differ across regions and cause differences in local consumer markets. Enabling policies, such as trade and communications liberalization have the biggest impact on e-commerce by having ICT and internet access more affordable to firms and consumers. Mechanisms that ensure greater confidence in doing business electronically were necessary to protect both buyers and sellers. Specific e-commerce legislation did not seem to have a major impact on firms' abilities to go online.

The acceleration of economic growth that ICTs can bring about (especially through the adoption of e-business practices) will probably result in a more immediate and self-sustainable contribution to the reduction of poverty. An encouraging factor in this regard is that ICTs, e.g., mobile phones, seem to be spreading in the developing countries faster than was the case in previous technological revolutions. E-commerce gives small and medium-sized enterprises (MSEs) the ability to access distant markets at low costs (UNCTAD, 2002). The mobile phone can be used by both retailers and individuals to access distant markets; for example, a picture of a vehicle being sold in Japan can be transmitted on a cheap handset in Kenya. Many phones are fitted with multimedia messaging services (MMS) that enable one to send or receive pictures or videos, which can also be downloaded on a computer using the Bluetooth protocol which is available on many handsets and computers. Note that both the computer and the handset have to have the Bluetooth for transmission to take place.

E-commerce is beneficial to business and society in general (Retrieved November 11, 2007, from www.deed.state.mn.us/community/erg/index.htm) because it extents markets reach around the globe as it erases geographical boundaries, a community can effectively and efficiently be reached for both purchasing and selling of goods and services around the globe. E-commerce also increases convenience choice, consumers can specify preferences; individuals and businesses, can locate and purchase goods and services twenty-four hours a day, seven days a week; informed decision making is facilitated through numerous online resources; comparison shop and testing of products and services is also possible. It generates new business opportunities as it is a twenty first economic development tool. The explosive

growth of information networks and increasing consumer confidence in technology open the door for today's commercial pioneers to develop new businesses. To a large extent, these businesses capitalize on the array of information available through networks and the new levels of interactions they create both locally and internationally. E-commerce enhances competition and reduces prices, it is a greater leveller, it allows businesses, small and large to compete on a common playing field; information is made available to consumers which leads to more competition, better quality products and services as well as reduces prices; there is an opportunity for free information or questions by customer service online. It also creates new markets efficiencies by offering opportunities for users to benefit from new market opportunities; this is because of the information provided online. E-commerce enables employees to work from home and remote places. They do not need to physically be in the work place; and consumers also do not need to be at the selling point. E-commerce creates a virtual market by making trading over networks possible. The internet can be accessed using very cheap phones on the Kenyan markets. Many social network websites, for example Facebook, Twitter and Youtube are popular with the youth in Kenya and are accessed with mobile phones. A lot of virtual business transactions such as promotion and virtual social discussions take place among the participants.

3.2.3 The concept of E-commerce Readiness

E-readiness is the degree to which a community is prepared to participate in the networked world (Kashorda and Wagacha, 2007). E-commerce readiness is the extent of preparedness of a sector, firm or country to participate in electronic commerce or to trade electronically. Countries are usually at very different starting positions in the task of building infrastructure that would develop and support e-commerce readiness and applications. The uniqueness of the internet, together with different environment and policy influences, results in characteristics that are shaping e-commerce diffusion paths among countries and regions. Identification of what is unique and what is common among countries is an essential tool for understanding world e-business diffusion (Tigre, 2003). Several researchers and institutions use different indicators and theories to measure e-commerce readiness of a firm, country or a society. Cellular networks are widely spread in Kenya. Although some areas still experience network problems, this is being improved on. A mobile phone is the most affordable ICT for e-commerce in Kenya and has changed the ways of doing business.

3.3 Indicators of E-Commerce Readiness

According to Oxley and Yeung (2001), a systematic cross-country analysis of e-commerce activities reveals that physical infrastructure explains most of the variations in internet use; these activities also depend on a supportive institutional environment. The most important characteristic of such an environment is national respect for "rule of law", followed by the availability of credible payment channels such as credit cards or electronic money transfers. These indicate that an institutional environment that facilitates the building of transactional integrity is critical to the development of e-commerce. The institutional environment that guarantees a well functioning exchange system is critical for operations of e-commerce markets, just as it is for ordinary markets. There is need for policy makers to recognize that a new wave of markets is emerging, and these are the e-commerce markets. Mobile phones have made it possible for one to carry money on the handset and also transmit the money without one going through the expensive channels that were the preserve of commercial banks in Kenya. It should be noted that the money is stored on a server and therefore if one loses the handset, the money is safe. Cases of misplaced money are few and the service providers are able to reclaim most of the money that goes a stray for customers. It is not mandatory for all people having mobile phones to register, which makes it easy for one to trace the wrong recipient of the money

The Organization for Economic Co-operation and Development (OECD 2002), points out that e-commerce policy priority evolves with a country's transition through various phases of "e-commerce readiness". For most developing countries, getting the basic telecommunications infrastructure, competitive environment, and regulatory framework in place to support widespread and affordable internet access remains the highest priority. Telecoms privatization needs to be accompanied by expanded competition, not excessively generous exclusivity agreements. In important middle-income developing countries, government must address a further challenge: ensuring an e-commerce conducive, business environment. Some issues, like consumer protection, that are familiar even in cross-jurisdictional, and also, remote and anonymous transactions in a virtual environment complicate dispute resolution. Convergence of the internet, mobile phones and other communication technologies has enhanced e-commerce in the informal sector in Nairobi and the country at large. What needs to be researched is consumer protection and dispute resolution. The problems seem not to affect

the informal sector; the reason could be that although the operators are participating in virtual markets, they know the people they are selling or buying from, and therefore can make a follow up if a business transaction is not honoured.

The indicators of e-commerce readiness that come out clearly from Oxley & Young and the OECD studies are as follows: the quality of electronic and related infrastructure, competitive telecommunication service providers, affordability of internet, legislation for consumer protection, and credible payment channels such as credit cards.

3.3.1 The Indicators proposed by Information Technologies Industries (ITI) Council

The Information Technologies Industries Council has come up with six indicators of readiness for electronic commerce. The first is infrastructure and basic technology. Fundamental to all e-commerce is the infrastructure, that is, the physical wires (fixed lines, wireless, satellite cable TV, etc), and devices (ICTs, tools that are used to access the internet), that are necessary to provide all telecommunications. What users experience as e-commerce are applications that ride on top of the infrastructure, and depend on it to connect geographically separated participants in transactions. Part of the infrastructure is end-user devices, the information appliances, the customer-premises equipment that one interacts with when engaged in e-commerce. Undeniably, e-commerce would not exist without telecommunications infrastructure that telecommunications supports that therefore, enables e-commerce. The end user device is the mobile phone handset which uses wireless technology and satellite, but will soon be using fibre optic cables.

The second is the extent of access to necessary services; it states that a key issue for e-commerce readiness is the breadth, depth and scope of access to electronic commerce services, since access will have an enormous impact on the benefits that will accrue to an economy, its people and institutions. The degree of access provided by government and private sector policies will accelerate the benefits. Policies that provide transmission alternatives to businesses, institutional and individual users, in the form of cable, satellite or wireless solutions should be developed and implemented. The level and type of use of the internet is the other indicator mentioned by the council. It says that the number of internet users in both developing and developed countries has grown explosively over the years, since the 1980s. Although individual users capture the public imagination, the real story of the

internet and e-commerce lies in the business usage; most users use the internet mainly for sending e-mail or browsing, but not conducting businesses. Governments world wide, Kenya included, are integrating the internet and information technology into their operations to streamline, transform, and improve both business and administrative activities and interactions with the citizens. Mobile phones that are not internet enabled can still be used for e-commerce since transactions take place electronically.

The fourth indicator is the extent of promotion and facilitation activities; the internet provides much of the platform for e-commerce; however, e-commerce is more than the internet, and the explosion of a select of demographic group of web surfers will in itself not automatically create the economic benefits of e-commerce. Small and medium sized businesses, given their limited resources, will often need additional support to transform their businesses with e-commerce. Skills and human resources are also taken to be important readiness indicators for e-commerce. E-commerce can be applied with competitive effect in all sectors of the economy. Therefore, the requisite skills for the successful deployment of e-commerce, and the realization of its benefits, depend on the availability of necessary skills in all sectors. Although e-commerce is founded on information technology and telecommunications, the skills to support its deployment are not restricted to discipline in those fields. E-commerce is an application of these technologies, and a sector-specific business and process skills are required to complement technology skills. All that one needs to be able to participate in e-commerce are the handsets which are widely available in the country. Technological skills are not required for simple e-commerce applications like an operator in the informal sector calling a buyer or a client sending money to a firm. The instructions are very simple and can be mastered in a very short time. The service provider representatives are always at hand to assist those people who could be having problems. Using short message services (SMS) require some level of formal education since the text has to be typed on the handset.

Finally, it states that an e-policy environment is necessary for the adoption of e-commerce. There are significant policy challenges for government policy makers to optimally position their economies to compete in the global digital economy. Policy makers are best served to work with private sector to craft a policy environment that will encourage, rather than stifle, the growth and expansion of global e-commerce. The relevant issues to address in optimizing readiness include: (a) Tax – to help national and global e-commerce grow, governments

should coordinate their fiscal policies to ensure that electronic transactions are treated the same as paper-based transactions; (b) legal framework – a successful commercial transaction requires that the people involved know that a contract exists, what to do to enforce the contract and to know that there is trust between the involved parties; (c) electronic signatures – in contrast to handwritten signatures, a commitment is sealed here via imprint of electronic bits rather than pen and ink, and validation of such a signature requires means for detecting digital forgery techniques, and acceptance across countries; (d) security and encryption – to realize the opportunities made possible through e-commerce, consumers, businesses and governments must be confident that the financial and other sensitive information they exchange during electronic transactions is protected and safe, and that security products for this purpose are available; (e) copyright – since rights of creators need to be protected, a globally acceptable and effective copyright regime must be developed; (f) content– governments should encourage technology solutions that offer consumers a choice of tools to establish the critical balance between the flow of information and protection of other interests, such protection should reflect the internet's unique characteristics but not be too restrictive; (g) privacy – individuals will be reluctant to take full advantage of e-commerce unless they know how information is used or there is an option for one to opt out and seek redress, and also have a say in the nature and the scope of personal data protection in online transactions.

Many users of mobile phones in Kenya do not seem to be aware of the legal framework of using a mobile phone and it does not seem to effect their using the phone for business transactions. The mandatory registration of the subscribe identity module (SIM) card is what many people seem to know. Nonetheless the deadline had to be extended since less than half of the people with mobile phones had registered their SIM cards. The registration is supposed to be a security measure against some of the crimes committed by the use of mobile telephones

3.3.2 The Economist's Intelligence Unit Indicators

The Economist Intelligence Unit (2006) uses six categories to rank countries according to e-readiness. Each category has several indicators of readiness and each is given a weight. Connectivity and technological infrastructure is given a weight of 25%. Connectivity measures the access that individuals and businesses have to fixed and mobile telephone services, personal computers and the internet, security and reliability of internet services and

internet enabled transactions (secure socket layer (SSL) encrypted servers in the country) and wireless "hotspot" penetration, including the internet affordability (broadband penetration). Business environment has 20%. In evaluating the business environment, the Economist Intelligence Unit screened 70 areas covering criteria such as: the strength of the economy, political stability, the regulatory environment, taxation, competition policy, the labour market, the quality of the Infrastructure, and openness to trade and investment

Consumer and business adoption got a weight of 20%. This assesses how prevalent e-business practices are in a country, that is, what share of retail commerce is conducted online, to what extent is the internet used to overhaul and automate traditional business processes, and how are companies helped in this effort by the development of logistics and online payment systems, the availability of finance and government investment in ICT. The following indicators were used: national spending on ICTs as a proportion of GDP, level of e-business development, degree of online commerce, quality of logistics and delivery systems, and availability of corporate finance. Legal and policy environment was given 15%. According to the unit, e-business development depends both on a country's overall legal framework and specific laws governing the internet. How easy it is to register a new business, and how strong protection of private property, in particular intellectual property is. Governments that support the creation of an internet-conducive legal environment – both through policy and enforcement receive high scores. Those that are more concerned with censoring content and controlling the web score lower. The following indicators were used: overall political environment, policy toward private property, government vision regarding digital-age advances, government financial support of internet infrastructure projects, laws covering the Internet, level of censorship, and ease of registering a new business.

Many MSEs in the informal sector operate in unregistered premises except for the daily payment to City Council authorities, therefore using registration as an e-commerce readiness indicator would not yield any results. Moreover, using the mobile phone for business does not need one to be in registered businesses. Business can be conducted from home or in open air sites. The Kenyan government is very much aware of the digital-age as can be witnessed in the setting up of digital villages and fibre optic cable. The usage of mobile phones does not require all these preparations for simple e-commerce transactions. All that one requires is the

handset and airtime which are now available at affordable prices. The Governments interest in ICTs has contributed to this reduction.

Social and Cultural Environment is also considered to be important and was given a weight of 15%. Basic education (as measured here by mean years of schooling) and literacy are preconditions to being able to utilize the internet services. This category also considers a population's e-literacy, its experience in using the internet, its receptivity of it, and the technical skills workforce. E-business usually requires some amount of risk-taking and the fruits of risk-taking often culminate in the creation of intellectual property. Policy makers use e-business development as a catalyst for innovation. The indicators are as follows: educational level, internet/web use, degree of entrepreneurship, technical skills, and degree of innovation (Using the number of patents registered). Finally, supportive e-services were also included in the weighting and were given 5%. No business or industry can function efficiently without intermediaries and ancillary services to support it. For e-business, this includes consulting and IT services, and back-office solutions. There should also be industry-wide technology standards for platforms and programming languages. The following indicators were used: availability of e-business consulting and technical services, availability of back-office support, and industry-wide standards for platforms and programming language.

Basic education is important if one has to communicate via SMS or to perform other applications provided by the service providers, but voice communication does not need any education. There is free primary and secondary education in Kenya although due constraints, such as poverty and lack of schools not every citizen has taken advantage of this, Considering that mobile phones are electronic devices and they are many in the Kenyan economy and e-service support is easy to come by it would safe to say that the country was practicing e-business. It should be noted that mobile phones have enabled operators of MSEs to interact with large and small industries, such as the Government, Kenya power and the banks.

3.4 Models and Theories of E-Commerce Readiness

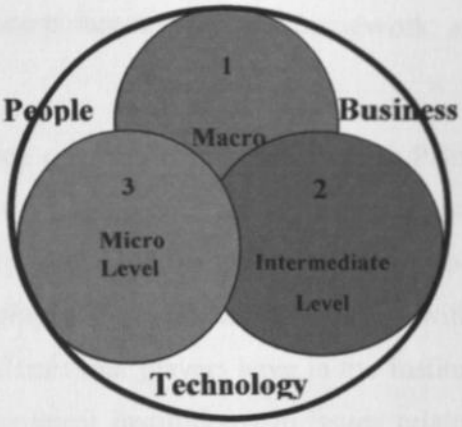
In this section, theories underlying e-commerce readiness and e-commerce transactions or markets are discussed. The theories and models help to explain why e-commerce activities are observed in some firms, sectors, or countries and not others.

3.4.1 Asian-Pacific Economic Cooperation (APEC) e-commerce assessment model

The APEC/e-commerce convention of 15th -16th May 2000 introduced an e-commerce assessment model to explain the readiness of e-commerce in a country or sector. The model has three components: people, technology and businesses. The model can be used to explain the emergence of e-commerce and the preparedness of e-commerce at three levels of society, namely, the macro, intermediate and micro levels.

At the macro level, which refers to the economy as a whole, telecommunication infrastructure include fibre optic, cabling & transmission, internet service providers, network backbone, servers, switches routers & relays, service and security. Institutional support includes: banks and financial institutions; security for credit card transactions, incubators (databases) and sponsors, regulatory and legislative bodies, control of fraud and misuse of information, educational establishments e.g. universities, colleges and training. The intermediate level comprises of the business community and the ICT industry. Corporate sponsors are needed to assist in the marketing of existing e-commerce MSE activities. B2B e-commerce is encouraged by cross positing, linking of businesses, marketing, data exchange, advertising and mailing lists. ICT vendors avail the hardware and software and they provide consultation and customized services where necessary, including installation and maintenance of the software and hardware. The micro level consists of individuals and firms. These are responsible for business reengineering & adjustments and for the formulation of strategies that encourage e-commerce. The firms are customer focused, and community based. Since e-commerce is dynamic, staff training and retraining is an important activity at this level. Individual firms manage their ICT and information resources, integrating the old and the new methods of doing business. Packaging of products and services for e-commerce are well understood and the web page contents of quality so that they are able to attract traffic which translates to customers. The people-technology-business model is depicted in figure 3.1

Figure 3.1: E-Commerce Assessment Model



Source: APEC/E-COMMERCE CONVENTION of 15th -16th May 2000

The model shows the people and businesses interact among themselves based on the state of technology available to facilitate e-commerce readiness in the economy. The telecommunication infrastructure and the institutions determine the extent of interactions. As already noted, this interaction takes place at different levels, namely, the macro, the intermediate, and the micro levels. Mobile phones fit very well in the e-commerce model since they ride on the platform of computer technology of which infrastructure is already in place. ICT polices have been formulated, the country has many banks and the mobile itself can also serve as a banks with money being saved on databases of service providers. The importance of education is reorganized by the authorities as can be witnessed by the many colleges and universities in the country. Mobile phones have moved the ICT industry to a high level, many people in the country including MSEs in the informal sector are using the phone for both business and social communication.

3.4.2 The Culture-Policy-Technology (CPT) Model

Bajaj and Leonard (2004) explain the roles of culture, policy and technology in promoting e-commerce readiness. They present a comprehensive model that can enable economies to facilitate e-commerce adoption by simultaneously addressing three issues fundamentally related to e-commerce readiness namely, the culture of e-players in the economy, the role of e-policies by the government in the economy, and the state of the ICT within the economy. The explanatory roles of these various dimensions are collectively referred to by Bajaj and

Leonard (2004) as the CPT (culture-policy-technology) framework, and these components of the model are detailed below.

As far as culture is concerned, they cite (Burns and Brady 1996; Palmer 2000) as saying that level of trust among players in an economy has been shown in numerous studies to affect the efficiencies of e-commerce. They further define trust along two sub-dimensions, that is, the level of expected reliability that players place on each transaction with one another within the economy and the overall level of trust that players have in the institutions of economy (such as banks, corporations, and government institutions) in issues related to remedies available when transactions fail. They also cite Endo (2001) as noting that transactions in developed economies usually perform as expected by both parties, since there is access to better redress, such as an efficient judiciary, efficient arbitration and reliable enforcement in the case of failed transactions. Culture does not seem to have any effect on the usage of mobile phones for e-commerce in the informal sector. The phone cuts across many cultures and the operators have trust in one another although this point needs to be investigated further to ascertain its validity.

Another aspect of culture cited by Bajaj and Leonard (2004) is the extent of corruption in the economy. This is also described along two dimensions: petty corruption, which is illegal payoffs related to micro transactions within the economy, and institutional corruption, which is illegal payoffs and nepotism at the level of social networks within the economy. It is widely accepted that petty corruption is much more rampant in developing countries than institutional corruption. They further state that many researchers concur with this observation, for example, Khera (2001) argues that many developing countries deliberately pay their officials low wages, with the expectation that many micro transactions that these officials participate in will result in illegal payoffs for them. According to the Bulletin of the Institute of Economic Affairs (IEA) (August, 2000), the long clearance process in the Kenyan port of Mombasa provides the opportunities for solicitation and extortion of bribes in the country. Ethnicity also plays a role in corruption.

Corruption remains one of the difficult areas in the process of Kenya's development. In recognition of this difficulty, Kenyan Anti-Corruption Authority (KACA) was formed, but while Kenyans readily appreciate its role, common consent has it that the organization tends to be cautious in the pursuit of the perceived perpetrators of grand corruption. On the other

hand, it must be understood that KACA operates under a statute that necessarily delimits the scope of its action (IEA 2000). Over the years, the Transparency International has been ranking Kenya among the most corrupt countries in the world as perceived by business people, the public and political analysts. A study by Esuha and Fletcher (2002) revealed that business owners with political links enjoy privileges, which are not easily available to an ordinary citizen in Kenya. Corruption was also cited as major barrier to business development in both Kenya and other African countries (Esuha and Fletcher, 2002). The usage of mobile phones in the informal sector does not seem to be affected by corruption. Grand corruption may affect operators indirectly because it affects the common good, but at firm level, the MSEs are busy trying to improve their livelihoods. Corruption might occur where one might bribe an authority to operate illegal businesses in the informal sector, but this does not affect the use of a mobile phone for e-commerce.

The third aspect of culture that Bajaj and Leonard (2004) analyze is the pattern of communication that exists within the nation. The elements of patterns of communications that they isolate are: the power distance (Hofstede, 2001) between members of an economy, and the richness of interpersonal communication usually accompanying each transaction. They proposed that cultures that have a greater power distance, i.e. greater hierarchy amongst members, would face greater difficulty when transacting on the Internet. For example, Asian and European cultures tend to be more hierarchical than the USA. Transactions on the internet will be harder to complete in such cultures where junior staff members might shy away from communicating with their seniors via the internet. In cultures with rich interpersonal communication (Lee, 2000), where face-to-face interactions consist of greater intensity of socializing, more verbal communication, more pronounced body language and greater time of communication, transactions on the internet often lead to leaner communication, thereby creating barriers to adoption. Kenya is a country with rich interpersonal communication, but this is not a barrier to the usage of mobile phones by MSEs in the informal sector. Resources saved both in time and money outweighs face-to-face interactions, especially, when ordering or making a follow up on goods and services. Many customers still come to the business to buy items; the mobile phone has not replaced this. Many businesses both in formal and informal sectors in Kenya mix e-commerce with face-to-face trading.

When it comes to policy, Bajaj and Leonard (2004) divide the effects of policy into two dimensions: the policies related to general trade in the economy and the policies enabling internet usage and commerce. Examples in the first category include policies related to copyright protection of intellectual rights, taxation regulations across different parts of the economy and legislation for breach of contract in civil lawsuits. Examples in the second category include tax breaks for telecommunications equipment costs and state spending to promote internet education and usage. Kenya is a member of most major international and regional intellectual property conventions, such as: the world Intellectual Property Organization (WIPO); the African Regional Industrial Property Organization; the Paris Convention on Protection of Industrial Property; and the Berne Convention on the Protection of Literary Artistic Works. Although copyrights are protected in theory under the Kenyan law, violation of copyrights is pervasive and enforcement remains sporadic, and understanding of the importance of intellectual property is extremely limited (Retrieved August 26, 2007, from http://www.ustr.gov/assets/Document_Library/Reports_Publication/2004/2004_Trade_Estimate/2004_NTE_Report/assets_upload_file566-4778.pdf).

An economy with lower taxes for commercial activities across, say, different provinces, will be more likely to enable e-commerce (Geist, 2002). Stronger legislation for breach of contract in civil lawsuits also positively influences the level of comfort for e-commerce transactions. According to Ochieng and Majanja (2006), there is no structure at the national level for processing international trade disputes in Kenya. In the Quarterly State of ICT report - end of 2nd Quarterly 2003, the Computer Society of Kenya (CSK) cites that e-commerce has not yet taken off in Kenya due to the absence of enabling legislation although there is a bill called Information Technology Act, which is yet to be tabled in parliament. Kashorda (2006) also confirms this by stating there is no e-commerce legislation in Kenya.

Technology is the other aspect of the framework. Mobile telephony presents developing economies with the opportunity to countermand several generations of technology development to gain access to world markets, as well as improve the livelihood of their citizens, in particular, those in the informal sector. Bajaj and Leonard (2004) examined three dimensions in technology that would critically influence the enablement of e-commerce: the level of hard wired telecommunications infrastructure that exists in an economy, the level of computer engineering experts in an economy and the level of wireless infrastructure within

the economy. They concluded that while high levels of hard-wired infrastructure will clearly promote e-commerce, these are not usually found in developing economies; however, developments in the area of wireless networks now make it far cheaper to set up internet networks, and to bypass the expensive setup of hard-wired network. The availability of computer engineers also clearly affects the robustness of the infrastructure, as well as the cost of access to the internet, where hire availability would be clearly beneficial in both respects. The effects of the CPT model on e-commerce are summarized in table 3.1.

Table3.1: Summary of the impact of the CPT factors on e-commerce

Various Dimensions of CPT Model	Effects of Dimensions on Various Aspects of e-commerce		
	Business to Business Transactions	**Business to Consumer Transactions**	**Consumer to Consumer Transactions**
Culture			
Trust	– There are fewer relationships among businesses – Developed countries distrust government involvement in areas such as legislation on redress in developing countries.	– There occurs distrust between developing countries' businesses and developed countries' consumers; – Developing countries' businesses and developed countries' consumers cannot establish relationships	– Consumers distrust selling to developing countries' consumers
Corruption	– Business to Business feelings of deceitfulness and distrust lead to few relationships	– The consumers of developing countries are distrusted by developed countries' businesses	– There is suspect of fraud in developing countries when dealing with Consumers to Consumers
Patterns of Communication	– There is poor communication between developing countries and developed countries due to cultural distance; – Developed countries distrust certain cultures in developed countries	– Cultural and physical distance promotes distrust between Business to Consumer; – Lack of infrastructure may prevent relationships between Business to Consumer all together	– The customers in developed countries are not able to properly communicate to developing countries' customers due to language barriers

Policy			
General Commerce	- There are differing policies from different countries between business to business due to: different tax laws, intellectual property, and trans-border information sharing	- There are differing policies from different countries on general commerce between business to consumer due to: different tax laws, intellectual property, and trans-border information sharing	- Transferring money and products across international borders could be problematic because of different policies. - There are also different tax laws that could affect transaction consumers to consumers
Specific to E-Commerce	- Lack of funds available for infrastructure development; - Lack of country policies on copying/stealing; - Lack of education on policies	- Concerns regarding receiving payment or products; - Lack of funds available for infrastructure development; not clear in some counties - Country policies on copying/stealing	- Concerns regarding arbitration mechanisms; - Policies on relationships between consumers not clear in some countries
Technology			
Level of Hard-Wired Infrastructure	- Level of Hard-Wired Infrastructure in business to business technology is characterized with lack of infrastructure; - There are also less sophisticated	- Technology prevents developing countries' businesses from selling to consumers; - Technology prevents developing countries' consumers from buying from developed countries and developing countries	- Technology prevents selling to developing countries' consumers; - Technology prevents developing countries'

	connectivity in business to business technology	businesses; - Level of Hard-Wired Infrastructure in business to Consumer relationships looks at the ability to complete the transaction	consumers from selling to developed countries' consumers; - Technology leads to Digital Divide limitations
Level of Computer Engineering Expertise	- Network expertise needed for business to business - Computer Engineering Expertise in business to Business relationships looks at the ability to create needed exchanges; - Computer Engineering Expertise in business to Business relationships looks at the ability to promote evolving ecommerce	- Computer Engineering Expertise in business to Consumer relationships looks at the ability to created needed exchanges; - Computer Engineering Expertise in business to Consumer relationships looks at educating businesses on how to use the technology infrastructure	- Computer Engineering Expertise in consumer to Consumer relationships looks at the ability to create exchange mechanism
Level of Wireless Infrastructure	- Level of Wireless Infrastructure in business to Business relationships looks at the ability to offer wireless opportunities	- Level of Wireless Infrastructure in business to Customers relationships looks at the ability to offer wireless opportunities	- Level of Wireless Infrastructure in Customers to Customers relationships looks at the ability to offer wireless opportunities

Adapted from Bajaj & Leonard (2004)

3.4.3 The Steps Model

Duncombe et al. (2006) explain e-commerce readiness using a steps model which they call an e-commerce ladder. The model is illustrated in figure 2

Figure 3.2: The E-Commerce Ladder Model

Source: Duncombe et al (2006)

In the first step, people and businesses use wireless technologies to conduct business, for example, mobile phones which offer a business an opportunity to communicate with customers either directly or via small messaging services (SMS). The second step in the e-commerce ladder is where computer technology is introduced. For example, Multimedia (pictures, text, sound, video etc.) information can be exchanged via the internet. The internet is a very powerful ICT which can benefit many businesses. E-mail, which is the means of communication introduced at this stage, is a cheap, quick reliable way of exchanging business information with customers. All the applications mentioned in step two are available on mobile phones, therefore and MSE in the informal sector using a mobile phone for e-commerce does not need to advance

to that step. Step three now becomes more advanced because web pages are introduced. To add on computer equipment and connectivity, computer specialists are also required at this point Hiring services for web design could be very expensive. Internet enabled phones which are available in the Kenyan market can be used to access websites and to advertise on web, what is needed is evidence to clarify if MSEs are using this facility. The target for many MSEs in the informal sector is local clientele and therefore, there might be no need for interactions with website whose target is both internal and external consumers. In step four business-customer relationships is greatly enhanced. This step involves interactions of businesses with customers over the internet on an extensive scale. Customers may order online, and also make inquiries via the e-mail. Internet enable phones can also be used in step four.

Full adoption of e-commerce is illustrated in step five. It covers the whole transaction process, from placing an order online to online payment of goods and services via the internet. Payment by credit card systems or bank systems is introduced. The e-commerce legislation and security are very important at this stage for e-commerce to flourish. The final step expands e-commerce to the electronic link among businesses where business processes are streamlined by networking. The links are both internal and external, that is, businesses communicate electronically internally and also with customers and suppliers. This integration makes it easier and cheaper to do business, and it encourages customer loyalty and repeat business. This final step can also be accomplished with mobile phone usage, although it is more appropriate for larger firms and not micro business that are found in the informal sector. It would be more efficient to use computers for some of the business processes than a mobile phone. For example, payroll processing for a large organization or processing orders for a super market. Nonetheless, 3G mobile phones coupled with the incoming of fibre optic cables will allow faster transmission of data paving way for spread sheets and storage of business information.

The vertical line in the steps model indicates that the higher the step at which a business is at, the greater the benefit it gets from e-commerce. The horizontal line indicates that as steps increase, the organization structure of the business changes enabling it to participate more in e-commerce.

3.5 Mobile Phones and E-commerce

Mobile commerce, a sub-set of e-commerce refers to the buying and selling of goods and services through hand held devices. It also includes the storage, payment, receiving and sending of electronic money by mobile phones (Mendes et. al 2007). An example of electronic money transfer in Kenya is M-Pesa. Heyer and Mas (2009) observe that M-Pesa allows users to hold money in a virtual "stored value" account maintained in a server by a service provider and operated by users through their mobile phones. It should be noted that even if the owner of the account loses a handset, the money is still safe on the account. According to William et al (2009) M-Pesa is the most popular money transfer in Kenya, and its growth is stronger than for previous financial options such as banks and postal services. Heyer and Mas (2009) assert that the potential of mobile phones to revolutionize access to financial services in developing countries is exemplified powerfully by the success of the M-Pesa mobile money services in Kenya. Users of these services can withdraw or deposit money with an M-Pesa agent and use the available balance to, for example, a) buy airtime; b) debt payments; c) pay for goods; d) pay bills; e) send airtime to other mobile users; f) pay salaries; and g) store money for everyday use. Payments of M-Pesa play an important role in facilitating informal economic activity (Heyer and Mas (2009).

Suri (2009) argues that whether M-Pesa will boost the savings rate of the Kenyan population is an empirical matter. However, in an economy in which entrepreneurial activity growth is often hindered by lack of access to capital, the prospect of such change is quite welcome. Nonetheless, mobile phone money transfer requires considerably higher entrepreneurial capabilities than airtime sales due to the higher working capital movements, and required treasury management expertise. Suri (2009) further states that the ability of retail stores to conduct agent businesses for mobile phone money transfer scheme will depend on how easily they can rebalance the liquidity portfolio, which would be hard to achieve if bank penetration is too low.

Some of the problems experienced by users of M-Pesa services as noted by William et al (2009) are: a) agents lacked funds; b) could not retrieve money gone astray; and c) users not knowing how to complain to customer service. The same survey shows that compared to alternatives, M-Pesa is quicker, safer, convenient, cheaper, and easy to use. About 98% of the respondents were

happy with the M-Pesa innovation. According to Michael Joseph, CEO Safaricom, M-Pesa users will from the 1st of March, 2010 send money to other people directly from their phonebooks, thus eliminating the risk of sending cash to the wrong number (The Standard, 2010). Mobile phone business model depends on: a) volume – being able to capture a large number of relatively small transactions; b) speed – being able to generate momentum and trigger simultaneous interest among users and merchants; and c) coverage – being able to use it anytime, anywhere. These features together suggest that the M-Pesa business model needs to be highly scalable in order for it to be successful (Heyer and Mas, 2009).

According to the report by United Nations Economic and Social Council (2009), mobile phones are an important tool for development in poor countries because of their ability to bypass the infrastructure barriers in remote rural areas in Africa. Further, the rapid advancements in technologies and the ease of usage in addition to falling prices of mobile handsets, present the mobile phone as an appropriate and adaptable tool to bridge the digital divide. The Information Economy Report (2007-2009) states that in the past couple of years, mobile telephony has emerged as the most important ICT for low-income countries, and its increased diffusion points to the mobile phone as a "digital bridge". McCoy and Smith (2007) argue that people in developing countries are welcoming mobile phones as life changing devices. They cite examples of fishermen in India who use the mobile phone to call different markets to inquire about prices; and a hairstylist in Cote d'Ivoire whom the phone provides immediate contact with customers and simplifies the scheduling of customers. In both cases, sales went up and the customer base increased.

E-commerce is about taking the shopping environment to the consumer instead of the customer physically going to the shop, and as mobile technology advances, e-commerce experience will increasingly mean delivering the environment to the customer's mobile phone handset (Hoy, 2009). Adhikari (2009) states that some countries in Europe and Asia appear to have much more robust mobile commerce and mobile phone payments than in the U.S. Perez, (2009) supports this point by saying that despite the massive numbers of mobile phone users, mobile e-commerce is struggling in the U.S. The number of people using their phones for e-commerce is small and far between. She further argues that using a mobile phone to make purchases is more of a problem in the developed world. However, in developing markets where critical infrastructure,

such as banks and high speed internet is often lacking, people use mobile phones for mobile banking, mobile money transfer, mobile education and mobile business.

According to Mendes et al. (2007), much focus of the role of ICTs in development was traditionally on people's increasing access to computers and fixed lines through IT-centres. However, the explosive growth of mobile telephony has overridden these efforts, as the phones are the primary form of telecommunication in developing countries. Further, the phones play the same role that fixed-phone networks did in facilitating growth in Europe and North America in the twentieth century. Moreover, increased access to mobile phones drives the economic growth in developing countries. Millions of poor people are engaging in tasks normally associated with the internet, using relatively simple mobile phones. For example, information retrieval, electronic payments, and remote computing such as inquiring the account balance from a bank database. Therefore, understanding the beginnings of more than voice applications over the mobile phones is important as it would serve as a basis for coherent and effective policy and regulatory response (OECD and InfoDev, 2009).

3.6 Summary of Literature Review

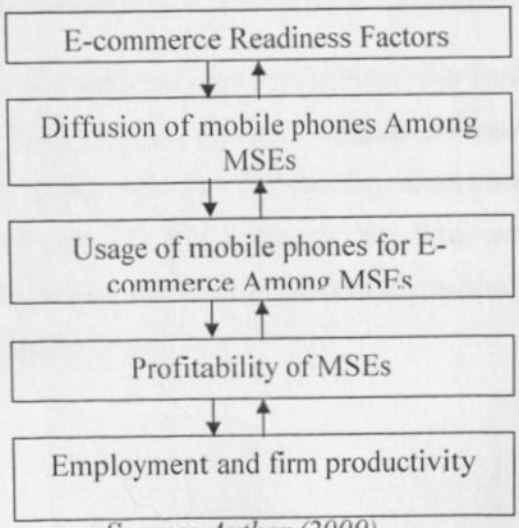
The reviewed literature shows complex relationship between ICT adoption and the usage of ICTs for business transactions or commercial activities in particular. The literature reveals several salient aspects of the relationship between ICTs and e-business:

ICT adoption is a necessary but not a sufficient condition for e-business. In order for a country to promote the growth of e-commerce, it must encourage and realize high rates of diffusion of ICTs. An important way to promote adoption and diffusion is to invest in e-commerce readiness. For example, investments can be made in computer infrastructure, e-literacy, e-legislation, trust, social capital, and supportive e-services such as electricity and internet facilities, and e-skills. However, due to poor profit prospects, these factors can exist in country and yet businesses may not adopt ICTs and may not embrace e-commerce, e.g., in USA and UK only large firms have adopted e-business and e-commerce. Since the mobile phone was found to be the predominant ICT among MSEs in Kenya, the study tested if e-commerce readiness factors accurately predict adoption of mobile phones by MSEs in Kenya using survey data from Nairobi.

Adoption is not a sufficient condition for usage of ICTs to conduct business. The study investigated the factors that influence use of mobile phones for e-commerce among the MSEs in Nairobi. The literature suggests that characteristics of owner of business, attributes of the enterprise and the general environment in which the enterprise operates (the subsets of e-commerce readiness factors) affect usage of ICTs in commercial activities.

The research investigated the determinants of mobile phone adoption and the extent of their usage for e-commerce. The study also investigated the relationship between e-commerce and sales (profitability), firm expansion, sales turnover and export propensity. The above discussion is summarized in Figure 3.3 and it shows the relationship between mobile phone adoption, usage of mobile phones for business transactions (e-commerce), and firm productivity. Literature suggests that this relationship is complex, as it is a bidirectional relationship which poses estimation challenges. Investigations of the impacts of mobile phone diffusion and usage on performance of firms are rare in literature. The study estimated the effects of e-commerce readiness on diffusion of mobile phones assuming that the feedback relationships shown in Figure 3.3 do not hold. This is a reasonable assumption because mobile phone possession precedes engagement in e-commerce activities (see Figure 4.1 in chapter 4). The study also measured for the first time the extent of mobile phone adoption in Nairobi among MSEs and the extent to which these technologies are being used for e-commerce.

Figure 3.3: Linkages between e-commerce and firm productivity



Source: Author (2009)

CHAPTER FOUR: THEORETICAL FRAMEWORK AND METHODOLOGY

4.1 Problem Conceptualization

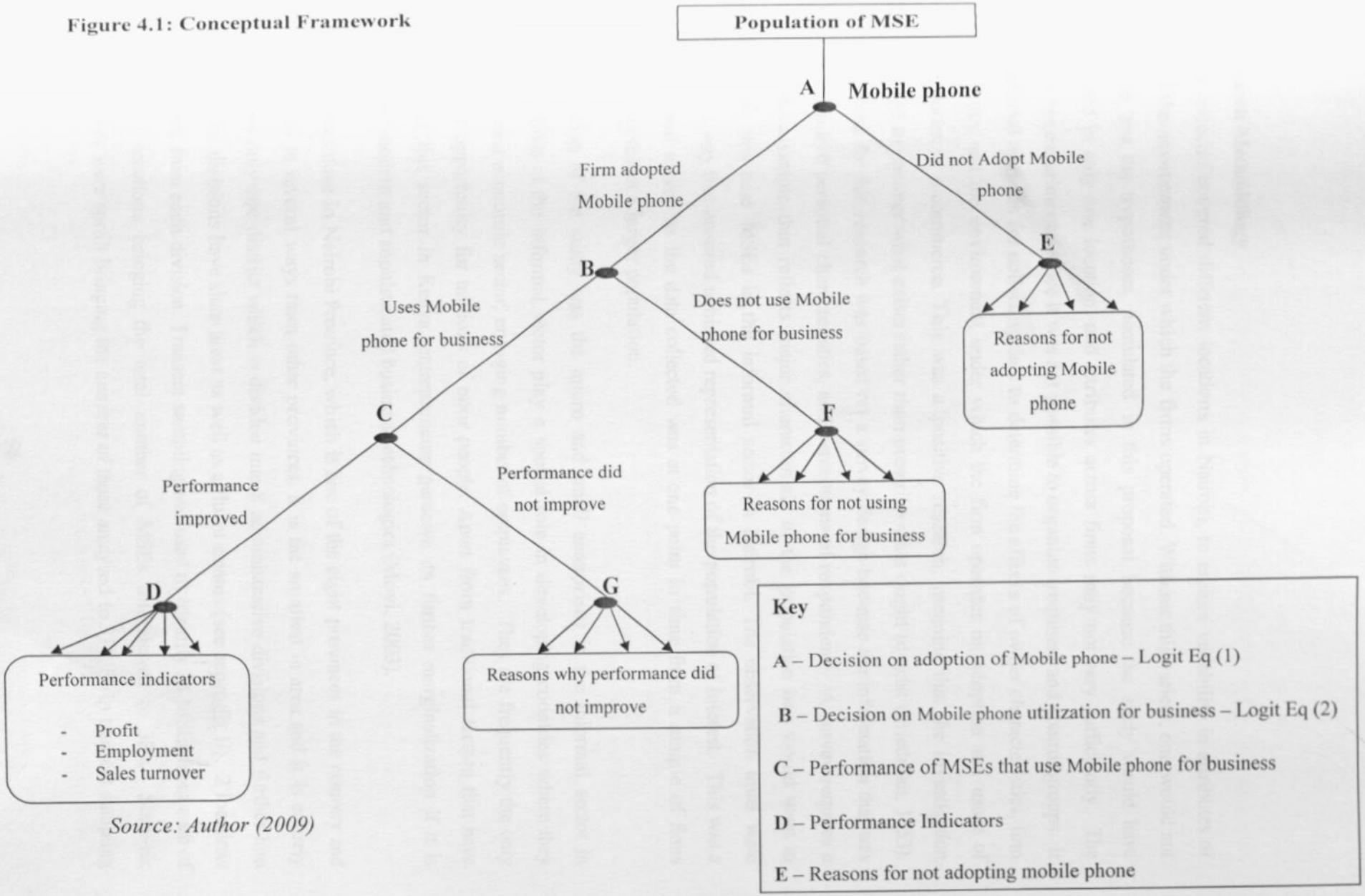
The conceptual framework for the study is illustrated in Figure 4.1. The focus of interest at the empirical stage of this research was the population of informal MSEs in Nairobi. The conceptual framework links mobile phone adoption and its usage to facilitate business transactions to a set of implicit factors associated with MSEs in the informal sector and the environment in which they operate.

A logit model, a probit model and a linear probability model were used to identify the key variables influencing the adoption of ICT (node A in Figure 4.1). Specifically the models were used to test if firm characteristics, owner characteristics and the environment in which the MSEs operate can predict the adoption of an ICT. For those MSEs that had adopted a mobile phone qualitative and quantitative analysis was conducted to identify the reasons why they had not adopted the ICT (node E in Figure 4.1).

The three models were further used to identify the variables that determine usage of mobile phones for business purposes once an MSE has adopted the ICT. That is, the models were used to establish the extent to which characteristics of MSEs, the attributes of owners of MSEs, and the environmental variable affect usage of an ICT for commercial activities. Both qualitative and quantitative analyses were employed to identify the reasons why an MSE does not use a mobile phone for business transactions after acquiring such equipment (node F in Figure 4.1).

Once an MSE has adopted an ICT and is using it for business, the study attempted to find out if the performance of the MSE had improved. The performance indicators that were used for this purpose included profitability, employment level of the firm, sales turnover and whether or not a firm has been able to enter the export market (node D). For firms whose performance had not changed favourably, the study sought to find out the reasons behind such performance, using qualitative data and methods (node G).

Figure 4.1: Conceptual Framework



Source: Author (2009)

4.2 Research Methodology

The data collected covered different locations in Nairobi, to ensure variability in attributes of firms and the environment under which the firms operated. Without this variety, one would not be able to test the hypotheses, postulated in this proposal because the study would have concentrated in only one location, and attributes across firms may not vary sufficiently. The study was not experimental since it was not possible to organize treatment and control groups. It used statistical methods for collecting data to determine the effects of owner characteristics, firm characteristics and the environment under which the firm operates on adoption and usage of mobile phones in e-commerce. This was a positive research, meaning that the investigation endeavoured to uncover what exists rather than prescribe what ought to exist (Friedman, 1953). The fieldwork for this research was based on a survey design because the information that was gathered required personal characteristics, and perceptions of respondents. A survey requires a representative sample that reflects major characteristic of the population one would want to represent in this case MSEs in the informal sector in Nairobi. The observation units were selected in a way that ensured unbiased representation of the population of interest. This was a cross-sectional survey as the data collected was at one point in time from a sample of firms selected to represent a larger population.

The population of the study was the micro and small enterprises in the informal sector in Nairobi. MSEs in the informal sector play a special role in developing countries where they form the largest economic sector, engaging number of employees. They are frequently the only employment opportunity for millions of poor people. Apart from traditional factors that have marginalized this sector in Kenya, entrepreneurs perceive its further marginalization if it is bypassed by modern and sophisticated business technologies (Moyi, 2003).

The study was done in Nairobi Province, which is one of the eight provinces in the country and which differs in several ways from other provinces. It is the smallest in area and it is entirely urban. It has only one district which is divided into 8 administrative divisions and further into locations. The divisions have slum areas as well as affluent estates (see appendix II). 2 locations were selected from each division. Transect sampling was used to identify 24 MSEs from each of the selected locations bringing the total number of MSEs interviewed to 384. Sixty-six questionnaires were spoilt bringing the number of those analysed to 318. Strip transect sampling

is used when the species (units of analysis) can easily be counted and is not disturbed by the observer; it is a common technique used by scientists to count plants, where one cannot easily determine the population.

In such a situation Webster (1995), suggests that the following formula to be used to estimate the sample size.

$$n = \frac{z^2 \pi (1-\pi)}{(error)^2}$$

Where π is taken to be 50% proportion of MSEs with mobile phone to all the small firms. At the 95% desired level of confidence and margin error of 5% the sample size (n) is calculated as follows:

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

$\approx$ 384 MSEs

According to Sutherland (2000), it is much better to have a large number of small samples, as the samples are more likely to be representative than a few large ones. In transect sampling, an observer tossed a coin and started from a given point, set a distance on foot and interviewed 24 MSEs that were seen within a given distance of the transect. Systematic sampling was used to identify the MSEs within the transect interviewing every n^{th} MSE along the road or path and the opposite MSE. The n^{th} MSE was determined by the concentration of MSEs in a particular location. Transect sampling was more likely than other methods to include a range of MSEs, thus increasing sampling precision. The e-commerce ladder model of Duncombe et al (2006) was used to identify the sophistication in e-commerce adoption of MSEs. The model collapsed as there were no MSEs using the computer and internet for e-commerce among the observed MSEs.

4.2.1 Data Collection

Data for this study was collected from all the 8 divisions of Nairobi province. Purposive sampling was used to identify two locations per division; one perceived to be very poor and the other to be middle class. These are the areas where one would find a high concentration of

MSEs. The poor locations were the ones which had informal settlements and therefore, are lacking some of the basic infrastructure, for example, water, access roads and electricity, the middle class locations are assumed to have access to the infrastructure. The reason for picking the two groups from each division was to find out if e-commerce diffusion is different among divisions. High class locations such as Lavington and Karen might not have many MSEs, as these are mainly residential areas for the very rich.

From the central division, Mathare and Huruma locations were picked for interviews; from Dagoretti division, Kawangware and Riruta were selected; from Embakasi, Kayole and Kariobangi South were picked; from Kasarani Division, Githurai and Kariobangi North were sampled; from Kibera Division, Laini Saba and Nairobi West were chosen; from Makadara Division, Makongeni and Maringo were selected; from Pumwani Division, Kamukunji and Pumwani; from Westlands, Kangemi and Highridge were sampled. Data collection was done by the use of structured questionnaires that were used to interview MSE operators. The data collected included owner characteristics, firm attributes and the environment under which the MSEs operated. Information on the possession and usage and of ICTs was collected. The respondents were owners of informal MSEs employing 1 to 9 people, owner included.

4.2.2 Data Analysis

Objectives one and two of the study were achieved by descriptive statistics that were computed to provide proportions of people who had access to e-commerce technology, and also by bivariate analysis that was used to test the hypothesis of association between e-readiness factors and adoption of mobile phones. Mobile use for e-commerce was correlated with business attributes and business owner characteristics to determine the association. Objectives three and four were attained by three estimating models, namely, the logit model, the probit model and the Linear Probability Model (LPM). The logit and probit models for adoption of ICT and of its application for e-commerce were estimated using the maximum likelihood method, and LPM was estimated using OLS. The STATA package was used to carry out the quantitative part of the analysis. Adoption of e-commerce by MSEs was analyzed using the same three models because at a given point in time, a firm is either using or not using a mobile phone to transact business. There are many varieties of discrete choice models (Cader et al, 2004). The working assumption here was that a firm is rational and therefore, chooses the alternative (mobile phone

versus no mobile phone) with the most net benefit. Qualitative data was also analyzed by observations of the study area.

A firm's decision to adopt a mobile phone for the purpose of using it to conduct business can be represented by the following logistic model.

$$P_i = \frac{1}{1 + e^{-Z_i}} \qquad (1)$$

Where: P_i = Probability of firm i adopting e-commerce technology.

e = the natural number (approximately equal to 2.7182)

Z_i = logit index for firm i

The logit index for firm i can be specified as:

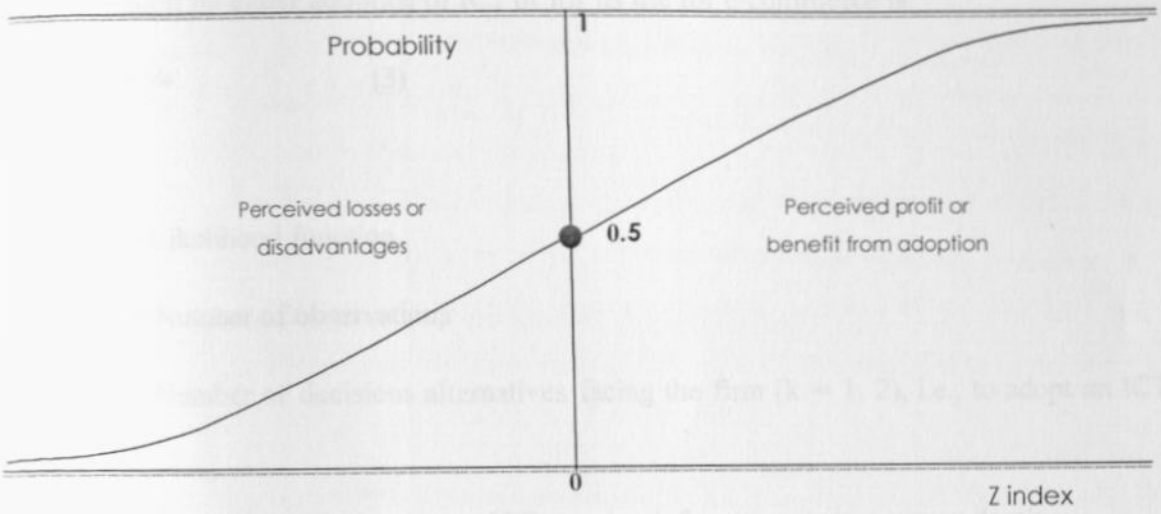
$$Z_i = \alpha + \beta x_i + \gamma w_i + e_i$$

Where:

x_i is as a set of attributes for a firm i, such as age of the owner, education of the owner and number of years the firm has been in existence; w_i is a set of e-commerce readiness indicators that are not specific to the individual, such as, distance from firm to the nearest road network, distance to the nearest port, supply of electricity, availability of computer facilities within the vicinity of the firm, among others; and α, β and γ are parameters to be estimated; e_i a disturbance term for firm i which is assumed to follow a logistic distribution (see figure 4.2).

The logit index Z_i, indicates the benefit the firm perceives from the adoption of an e-commerce, such as a mobile phone, a computer or a website.

Figure 4.2: Logistic Curve



Source: Author (2009)

The same logit model, i.e. Equation (1) was used to analyze whether conditional on adopting a mobile phone, the phone was being used for e-commerce. Thus, there were two steps in this study. The first step was whether or not a firm possesses a mobile phone that can be deployed for e-commerce, and the second step was whether or not the phone was being used for e-commerce.

The logit model that describes the use of or non-use of an ICT to conduct e-commerce can be expressed as:

$$P_i = \frac{1}{1 + e^{-Z^*}} \qquad (2)$$

Where $Z^* = \theta_0 + \theta_1 x_i + \theta_2 s_{1i} + u_i$

Where:

x_i is a set of variables as in Equation (1)

s is a set of variables that describe the e-readiness in the environment in which the firm operates. For identification purposes some of the variables in w_i, on Equation (1) are not in *s* in Equation (2).

u_i is a logistically distributed error term.

The likelihood for either adoption of ICT or for its use for e-commerce is:

$$L = \prod_{i=1}^{N} \prod_{i=1}^{k} P_i^{Q_{ik}} \qquad (3)$$

Where

L = Likelihood function

N = Number of observations

k = Number of decisions alternatives facing the firm (k = 1, 2), i.e., to adopt an ICT or not

P_i = Probability of adopting an ICT or using it for e-commerce, upon adoption

Q_{ik} = A binary variable which takes a value of 1 if an ICT is adopted (or is used for e-commerce) and a value of zero otherwise in either case.

It should be noticed that there are two likelihood functions in equation (3), one for the adoption of an ICT, and the other for its use for e-commerce transactions. Equation (3) can be re-expressed in log form as:

$$\ln L = -\sum_{i=1}^{N} \sum_{i=1}^{k} Q_k \ln P \qquad (4)$$

Equations (3) and (4) was estimated using maximum likelihood methods to yield parameter estimates for α, β, θ and γ which were used to analyze how the various variables affect adoption and utilization of ICT in commercial activities within the MSEs in Kenya.

It should be noted that equation (4) represents two log-likelihood functions, one for adoption of ICT, and another for usage of mobile phones (conditional on adoption) to transact business. Thus p_i in equation (4) represents probability of firm i adopting a mobile phone equation (1) and probability of it using the phone for e-commerce, equation (2). Equation (4) can also be used to estimate probit models. In the empirical analysis, the Linear Probability Model was estimated in addition to logit and probit models to obtain baseline parameter estimates.

CHAPTER FIVE: FIELD OBSERVATIONS AND DESCRIPTIVE STATISTICS

5.1 Introduction

This chapter presents qualitative and descriptive findings of the thesis. It begins by giving field observations on MSEs, followed by a description of the study area, with a focus on the relationship between owner characteristics, firm attributes, and business environment, and the role played by mobile phones in e-commerce. Next focus is on the evidence of the association between mobile usage and performance of the MSEs in the informal sector in Nairobi. Initially, the findings were to include relationships between computer usage and business performance, but preliminary investigation revealed that only 15 out of 318 firms had access to computers and none of these firms had ever used computers for e-commerce.

5.2 Field Observations and Perceptions on MSEs

The research was conducted in Nairobi Province (see appendix II). Nairobi province had 8 divisions at the time of the survey, but since the survey it has been split into several other divisions or constituencies. Some constituencies go by the division names. This study used the constituency name for the different divisions (now districts). The division names used in the study are Westlands, Dagoretti, Makadara, Kamukunji, Embakasi, Langata, Starehe and Kasarani. The province is headed by the Provincial Commissioner, while the divisions have district officers as the heads. Each division has several locations which are headed by chiefs and assistant chiefs. All the administrative centres occupied by the chiefs, assistant chiefs and administrative police have very poor structures.

Some of the SMEs interviewed were in the City Council markets, but the majority of the firms operated from permanent or temporary shelters or in the open air sites. Permanent shelters included structures with stone or wooden walls or with iron sheets as roof tops. Included in this category, were businesses operating in mud houses which seemed to be extensions of their residential premises. Any structures that could not be easily dismantled or reallocated were considered to be permanent business sites. Temporary shelters were structures that had polythene papers or cardboard for roofing or wall. Most of these had wooden sticks or stands on which they displayed their wares. It should be noted that this classifications are used by the researcher for identification purposes and are not as stipulated in the planning and building fields. The people who were selling goods under umbrellas or under trees were classified as being in

temporary shelters. Open air sites refer to SME sites which did not have any shelter at all. They had their goods on the pavements, wooden stands and wheelbarrows, to mention but a few of the makeshift arrangements under which they operated. The interesting thing about this group is that when asked if they owned the premises, some of them said yes, meaning that they went to the same spot every day to sell their goods. For example, those roasting maize or selling sugarcane on a wheelbarrow would go to the same spot every day.

Following is a detailed description of the researched locations in each of the eight divisions:

Westlands Division

Westlands is one of the affluent constituencies having both high class areas such as Loresho, and middleclass areas such as the Parklands. The constituency also has Kangemi location which has slum and middle class residential homes. The two locations in which interviews were conducted in Westlands are Kangemi and Highridge.

Kangemi - The SMEs interviewed were mostly in the open air sites along two tarmac roads. The traders operated along the road side, with many of them having only temporary shades. One interesting observation about Kangemi was the ethnic biases expressed by the operators. One street was meant to be for one ethnic group that supported the area member of parliament, while the other street had an assortment of people from different ethnic backgrounds, with different political sentiments and affiliations. The political problem was highlighted by the area chief who alerted us to be careful during the interviews. The research was conducted soon after post election violence and since many people were affected, some people were still harbouring ill feelings towards their neighbours. Open air MSEs sold items such roasted groundnuts, roasted maize, sweets, cigarettes, charcoal, shoes and second-hand clothes. The temporary shelters traded in vegetables and fruits, and other small items. The permanent MSEs had electronics, new clothes, hotels, butcheries, chemists, watch repairs, and barber and repair shops. These are very general classifications, as MSEs traded in an assortment of highly differentiated items and services.

Highridge - Unlike Kangemi, the MSEs in Highridge were in a City Council market which is situated in a middle class area. The market is surrounded by a perimeter wall, although on the outside, there are many open air businesses. The market is mostly a fruit and vegetable market,

although cereals are also sold. There are no stalls for the fruits and vegetables. The vendors stay close to one another, selling their goods on wooden stands. The market is very busy, and getting operators to stop their work to answer questions was a very challenging task. We had to wait for the time when they were not very busy. As a result, interviews in this area took a very long time to complete. On the outside of the market area, in what looked like an extension of the market, there is an assortment of MSEs in small stalls. The businesses in the area included hair saloons, barber shops, carpentry, hotels, butcheries, second-hand clothes, shoe shining, tailoring, hardware shops and general retail shops. In the open air surrounding the market, people traded in watermelons, sugarcane, green maize, roasted maize and many other wares.

Dagoretti Division

The division has middle class and low class residents. It covers areas such as Ngumo estate, which is a middle class area, Milimani is the middle income and affluent area, part of Kibera and Kawangware slum areas. Interviews were conducted in Riruta and Kawangware locations.

Riruta - The MSEs here were mostly poor; the poverty of MSEs was evident from the type of structures on the area and goods. The businesses were along a worn-out tarmac road, which was partly dirt. The area did not seem to be as busy as the Kangemi and Highridge locations. This is where traders sold paraffin in small containers and at the same time sold potato chips in the open air sites nearby. There was a lot of food being cooked and sold in open sites. One got the impression that money from these MSEs could hardly sustain the family. Some MSEs in the area sold charcoal burners which used saw dust instead of charcoal. This is a very interesting cooking invention which can reduce the use of wood for fuel and the associated pollution. In the same area, there was a studio, a local brewer, and a poshomill. Although MSEs in this particular area seemed to be struggling to make ends meet, it is the one area in which every one in the research team felt comfortable and safe.

Kawangware - Kawangware is a very congested slum area. The MSE were aligned along two major tarmac roads. However, the whole area seemed to be full of MSEs, scattered across locations. All kinds of MSEs operated in this area, ranging from those in permanent structures to those in open air sites. The place was very noisy, partly because public transport vehicles picked and dropped passengers in this area. The area chief alerted us that the place was notorious for petty stealing, but nonetheless, we did not encounter any problem there. The interesting

observation was a fuel station that had the tanks of petrol, paraffin diesel with the fuel delivery pipes coming from a small permanent structure. The petrol station seemed to pose danger to surrounding MSEs in the event of fire.

Makadara Division

Makadara division, has middle and low income residential areas, such as Buruburu, Kaloleni and Jericho estates. The MSEs that were interviewed are within the City Council markets in Maringo and Makongeni locations.

Maringo - The market itself has permanent structures and temporary structures. Unlike other City Council markets, this market did not have a perimeter wall and therefore, it was not easy to differentiate the MSEs inside the market from those outside. The market looked like a street joining two residential estates. The paths within the market were used by customers to access different MSEs. One path had second-hand clothes, shoes, curtains and an assortment of household goods. These MSEs operated in wooden stalls with iron sheets for roofing. The paths on the sides had temporary structures made of wooden stands and polythene roofing. These ones mostly sold vegetables and cooked food. The market was congested, which caused the interviewers the problem of accessing the MSEs. Open air sites were outside the market along a tarmac road. The MSEs sold items such as roasted maize, roasted yams, sausages, boiled eggs, car wash services and transport. Some MSEs sold their wares under a large tree outside the market. Next to the market were large commercial buildings, a primary school and rental houses.

Makongeni - This market has a perimeter wall, although there are many small scale businesses taking place on the outside. The market is famous for selling meat, mainly beef, although some MSEs traded in goat meat and pork. The meat stalls were nearer the entrance, where there are very many butcheries. The market was well structured as compared to Maringo market. The stalls are permanent with stone walls and iron roofing. Apart from meat, MSEs here operated businesses that sold rice, beans, ground nuts, processed juice and fish. There were also watch and mobile phone repair shops, tailoring stalls, barber and hair saloon stalls, hardware shops, hotels, bakeries and a pharmacy. The interesting observation here was the dry cleaner called a "dhobi", whereby the operator of the business washed people's clothes by hand and sun dried them. The clothes were predominantly overalls from the butchery, which became dirty because

of handling raw meat. I found this to be an entrepreneurial activity, although a tiresome one. On the outside, in what clearly was an extension of the market, were temporary structures. The operators of the MSEs sold fruits, repaid shoes, shined shoes, repaired locks and sold second hand clothes. There were also motorcycle transporters, wooden wheel barrows (mkokoteni) for transporting goods and a furniture and fabrication shop.

Kamukunji Division

Kamukunji division has highly differentiated MSEs; Gikomba market and Kamukunji market which were in Bondeni location and Kiambiu market in Pumwani location.

Bondeni - Two markets were visited in this location, namely, Gikomba and Kamukunji markets. Gikomba market is famous for its second hand clothes and household items. Small business owners come to buy goods from this market to go and sell elsewhere. There were lots of second-hand clothes, curtains, beddings and household goods. Businesses were lined along tarmac roads in temporary structures and open air sites. One section of the market had an assortment of fish, such as dried fish, small fish, fresh and fried tilapia. There was also a fish processing plant for cleaning fish and packaging for big hotels. There was also an enclosed permanent area within the market, whereby MSEs sold new clothes and made school uniforms which were later sold to uniform retail shops in the central business district of the city.

Kamukunji market is known for metal fabrications. This was an area where some of the sales ran into millions of shillings. The place is very noisy because of the fabrication and the welding of items. The MSEs lined a tarmac road and most of them operated in open air sites. They sold things like, metal boxes, door and widow grills, scrap metal, cooking pans, charcoal burners and food processing items. A lot of creativity could be seen among the MSEs; the goods were amazing and suggested a high level of innovation in. The operators did a lot of manual work, since they used very simple tools to fabricate the metal; the noise and the sparks from welding seemed not to be healthy for the workers. The few permanent structures sold finished goods, such as plastic containers, huge cooking pans and machines for making chips.

Kiambiu - Kiambiu is a slum area with permanent structures made of mud walls and iron sheet roofing. The MSEs operated along a poor tarmac road, in what seemed to be an extension of their houses. There were few customers as compared with the other areas that were visited. The

street had many idle youth who seemed to be drunk or unsteady psychologically. This was one place where the interviewing team did not feel safe, although the area chief assured us that there would be no problem. It is also one of the areas where we were made to understand that the daily fee of 20 Kenya shillings was not paid to council officers, since they were afraid of entering the area. The MSEs operated general retail shops with very few items, fruits, vegetables, hair saloons, barber shops, hotels and butcheries. There was even a studio whose operator said that most of his customers did not come to the premises; he was a free lancer, who took pictures on special occasions, such as weddings and graduation. The impression one got from here was that these MSEs were barely surviving, since the portions of goods were very small.

Embakasi Division

Embakasi is the largest constituency in Nairobi Province. It has high and low income residential estates, and also sum areas. The locations that were visited were Kariobangi South and Kayole.

Kariobangi South - The market visited in this area is a City Council market that is enclosed in a perimeter wall and very clean. The MSEs in this market operated from very neat permanent structures. Their stalls were well stalked with various items. There were shops for selling liquid gas, electronics including television sets, beauty products, new clothes and groceries. There were also hair saloons, tailoring shops, a hotel and a studio. Movement within the market was easy since the space between the stalls was left free for customers to move around. Outside the market was also not crowded with open air sites as opposed to other City Council markets. The few MSEs operating in open air sites outside the market sold roasted maize and grilled sausages. There was also an operator who had a stall in the market but used the outside to make grills for doors and windows. This particular operator told us that the business was doing very well and that he had many orders and would never wish to join formal employment. He was one of the few people who employed more than one person.

Kayole - Kayole market has many temporary structures and a few permanent ones. There are also many MSEs operating from open air sites. This market is very busy with an assortment of goods for sale. The operators sold fruits, vegetables, charcoal, second-hand clothes, shoes, electronics, new clothes and household goods. There were makeshift hotels that supplied the vendors and customers with cooked food. The businesses were lined along a tarmac road, although one had to use foot paths to reach the interior MSEs. We were made to understand that

the market shared a border with Soweto slums. The hotels in this market operated in very temporary structures which were covered with polythene bags and mud floors that seemed inaccessible during the rainy season. The food was mostly cooked in open air sites and served inside the structures. There were a few butcheries, a bookshop and a pharmacy that was very poorly stalked. Some of the operators were very suspicious of the interviewing team suspecting they were City Council officers, and the intervention of the local informant was required for us to be able to get information from them.

Langata Division

Langata division houses one of the largest slums in Africa, Kibera slum, middle class estates such as Nairobi West and Southlands and an affluent area, Karen. The locations that were interviewed were Laini Saba and Nairobi West.

Laini Saba - MSEs that were interviewed were lined on both sides of the railway line within the Kibera slum, although there were some MSEs in the interior, operating along foot paths. The MSEs traded in second hand clothes, shoes, household items, electronics, used books and an assortment of goods. There was even a computer bureau in the only permanent structure near the tarmac road. The services offered by the bureau were typing photocopying and e-mail services. The rest of the MSEs were in temporary structures. This is another area where City Council operators do not go to collect trading fee. The area is known for insecurity, although we found the traders very friendly. Many operators complained that their businesses had been affected by the post election skirmishes, and therefore were either recovering or had changed the business altogether. The interior MSEs operated hotels, hair saloons and mobile phone and watch repair shops. There were also stalls selling fruits and vegetables.

Nairobi West - The MSEs interviewed were in Mitumba slum area behind Wilson airport. The businesses were along a rough road and the people operated from what seemed to be their homes. The structures were permanent made of iron sheet walls and iron sheet roofing. The customer base seemed to be limited to slum dwellers as the amount of goods for sell was very small. Some goods were sold in the open air on the sides of the road. The whole area seemed inaccessible during the rainy seasons.

Starehe Division

This constituency includes a metropolitan section, middle and low income residential areas and the second largest slum in Kenya, Mathare slum. The locations from which interviews were conducted were Huruma and Mathare North.

Huruma - MSEs in Huruma market were lined along a tarmac road. It is a very busy market, with operators of MSEs trading in second hand and new items. There were second hand clothes, new clothes and bed sheets, new shoes and mattresses, electronics, live chicken, and scrap metal. The structures were permanent having wooden or iron sheet walls and temporary having a polythene bag cover or an umbrella. There were some MSEs trading in open air sites selling items such as fruits, green bananas and vegetables, stationery and herbal medicine. Some of the items were on wheel barrows, while others were on wooden stands or on the pavement. There were also hair saloons, barber shops, shoe shine services, laundry services, studios and hotels. This is an area where there is a large assortment of MSEs on a long stretch of road.

Mathare North - The traders that were interviewed were along two tarmac roads. There were other traders in permanent stone buildings, but the focus was on those trading in permanent structures with wooden or iron sheet walls, and those in temporary and open air sites. The MSEs in temporary structures operated under polythene paper covers, umbrellas, and under trees. Those in open air sites operated from the pavements and mostly sold vegetables and second hand clothes, and some roasted maize. The market was not well organized as the Huruma market, and was not as busy.

Kasarani Division

Kasarani constituency has high and low income residential areas, and also slum areas. The locations studied were Githurai and Kariobangi North.

Githurai - The MSEs are lined along an earth road that branches off a tarmac road. Accessing the MSEs during rainy season could be a challenge to both motorists and pedestrians. The traders operated mostly from temporary structures or open air sites. There were a few in permanent structures of wooden or iron sheet walls and iron sheet roofing. Those in open air sites sold items such as fruits, roasted maize, second hand clothes and shoes. In temporary shelters, there were MSEs that repaired shoes, sold fruits under umbrellas or trees, operated

hotels, sold vegetables and many other items. In permanent structures, there were books being sold, groceries, a chemist and mobile repair services. The MSEs in this area were very poor; they did not seem to have many customers, and one could notice the perishable items had been on display for a long time. The amount of goods being sold was also meagre and did not seem enough to sustain the operators.

Kariobangi North - There was a mixture of large commercial buildings and small businesses. The focus was on the small businesses that were lining the tarmac roads. The MSEs were in permanent structures of wooden and iron sheet walls or mud walls with iron sheet roofing. There were also many temporary structures covered with polythene bags, and many open air sites. The area is busy and congested. In the temporary structures, fruits and vegetables were sold, and food was also sold in these structures. The permanent structures had tailoring businesses, general groceries, hair saloons and barber shops. Open air sites were on the pavements and sold items such as second-hand clothes, CDs of music and movies, charcoal, shoe repair and shoe shine. The operators here seemed to be barely surviving; they did not have many items for sell despite the fact that the area is congested. The hotel business seemed to be doing well although the structures were very poor and gave the impression that they might close down in case of heavy rain.

Overall Perspective

All the MSEs in the 8 divisions of Nairobi province have similar characteristics with very few variations. They have operators in permanent, temporary and open air sites. Some of the MSEs within or next to City Council establishments had access to social infrastructure such as running water, electricity and toilets. A few of these had structures made of stone walls and could be categorized in the formal sector. The MSEs were operating from permanent structures made of wooden walls, iron sheet walls and mud walls, but most of them operated in temporary structures with polythene paper coverings and open air sites. The majority the MSEs investigated operated near informal settlements or inside the slum areas suggesting that they were a source of livelihood for slum dwellers. They were strategically situated along tarmac roads, and along earth roads and foot paths that are not easily accessible during the rainy seasons. It should be noted that there are slum areas in each of the 8 divisions of Nairobi district.

Although the majority paid a fee of 20 Kenya shillings to the council officers, we did not see any police officers patrolling the areas; there seemed to be a lot of trust among the operators, as no security issues were witnessed by the interviewers during the entire period of the survey. Some of the MSEs were well stocked with an assortment of items and had many customers, but others had very few items. One could not fail to see the desperation on the faces of some operators, as much as they tried to be friendly and cooperative. The discrepancies within the sub-sector are mesmerizing. Some are happy earning their livelihoods while others are extremely poor. It would be wrong to have the same description for all the MSEs. If that was the case, then many MSEs in the informal sector would be sidelined by the policy makers.

Many of the operators had mobile phones, making the mobile the preferred ICT in the informal sector. The structures and sites where many MSEs are situated cannot allow one to invest in ICTs such as the computer and the internet. The mobile phone is able to cater for almost all the business needs of the owners of the firms. The people are educated as most of them could speak English and Kiswahili; some said that they were waiting to join local universities, contradicting the perceptions that the operators were illiterate. There are many entrepreneurial activities taking places within the sector, for example, one would sell two teaspoons of sugar and a teaspoon of tea leaves to those who could not afford to buy the normal measurements of half a kilo or one kilo; the sofa sets that were made are sizes that could fit in the small rooms the people within the slum areas lived in; some cut the vegetables and cook food for customers to buy on the way home; the MSEs operating photo studios were painted black to keep out the light.

5.3 Descriptive Statistics

Summary statistics are presented in table 5.1, while correlations for selected variables are given in table 5.2.

5.3.1 Main Features of Enterprises

Most of the businesses in this sector are young, with the youngest being 2 months old and the oldest 35 years. About 90 percent of the MSEs have been operating for less than 15 years and 74 percent for less than 10 years. Many of the businesses are registered, i.e. 90 percent. Registration for these MSEs means paying a fee of 20 Kenya shillings to the local authority every day of business on city premises. Upon paying the fee, business owners are issued with a receipt, meaning that their

operations are recognized by the government for 1 day. The 10 percent of MSEs that were not registered were mostly found in the locations considered to be a security threat to the City Council officers. About 75 percent of the MSEs kept records of their transactions, which contradicts the assertions of some studies that operators in the informal sector do not keep records (Kubr, 2002; Oleksiy, 2006, Rannan-Eliya, 2006). I did not check the conditions of the records kept, but from my discussions with business owners, the records seemed to adequately inform the owners about the movement of goods they traded and about the proceeds from business transactions.

The number of people employed by the MSEs ranged from 1 to 8 persons, with a mean of 1.6, including the owner. A large number of MSEs had only one employee, who was the owner of the business, that is, 224 out of 318 MSEs investigated; and 99 percent had up to 5 employees. This concurs with many studies on this sector, including the 1999 Kenya baseline survey on the MSE sector which found that micro enterprises employ 1 to 9 people, with the majority being operated by the owner alone. Although the MSE stands for micro and small enterprises, all the MSEs investigated fell under the category of micro enterprises as defined by the ILO, i.e. a firm having not more than 10 employees, including the owner (Stevenson and St-Onge, 2005).

Nearly, all the MSEs (95%) possessed mobile phones and 84 % use them to transact business. The cost of the handset and airtime were given as reasons for not possessing a mobile phone and for not using the phone for e-commerce. The findings are a clear indication that a mobile phone is intensively used in e-commerce within the MSE sub sector. The reason for this widespread use of a mobile in e-commerce could be that it is affordable, easy to use, and portable. One can carry it home after business hours, and even transact business after closing the business premises. It can also act as bank, where those registered with M-pesa or ZAP can store money in the phone and transport the money securely to different locations.

At the time of the study, M-pesa was very popular with MSEs, with 75 percent of those having mobile phones registering with this money transfer service. ZAP being a new product on the market was not investigated in this study, but it is safe to assume that many MSEs have also registered with ZAP. M-pesa, the product of Safaricom mobile service provider, and ZAP the product of Zain service provider, are all used for money transfers at affordable prices as compared to costs at banking institutions. The M-pesa delivery and receiving points are all in accessible areas, and are in many cases part and parcel of the MSEs.

Table 5.1: Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Age of business in years	318	6.387044	6.376222	.02	35
Number of employees	318	1.556604	1.083983	1	8
Registered businesses (1 = registered)	315	.8984127	.3025855	0	1
Business accounts (1 = keeps business accounts)	318	.745283	.4363887	0	1
Age of owner in years	316	32.33228	9.632635	17	68
Education level in years	314	10.25478	2.884141	0	14
Gender (1 = male)	318	.6006289	.490541	0	1
Marital status (1 = married)	317	.7697161	.4216802	0	1
Mobile possession (1 = Possesses mobile phone)	317	.955836	.2057843	0	1
Years phone has been used	251	3.16243	2.45167	.02	13
M-pesa registration (1 = registered)	297	.7575758	.4292729	0	1
Mobile used for business? (1 = Yes)	318	.8396226	.367534	0	1
Education of neighbour (1 = educated neighbour)	317	.6088328	.4887833	0	1
Same business with neighbour (1 = same business)	314	.5031847	.5007879	0	1
Sales of fast moving items (log of shillings amounts sold in last 3 months)	317	10.89835	1.895849	2.70805	15.78959
Sales of slow moving items (log of shillings amounts sold in last 3 months)	271	9.082666	2.194204	1.098612	13.71015
Total sales of items (log of shillings amounts sold in last 3 months)	317	11.19709	1.801713	2.70805	15.80064
Electricity availability (1 = has access to electricity)	318	.4748428	.5001537	0	1
Distance to tarmac road (in km)	318	.3325472	.6502832	0	5
Distance to mobile shop (in km)	318	1.842044	2.72736	0	15
Distance to repair shop (in km)	318	.3357862	.7897836	0	8
Retail industry (1 = retail)	318	.6446541	.4793723	0	1
Manufacturing industry (1 = manufacturing)	318	.1257862	.3321308	0	1
Service industry (1 = services)	318	.2075472	.4061898	0	1
Other industries (1 = other)	318	.0220126	.1469556	0	1
Permanent premises? (1 = yes)	318	.4402516	.4971997	0	1
Extent of sales increase due to mobile usage (1 = great)	267	.6516854	.477331	0	1
Sales increased due to mobile? (1 = Yes)	262	.9274809	.2598418	0	1
Number of calls made last 2 days	294	4.721088	5.067843	0	30

Source: Author (2009)

The invention of the mobile money transfer system is greatly assisting MSEs with their financial business transactions. For example, they can pay for the goods without travelling to the point of sale; they can receive money from debtors while working, and can securely transport the money to different locations. Even if the mobile phone is stolen, the money would still be safe on the mobile account; moreover even if the money is sent to the wrong person accidentally, the service providers can trace it and recover it for the sender. Investigations on the intensity of the usage of mobile phones revealed that an average of 5 calls had been made during the last 2 days prior to the start of the survey. The maximum number of calls was 30 while 26 people out of the 294 using mobiles for business had not made any calls at all.

This pattern of calls could be an indication that most MSEs preferred to send electronic messages via short message services (SMS) rather than make telephone calls, since the cost of airtime was cited as one of the constraints on using a mobile phone. Sending messages to customers is a cheaper way of communicating via the mobile phones compared to talking. There were some MSEs that were using the mobile for business calculations, but no effort was made to quantify this usage. About 92 percent of MSEs that were using mobiles for business transactions said that their sales had increased as a result of using mobiles. This suggests that the mobile could be improving the performance of MSEs.

Most of the MSEs (64%) are in retail business while 13% are in manufacturing. The service industry which includes hotels, shoe shinning and hair dressing has 21% of the MSEs. The reason for a large concentration of MSEs in the retail industry could be because it is easy to enter and exit and requires little start up capital. Some of the products that are sold, for example, a bunch of bananas in open air sites were from gardens of business owners, which meant that start up capital is not required for such businesses; neither is rent payment required, except for the 20 shillings which is paid to the City Council. In the service industry, for example, hair saloons and hotels, some inputs must be bought, meaning that some start up capital is needed. The same applies to the manufacturing industry, where if a product such as food is to be processed, the equipment for processing it has to be bought. Also, if furniture is to be made or metal has to be fabricated, raw materials have to be bought. Very few MSEs were in the wholesale industry. These were included in other industry classification, which comprised 7% of the MSEs. This category included MSEs selling herbal medicines, which require little capital to start.

With regard to occupations of neighbours, on average 50% had businesses similar to those of the MSEs interviewed. This could be taken to mean that there is little innovation in starting businesses in this sector or that people fear venturing into new businesses. However, since 50% of neighbours were in different businesses, this could be evidence of entrepreneurship in this sub sector. The 50% of business owners not having similar businesses with their neighbours, could have been unwilling to face competition, and therefore looked for something different from common businesses. The similarity of businesses was mainly in areas with high concentrations of fruits and vegetables, or in second hand clothes. This pattern of businesses among neighbours could be a strategy by traders to assist customers, so that if a customer at a clothes firm for example, needs vegetables, he or she can obtain it nearby. The most surprising finding is that not all MSEs operating in the informal sector are poor. Amount sales for some MSEs (5%), mostly in the manufacturing industry, were in millions of shillings exceeded by far the official poverty line. However, the vast majority of MSE owners are extremely poor.

5.3.2 Profiles of Enterprise Owners

Virtually all the people in this sector are literate, with the average number of years of education being 10, or lower secondary. About 39% of MSEs owners have 8 years of schooling (primary education); while 46 percent have 12 years of education (secondary education) and 34% have post secondary education. Only 3% or 10 enterprise owners out of 314 had not gone to school. This negates the common belief that the informal sector has a large percentage of illiterate people. Some of the reasons that could have contributed to high literacy rates in this sub sector include lack of employment and downsizing of employment in the formal sector forcing people to engage in informal activities to earn a livelihood.

About 60% of enterprise owners are male. This finding contradicts the common belief that the sector is dominated by women. Cross tabulation of gender with different industries (retail, manufacturing and service) reveals that the number of men traders is higher than that of females in all industries. This finding could be an indication of men taking seriously the role of being bread winners in an impoverished economy, and thus, venturing into the informal sector which is easy to enter. Indeed, 77 % of enterprise owners are married, suggesting that their motive in business is to support their families. During the field survey, one could easily observe the seriousness with which MSE owners took their jobs. They only stopped for interviews if there

were no customers waiting to be served. Moreover, as noted earlier, 74% of enterprise owners kept accounts of business transactions, which is a sign of good management practices, usually acquired through education or specific training.

The MSE sub-sector is dominated by young adults with average age of enterprise owners being 33 years; the oldest person was 68 years old and the youngest 17. Nearly 80% of the respondents were below the age of 40, suggesting that they have had a chance to benefit from free schooling and that they are supporting young families.

5.3.3 The Infrastructure Supporting the Enterprises

Over 50% of businesses in the sample were lined up near tarmac roads, with an average distance of 3 kilometres from the road; the furthest MSE was 5 kilometres away from a tarmac road and 91% were less than a kilometre away. About 47% of the businesses had access to electricity. Cross tabulation results indicate that most enterprises with electricity were in permanent structures, but there were a few in temporary premises. The average distance to a mobile repair shop was 3 kilometres, with 90 % being less than a kilometre away. Only one enterprise was 8 kilometres away. This proximity to repair shops is understandable since repair shops are part and parcel of the MSEs. The role of education or some training is evident in people's ability to repair mobile phones within the MSE sub-sector.

Shops that sold mobile phones were not among the MSEs that were interviewed. This is as expected because such shops require adequate security which was lacking in most areas that fell into the sample. Moreover, the type of structures within the sample areas are not of the kind that one would risk stocking mobile phones in. The average distance to the mobile shop was 1.8 kilometres, with the furthest MSE being 15 kilometres away. About 96 % of the MSEs were less than 10 kilometres away from the shops that sold mobile phones. The few MSEs that were close to mobile shops were those that were in the vicinity of permanent commercial buildings.

5.3.4 Types of Premises

The premises in the MSE sub-sector vary considerably and can be categorized into permanent and temporary structures (see: appendix IV). Permanent premises are those that had stone walls, wooden walls or mud walls with iron sheets for roofing. Generally, any structure that could not easily be dismantled and reallocated was considered to be permanent. Temporary premises were

those with (i) wooden stands and polythene paper for roofing; (ii) in open air with wooden or portable stands; (iii) in open air with a tree or an umbrella for shelter and; (iv) in open air with the pavement or dirt road being used to display the goods being traded. About 44% of the MSEs had permanent structures, 40% had temporary structures with shelter, while 16 % had temporary sites without shelter. Among those MSEs in the permanent category, 55% were owned by men, while 63% of those in temporary premises were owned by men. In addition to the type of premises, the status of the premises was investigated.

Status is in respect of whether or not rent was being paid for the premises. About 24% of the respondents said that they owned the premises; 58% rented them, while 17% operated from open air sites and did not pay rent apart from the daily registration fee they paid to the City Council. It should be noted that some owners of businesses in open air sites said that they owned the site, while some said they rented the place where their goods were displayed. What were not captured during the interviews is what business owners meant by owning or renting a space. For example, the pavement is a very temporary location, where one can be expected to reallocate in the event of rain and yet some claimed to own or rent the place. The pavement was also be used temporarily, for example, for parking or unloading of the goods. The specific uses of the pavement and similar sites for short-lived durations were not investigated.

Cross tabulation results showed that 71% of MSEs in open air areas are owned by men (as compared to those being rented, where the percentage drops down to 54). However, 67% of the people operating from their own premises are men. An important observation that should be acknowledged is that most of the people who said they owned the premises were operating from their own homes. These were permanent structures that had mud walls but often in poor condition. The small percent of women in open air MSEs could be due to the possibility that few women can cope with the hustles of doing business in open air, where one might have reallocate to and from at very short notice.

5.4 Correlations of mobile phone usage with owner and business characteristics

Table 5.2 illustrates correlation coefficients of mobile phone usage with characteristics of owners and the businesses. It should be noted that a correlation only shows a relationship and not causality. For example, one cannot say that one variable is causing the other variable to change.

The correlation shows the strength of association between variables and it ranges from +1 to -1, indicating that the variables can move in the same or opposite directions.

In the ensuring discussion, a 10% change in a variable is used as an arbitrary base for determining the degree of association between variables.

Correlation of the use of mobile phone with the sales of an MSE shows that a 10% rise in the probability of a sales increase is associated with a 3.97% increase in the probability of using a mobile phone. Similarly a 10% increase in the probability of mobile usage is associated with a 3.97% increase in the probability of the sales increasing. These results show that there is a strong relationship between mobile usage for business and sale going up although one can not tell if mobile usage is the one causing an upward movement in sales or when sales go up MSEs tend to use mobiles to transact businesses.

A 10 percent increase in the number of employees of an MSE is associated with an 8.1% increase in the probability of using a mobile phone for e-commerce, or a 10 percent increase in the probability of using a mobile phone for business is associated with an 8.1% increase in the number of employees. These results indicate that there is some relationship between mobile phone usage in e-commerce and the number of employees at the firm, but as previously noted, the number of employees in the firm could be the reason for mobile usage or the mobile usage could be the factor affecting employment.

Apart from a 10% base, a 100% base can also be used to assess the degree of association between variables.

The correlation of the number of calls made in the last 2 days (to the interview date) with mobile usage for business transactions gives a positive relationship although not as strong as would be expected. A 100% increase in the number of calls made, e.g. a doubling of calls from 3 to 6, is associated with a 23.6 percent increase in the probability of using a mobile phone for e-commerce. Since one cannot tell what is causing this relationship, it can also be said that a 23.6 percent increase in the number of calls is associated with a 100% increase in the probability of using a mobile to transact business.

Table 5.2: Selected correlation coefficients of mobile use with attributes of business and owner characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Mobile used in business transactions (1 = yes)	1.0000									
2. Sales increase due to mobile usage (1 = sales increased)	0.3966	1.0000								
3. Number of employees	0.0809	0.0063	1.0000							
4. Number of calls made in the last 2 days	0.2360	0.1599	0.1908	1.0000						
5. The age of the business	0.0216	-0.0288	0.2676	0.1074	1.0000					
6. Total sales in Kenya shillings.	0.1464	0.1584	0.1359	0.1497	0.1342	1.0000				
7. Education of owner	0.1463	0.0677	0.0982	-0.0144	-0.2088	0.1234	1.0000			
8. Gender (1 = male)	0.0360	0.0360	0.1461	0.1455	0.1521	0.1882	-0.1098	1.0000		
9. The age of business owner	-0.0842	-0.0098	0.0975	0.0611	0.5196	0.0049	-0.2234	0.1007	1.0000	
10. Export/import (1 = uses mobile phone to export/import)	-0.0782	-0.0887	0.0428	-0.0487	0.0269	0.0222	-0.1258	0.0163	0.0271	1.0000

Source: Author (2009)

Another suitable comparison base in a discussion of correlation coefficients is a 1% change in a variable.

The correlation of the age of the business and the mobile usage for business shows some positive relationship, although not a very strong one. A 1% increase in the mean age of a business is associated with a 0.026% increase in the probability of usage of mobile phone in e-commerce. The relationship of total sales and the use of mobile phone for business transactions is not very strong, whereby a 1% increase in total sales is associated with a .146% increase in the probability of using a mobile phone. Education and mobile usage have a positive correlation although not a very strong one, as a 1% increase in the average education of the owner of an MSE is related to a .146% increase in the probability of using a mobile for e-commerce.

Gender and mobile usage has a positive but weak relationship, whereby a 10% increase in the proportion of men in the sample is associated with a 0.36 % increase in the probability of using a mobile phone. The age of the owner is negatively correlated with the chance of a mobile being used for business. A 10% increase in the average age of business owners is associated with a .84% decrease in mobile usage. A 10% increase in education is associated with a 2.23% decrease in the age of business owners.

The correlation coefficients give some idea about the strength of association between selected variables and the usage of the mobile phone for e-commerce. The correlations can serve as rough guides in formulating models for analyzing determinants of mobile usage in e-commerce as well as models for assessing effects of the models on performance of MSEs.

CHAPTER SIX: ESTIMATION RESULTS

6.1 Introduction

The mobile phone is the preferred ICT for e-commerce among MSEs in the informal sector. However, literature gives contradicting results on the role of ICTs in business transactions among MSEs. For example, a study by Chowdhury and Wolf (2003) suggested that investment in ICTs has a negative impact on labour productivity and a positive impact on general market expansion. This chapter first presents empirical evidence on determinants of the possession of a mobile phone within the informal sector and then assesses the impact of using it for e-commerce on performance of MSEs, controlling for other relevant factors such as firm attributes, owner characteristics and the environment in which the MSEs operate.

6.2 Determinants of Mobile Possession

In this section, the focus is on the possession of the mobile phone by an MSE and the factors influencing the possession. It is necessary to understand the factors affecting mobile possession before analyzing its use in e-commerce. Literature tells us that the readiness factors affect whether or not a firm's owner possesses an ICT (Tandon, 2002; Bajaj and Leonard). It is interesting to know if the age of a business, its location, and social infrastructure, such as availability of electricity and proximity to roads also influence the possession of a mobile phone. 97% of MSEs investigated had mobile phones. It is important to know the determinant of mobile phone possession so that those having them can continue with the possession and the 3% not having would possess them.

Table 6.1 shows the results of estimating a model of a mobile phone possession. The estimating equation is of the form:

$$MP_i = \alpha + \beta_1 X_i + \beta_2 W_i + \beta_3 K_i + \beta_4 L_i + e_i \qquad (1)$$

In the linear model, MP_i is a dummy variable that takes the value of one if firm i has a mobile phone and a value of zero if otherwise. In the logit and probit models, MP_i is the index of perceived benefit of possessing a mobile, X_1 is a vector of readiness factors for firm i, W_i is a vector of characteristics of the owner of MSE_i, K_i are the attributes of firm i and L_i the location specific attributes for $firm_i$

Table 6.1: Determinants of mobile possession by business owner

(Absolute *t*-Statistics in parentheses)

Variables	Model parameters estimates (marginal effects)					
	LPM		Logit		Probit	
Infrastructural factors						
Electricity availability (1 = available)	.0449 (1.99)	.0492 (1.97)	.0459 (2.05)	.0426 (1.83)	.0459 (1.95)	.0444 (1.84)
Distance to repair shop in kilometres		.0036 (0.23)		-.0000 (0.00)		.0007 (0.05)
Distance to a mobile shop in kilometres		-.0181 (1.26)		-.0096 (0.89)		-.0130 (0.97)
Distance to tarmac road in kilometres		-.0333 (0.80)		-.0327 (0.87)		-.0319 (0.70)
Distance to repair shop in kilometres (squared)		.0116 (0.87)		.0117 (0.71)		.0121 (0.61)
Distance to mobile shop in kilometres (squared)		.0008 (0.63)		.0004 (0.40)		.0006 (0.51)
Owner and firm characteristics						
Age of business		-.0021 (0.99)		-.0016 (1.07)		-.0018 (0.99)
Owner age		.0006 (0.40)		.0004 (0.39)		.0004 (0.34)
Gender (1 = male)		.0162 (0.69)		.0144 (0.72)		.0131 (0.62)
Education level		.0029 (0.70)		.0016 (0.57)		.0019 (0.55)
Divisions (Kasarani and Westlands are omitted)						
Westlands		.0414 (0.82)				
Dagoretti		-.0071 (0.15)		-.0059 (0.17)		-.0040 (0.110
Makadara		.0298 (0.63)		.0200 (1.00)		.0238 (0.80)
Kamukunji		.0211 (0.43)		.0093 (0.39)		.0152 (0.50)
Embakasi		-.0406 (0.80)		-.0514 (0.69)		-.0445 (0.86)
Langata		.0366 (0.71)		.0197 (1.04)		.0264 (0.92)
Starehe		.0823 (1.46)		.0299 (1.74)		.0384 (1.43)
Constant	.9341 (58.94)	.9025 (12.18)				
R^2	0.0124	0.0456				
Pseudo R^2			0.0367	0.1198	0.0367	0.1157
F-Statistics (*p*-value)	3.96 (0.1593)	0.82 (0.6651)				
χ^2-Statistics (*p*-value)			4.22 (0.0401)	11.79 (0.7583)	4.22 (0.0401)	11.39 (0.7848)
Observations	317	311	317	273	317	273

Source: Author (2009)

Three models are estimated; namely, the linear probability model (LPM), which is estimated with ordinary least squares method (OLS), and logit and probit models, both of which are estimated with maximum likelihood (ML) method. The three models are estimated together to test the robustness of the model parameters. Availability of electricity is the key variable affecting possession of a mobile phone. Columns (2) and (3) of Table 6.1 contain OLS estimates while columns (4) and (5) contain the marginal effects of the logit model. Columns (6) and (7) show the marginal effects of the probit model. A marginal effect is the change in probability due to a unit change in an explanatory variable.

The estimates display similar magnitudes of the effect of electricity on the probability of possessing a mobile phone. The OLS results for the linear model show that having access to electricity increases the probability of an MSE possessing a mobile phone by 4.59% (*t*-value = 1.99). Similarly, the marginal effect for the logit is 4.46% (*z*-value = 2.05), and that of the probit is 4.59% (*z*-value = 1.95). The estimate of the coefficients on distance to mobile phone repair shop in all methods are statistically insignificant, meaning that distance has no effect on the probability of possessing a mobile phone. This finding could be reflecting the fact that mobile repair shops are widely available in the informal sector.

The distance to shops selling mobile phones is negatively associated with the probability of possessing a mobile phone, but this association is statistically insignificant. The major factor affecting the probability of a mobile phone possession by an MSE is electricity. This means that if electricity is broadly available in the informal sector, the probability of mobile phone possession among MSEs would greatly increase. The mobile phones whose batteries can be charged using solar energy are presently in the Kenyan market, but this technology is new. However, its availability in the study area was not investigated.

The R^2 in the linear model is 0.0124, meaning that 1.24% of the variation in the probability of an MSE possessing a mobile phone is accounted for by the availability of electricity. The *p*-value of the *F*-statistic of the model is 0.04; therefore, the null hypothesis that electricity has no effect on the possession of the mobile phone is rejected; i.e., electricity has an effect on mobile possession. The *p*-value is the magnitude of the error made by saying that the effects of the explanatory variables jointly are not equal to zero. R^2 and p-values of the logit and probit models further suggest that the null hypothesis should be rejected.

The effects of all the readiness factors on the probability of possessing a mobile are statistically insignificant. Electricity remains statistically significant with a coefficient of 4.9% (*t*-value = 1.97) in the linear model, and of 4.3% (*z*-value = 1.83) in the logit model and 4.4% (*z*-value = 1.8) in the probit model in the expanded specification. The R^2 of the linear model is 0.046, which means that 4.6% of the variations in the probability of possessing a mobile phone is explained by the joint effects of the readiness factors. In the logit model, the pseudo R^2 is 12%, while the probit model has an R^2 of 11.3%. The *p*-value for the F-statistic in the linear model is 0.665, in the logit model; *p*-value for the χ^2 is 0.758, while in the probit model *p*-value is 0.78 for the χ^2. All the *p*-values of the three models suggest that all variables in the model together do not influence the possession of a mobile phone. Therefore, the null hypothesis that readiness factors, owner and firm attributes, and the locations of MSEs together have no effect on mobile phone possession cannot be rejected.

6.3 Determinants of mobile phone usage for business transactions

This section analyzes factors that motivate business owners to use mobile phones for business transactions given that they possessed a mobile phone. The results of the estimates are presented in table 6.2. The estimating equation is:

$$MU_i = \alpha + \beta_1 X_i + \beta_2 W_i + \beta_3 L_i + e_i \qquad (2)$$

Where,

In the linear model, MU_i is a dummy variable that takes a value of one if firm i use a mobile phone for business purposes and a value of zero otherwise. In the logit and probit models MU_i is an index of perceived benefit of using a mobile phone. X_i is a vector for characteristics of the owner of an MSE, W_i are the attributes of firm i, and L_i the location dummy for MSE i. In the LPM, an additional year of education increases the probability of using a mobile phone for business by 1.8% (*t*-value = 2.48). The marginal effect for the logit model shows that an additional year of education increases the probability of using a mobile phone in e-commerce by 1.63% (*z*-value = 2.57). In the probit estimates, a year of education increases the probability of using a mobile by 1.78% (*z*-value = 3.30).

Table 6.2: Determinants of mobile phone use for e-commerce

(absolute *t*-Statistics in parentheses)

Variables	Model parameters estimates (marginal effects)					
	LPM		Logit		Probit	
Owner and firm characteristics						
Education level	.0183	.0224	.0163	.0164	.0178	.0190
	(2.48)	(3.01)	(2.57)	(3.36)	(2.57)	(3.30)
Age of business	.0036	.0038	.0039	.0033	.0042	.0042
	(1.03)	(0.93)	(1.12)	(1.13)	(1.17)	(1.20)
No. of employees	.0353	.0226	.0603	.0490	.0582	.0546
	(1.77)	(1.07)	(2.17)	(2.10)	(2.09)	(1.83)
Owner age		-.0031		-.0021		-.0024
		(1.25)		(1.37)		(1.29)
Gender (1 = male)		.0837		.0654		.0735
		(1.96)		(1.95)		(2.10)
Neighbour education		.1142		.0987		.1085
		(2.45)		(2.39)		(2.69)
Neighbour same business (1 = yes)		.0663		.0473		.0463
		(1.50)		(1.54)		(1.34)
Type of premises (1= permanent)		.0572		.0366		.0370
		(1.29)		(1.25)		(1.09)
Retail industry (other sectors omitted)		.1499		.0768		.0997
		(1.08)		(0.72)		(0.94)
Manufacturing industry		.2868		.1143		.1282
		(1.96)		(3.61)		(2.28)
Service industry		.1829		.0602		.0799
		(1.28)		(1.07)		(1.06)
Division dummies (comparison location is Kasarani)						
Westlands		.1083		.0730		.0790
		(1.25)		(2.43)		(1.56)
Dagoretti		.1154		.0584		.0669
		(1.35)		(1.74)		(1.33)
Makadara		.1068		.0676		.0707
		(1.20)		(2.09)		(1.31)
Kamukunji		.0314		.0371		.0422
		(0.36)		(0.90)		(0.72)
Embakasi		-.1647		-.1402		-.1544
		(1.92)		(1.26)		(1.70)
Langata		-.0474		-.0054		-.0077
		(0.54)		(0.09)		(0.11)
Starehe		.0521		.0390		.0416
		(0.61)		(0.96)		(0.72)
Constant	.5714	.2784				
	(6.69)	(1.33)				
R^2	0.0377	0.1443				
Pseudo R^2			0.0500	0.2009	0.0515	0.2005
F – Statistics (P-value)	4.05	2.71				
	(0.0076)	(0.0003)				
χ^2 - statistics (P-value)			13.92	53.54	14.34	53.45
			(0.0030)	(0.0000)	(0.0025)	(0.0000)
Observations	314	308	314	308	314	308

Source: Author (2009)

The age of business has some influence on the decision to use a mobile for business purposes. However, that influence is statistically insignificant. The number of employees is another important determinant of usage of mobile phone in business transactions. In the LPM, an additional employee increases the chance of using a mobile phone for e-commerce by 3.53% (t-value = 1.77). In the logit model, an additional employee increases the usage probability by 6.6% (z-value = 2.17), while in the probit model an addition to the number of employees increases the probability of using a mobile phone by 5.8% (z-value = 2.09). These results are intuitive because when an MSE has many employees, one would expect greater exchange of business messages among employees and between them and other businesses. The results are also in line with the correlations results which showed a positive association between the number of employees and the probability of using a mobile phone for business transactions.

The R^2 of the linear model is 0.038, meaning that 3.8% of the changes in the probability of using a mobile phone in business transactions can be explained by the variables included in the model (p-value for the F-statistic = 0.008). The logit model has a psuedo R^2 of 0.05 and the p-value of the χ^2-statistic = 0.003, while the R^2 of the probit model is 0.051 with a p-value of 0.0025 for the χ^2. The null hypothesis that all the explanatory variables in the model together have no effect on the usage of mobile phones for e-commerce is rejected since the error being made by rejecting the null hypothesis is very small in all the models (less than 1 percent).

After controlling for other variables, notably age of owner, type of business the neighbour runs, the education level of the neighbour, the type of business and places where the MSE is located, education still comes out as an important factor in determining the usage of mobile phones for business transactions. The effect of the number of employees is also strong, except in the linear model, where it is not statistically significant. Gender is another important determinant of mobile use, whereby being a man increases the probability of using a mobile phone for e-commerce by 8.37% (t-value = 1.96) in the linear model. In the logit model, the increase is by 6.5% (z-value = 1.95), and an increase of 7.4% (z-value = 2.10) in the probit model. Peer effects or social interaction effects might be high within the sector because having an educated neighbour increases the probability of using a mobile for e-commerce by 11.42% (t-value = 2.45) in LPM. 9.8% (z-value = 2.39) in the logit model, and by 10.85% (z-value = 2.10) in the probit model. The type of industry also determines whether an MSE is likely to use a mobile phone for

e-commerce or not. In the LPM, the MSE in the manufacturing industry have a 28.7% higher chance of using a mobile phone for e-commerce than MSEs in other industries. The logit model shows an increase of 11.43% (z-value = 3.61) in the probability of using a mobile phone. The probit model suggests a 12.8% (z-value = 2.28) higher chance. These findings are as expected since in the manufacturing industry; there are a lot of business interactions between suppliers and firms. Similarly customers make orders and therefore, need to be alerted when their goods are ready.

The R^2 for the linear model after controlling for other covariates is 14.43% and the p-value for the F-statistic is 0.0003. The results clearly indicate that the null hypothesis that the owner characteristics, firm attributes, and the environment in which the MSE operates together have no impact on the usage of mobile phones for e-commerce can be rejected.

6.4 The impact of mobile phone on business performance: effect on probability of an increase in sales

An increase in sales due to the use of a mobile phone is used as a measure of performance. The following regression model was estimated:

$$SU_i = \alpha + \beta_1 M_i + \beta_2 X_i + \beta_3 W_i + \beta_4 L_i + e_i \qquad (3)$$

In the linear model, SU_i is a dummy variable that takes a value of one if sales were reported to have increased prior to the survey and a value of zero otherwise. In the logit and probit models, SU_i is an index associated with sales increases. M_i is a dummy variable with a value equal to one indicating usage. X_i and W_i are vectors for characteristics of the owner and firm respectively, while L_i are dummies of locations for MSEs. Coefficients on mobile usage in all the models is the same (0.459) and statistically significant. The results show that mobile usage increases the probability of a sales increase, i.e. the MSEs in the informal sector that are using mobile phones for e-commerce have a 46% higher chance of their sales going up than the MSEs not using mobile phones.

Table 6.3: Determinants of probability of sales increase

(absolute *t*-Statistics in parentheses)

Variables	Model parameters (marginal effects)					
	LPM (OLS)		Logit (MLE)		Probit (MLE)	
Communication Technology						
Mobile phone use (1 = Used a mobile phone for business)	.4590 (8.07)	.5625 (6.49)	.4590 (3.87)	.6323 (2.82)	.4590 (5.29)	.6081 (3.68)
Owner and business characteristics						
Education level		.0014 (0.28)		.0004 (0.13)		-.0008 (-0.21)
Owner age		-.0032 (0.35)		-.0020 (0.28)		-.0018 (0.21)
Owner age squared		.0001 (0.48)		.0000 (0.42)		.0000 (0.34)
Gender (1 = male)		.2113 (1.92)		.0123 (0.28)		.0144 (0.25)
Business registration (1 = registered)		.1001 (1.98)		.1502 (1.19)		.1736 (2.10)
Business accounts (keeps accounts)		.0542 (1.51)		.0675 (1.54)		.0747 (1.95)
Interactions						
Gender x mobile use		-.2130 (1.86)		-.0284 (0.64)		-.0278 (0.45)
Divisions dummies (Kasarani and Kamukunji are omitted)						
Westlands		.0050 (0.08)		-.0150 (0.27)		-.0219 (0.39)
Dagoretti		.0104 (0.17)		-.0066 (0.12)		-.0179 (0.30)
Makadara		.0247 (0.41)		.0192 (0.62)		.0293 (0.62)
Kamukunji		.0857 (1.39)				
Embakasi		-.0763 (1.19)		-.1049 (0.83)		-.1035 (1.28)
Langata		.0015 (0.02)		.0078 (0.24)		.0136 (0.31)
Starehe		-.0062 (0.10)		-.0249 (0.41)		-.0236 (0.43)
Constant	.5 (9.11)	.2846 (1.43)				
R^2	0.2004	0.2695				
Pseudo R^2			0.2045	0.3379	0.2045	0.3349
F - statistics (p-value)	65.17 (0.0000)	5.90 (0.0000)				
χ^2 - statistics (p-value)			27.87 (0.0000)	42.39 (0.0001)	27.87 (0.0000)	42.01 (0.0001)
Observations	262	256	262	225	262	225

Source: Author (2009)

On controlling for effects of other variables, i.e. owner and business attributes and locations where MSEs operate from, the effects of a mobile phone usage for e-commerce on the probability of sales increase, is still high. LPM estimates indicate a 56% (t = 6.49) higher chance of sales going up among the MSEs using mobile phones for e-commerce. Logit models shows an increase of 63% (t = 2.8) in the probability, while the probit coefficient indicate an increase of 61% (t = 3.6) in the probability of an increment in sales. A one year increase in the average age of the owner of an MSE decreases the chance of sales going up in all the estimated models, although the coefficients are statistically insignificant; when the age is doubled, the effects become zero. This finding might suggest that the performance of businesses of younger people within the informal sector is better than that of the older operators. These results correspond with those of correlations whereby, there was a negative correlation between the age of the owner of an MSE and an increase in sales.

Gender is only statistically significant in the LPM estimates, whereby the probability of sales of men within the informal sector going up is 21% (t = 1.92) higher than that of women. When gender is interacted with mobile use, the results show that a woman using a mobile phone for e-commerce in the informal sector, has a higher chance of sales going up as compared to men using the phone in the sector. However, these results are only statistically significant in the LPM estimates whereby the chance of sales going up for women is 21.3% (t = 1.86) higher than that of men. Registration of firm and keeping of business records have impacts on the probability of an increase in the sales of an MSE as the results in Table 6.3 indicate. Keeping of business accounts is a good business practice and it is known to improve the performance of many firms (Kibera, 1996). Therefore, the results are as expected. The registration of a firm, which in this case means a payment of daily fee of twenty shillings to the council officers, could have a positive impact on sales. The assumption is that the firm stays closed on the days that the fee is not paid. Therefore, the MSE loses sales for that particular day. Registration of firms was found to improve profits in a study by McKenzie and Sakho (2007) on the impact of formality on firm profitability.

The R^2 of the model using only the effect of mobile use on the increase in the probability of a sales increase is 0.2004, meaning that 20% of the variations in the probability of sales going up can be explained by the use of a mobile phone for e-commerce, and the p-value for the F-statistic

= 0.000 in the linear model. The psuedo R^2 for the logit model is 20.5%, and an R^2 of 20.45% for the probit model. The *p*-values for the test statistics of models are zero, implying that the null hypothesis that using a mobile phone for business does not increase the chance of sales going up is rejected. The joint effect of all the variables in the model gives an R^2 of 27% for the LPM estimates, and an R^2 of 34% in the logit model, while the R^2 for probit model is 33%. The *p*-values of all models suggest that the null hypothesis that owner attributes, business characteristics and the places where MSEs are located jointly have no effect on the probability of sales going up is rejected.

6.5 The impact of mobile usage on business performance: effects on log of sales amount

In this section, the log of sales amount is used as a measure of performance, i.e. log of sales amount for fast and slow moving items and for both types of items. In this case several versions of the model are estimated with OLS. The estimating equation is:

$$AS_i = \alpha + \beta_1 M_i + \beta_2 X_i + \beta_3 W_i + \beta_4 L_i + e_i \qquad (4)$$

Where:

AS_i stands for the log of sales amount for firm i. M_i represents a dummy variable for mobile usage. X_i and W_i are vectors for owner attributes and firm characteristics' respectively; while L_i represents location dummies. The results show that firms that use mobile phones for e-commerce have sales from fast moving items which are 74% (t = 2.56) higher compared to sales of firms not using the phone to transact business. Similarly, e-commerce firms have sales that are 145% higher sales for slow moving items and total sales that are 82% higher (t = 3.03). These estimates are statistically significant. They show clearly that even when the sales amounts are used as a measure for performance of a firm, the positive effect of a mobile phone can be detected. On controlling for the effects of other variables, such as owner and business attributes and location of the MSEs, the OLS estimates show that people using mobile phones in e-commerce are able to increase the sales amounts of first moving items above sales of firms not using not using phones. The e-commerce firms increase the sales amount of slow moving items by 117% and sales of both items by 54%. The age of the owner of an MSE has a negative effect on sales of both items.

Table 6.4: Determinants of sales amounts

(absolute *t*-Statistics in parentheses)

Variables	Specifications					
	Log Sales from fast moving items		Log Sales from slow moving items		Log Sales from both items	
Communication Technology						
Business mobile (1 = Uses mobile for business)	.7353 (2.56)	.4683 (1.60)	1.449 (3.92)	1.173 (3.23)	.8229 (3.03)	.5397 (2.00)
Owner and business attributes						
Owner Age		.0054 (0.09)		-.0630 (-0.82)		-.0110 (-0.19)
Owner age squared		-.0001 (0.15)		.0010 (0.96)		.0001 (0.18)
Education level		.0430 (1.13)		.1144 (2.38)		.0499 (1.42)
Gender (1 = male)		.5065 (2.37)		.7763 (3.05)		.5183 (2.62)
Business accounts (1 = keeps accounts)		.7946 (3.21)		.6992 (2.31)		.8721 (3.82)
Division dummies (Kasarani is omitted)						
Westlands		1.434 (3.37)		1.342 (2.56)		1.513 (3.84)
Dagoretti		.8745 (2.05)		.8418 (1.60)		1.063 (2.70)
Makadara		1.438 (3.32)		1.770 (3.28)		1.555 (3.88)
Kamukunji		1.551 (3.60)		2.061 (3.80)		1.778 (4.46)
Embakasi		.8053 (1.84)		1.092 (2.05)		.8698 (2.15)
Langata		1.082 (2.50)		1.646 (3.09)		1.295 (3.24)
Starehe		1.069 (2.53)		1.483 (2.78)		1.201 (3.07)
Constant	10.28139 (39.07)	8.094233 (6.56)	7.842 (22.90)	5.54284 (3.66)	10.50662 (42.18)	8.301853 (7.28)
R^2	0.0204	0.1411	0.0540	0.1979	0.0282	0.1866
F - statistics (*p*-value)	6.55 (0.0110)	3.75 (0.0000)	15.34 (0.0001)	4.80 (0.0000)	9.16 (0.0027)	5.24 (0.0000)
Observations	317	311	271	267	317	311

Source: Author (2009)

These results are very similar to the ones of the effects of age on the probability of sales going up in Table 6.3. Men in the informal sector experience an increase of 51% in sales ($t = 2.37$) on the fast moving items as compared to women, an increase of 77% in sales ($t = 3.05$) on slow moving items and an increase of 52% ($t = 2.62$) on both items. Having business records increases the sales amounts of fast moving items by 79% ($t = 3.21$), the sales of slow moving items by 70% ($t = 2.31$) and the sales amounts of both items by 87% ($t = 3.82$). Keeping records of business transactions has a positive impact on performance of firms.

The locations of MSEs have positive effects on sales amounts; for example, MSEs located in Kamukunji division have sales amount of fast moving items of 155% ($t = 3.6$) above the MSEs in Kasarani division. Similarly, they have 200% ($t = 3.8$) higher for slow moving items and 178% ($t = 4.46$) higher for both items. It should be noted that Kamukunji was one of the divisions where some sales ran into millions of shillings; the division is specifically identified with metal fabrication activities.

The model for the effect of mobile usage on fast moving items has an R^2 of 2.04%. The R^2 for the equation of slow moving items is 5.4% and for total amounts equation is 2.8%. The p-values for F-statistics suggest that the hypothesis that mobile phone usage for e-commerce has no effect on sales amounts should be rejected. R^2 for total sales equation variable in the model is 0.1411 in the fast moving items, meaning that 14.1% of the changes in the fast moving items can be explained by all the variables included in the model. The R^2 for the goodness of fit of the equation for the slow moving items is 19.79% and that for total sales equation is 18.66%. The null hypothesis that all variables jointly have no effect on sales amounts is strongly rejected since the p - values are all equal to zero.

6.6 The impact of mobile usage on business performance: effects on employment

This section uses the number of people employed by an MSE and the log of the number of employees as a measure of performance. The estimating model is as follows:

$$NP_i = \alpha + \beta_1 M_i + \beta_2 X_i + \beta_3 W_i + \beta_4 L_i + e_i \qquad (5)$$

Where, NP_i is the number of people of people employed by firm i, or the log of the number of employees in firm i. Variables M_i, X_i, W_i and L_i are the same as in Eq. 4. The use of a mobile phone for e-commerce is associated with an increase of .386 (t = 2.36) in the number of employees in an MSE, i.e., if an additional 100 MSEs used mobile phones in e-commerce, employment within the informal sector would go up by 38 people. In column (3), the coefficient where the dependent variable (no. of employees) is in log form, the coefficient on mobile phone dummy shows that the use of mobile phones in business is associated with an 18.5% increase in employment. There was also a positive correlation between the number of employees and the usage of employees and mobile phone usage in e-commerce. This is a clear indication that mobile phones have an influence on employment in the informal sector.

The age of the owner of an MSE has a positive effect on the number of employees an MSE would have, whereby an additional year in the average age of the owner of an MSE in the informal sector increases the number of employees by 7.2% (t = 2.01), and also increases the log number of employees by 3.5% (t = 2.16), but when the age is doubled, the number of employees decreases. These findings imply that older people within the informal sector tend to have more than one employee in the firm, while younger operators and very old people prefer to work alone. This is close to reality, because younger business owners are not yet settled in their jobs, but the older people have had the same business much longer. This argument is supported by the results of the correlation between the age of the owner and the age of a business where the relationship is very strong.

Being a man in the informal sector increase employment by 0.377 (t = 3.05) or by 18.6% (t = 3.34). Registration of the firm has a positive influence on the number of employees a firm would have, but the impact is statistically insignificant. Nevertheless, keeping business records has very little influence on the number of employees, whereby firms that keep record of their business transactions increase the number of employees by .015 (t = 0.11). There is a decrease of 0.6% (t = 0.08) in the log number of employees among those MSEs that keep records. All the divisions within the model suggest a decline in the number of employees as compared to Kasarani. This might suggest that some businesses specific to Kasarani increase employment in the informal sector.

Table 6.5: OLS Estimates of the effect of mobile phone usage on employment

(absolute *t*-Statistics in parentheses)

Variables	Model specifications			
	Number of employees		Log of number of employees	
Business communication technology				
Business mobile (1 = Uses mobile phone for business)	.3864 (2.40)	.4072 (2.40)	.1851 (2.47)	.1917 (2.49)
Owner and business attributes				
Education level		.0394 (1.79)		.0172 (1.72)
Owner Age		.0725 (2.01)		.0352 (2.16)
Owner age squared		-.0008 (1.62)		-.0004 (1.73)
Gender (1 = male)		.3769 (3.05)		.1863 (3.34)
Business registration (1 = registered)		.2573 (1.22)		.1591 (1.66)
Business accounts (1 = keeps accounts)		.0152 (0.11)		-.0055 (0.08)
Division dummies (Kasarani is omitted)				
Westlands		-.8276 (3.35)		-.4253 (3.80)
Dagoretti		-.6690 (2.70)		-.3144 (2.80)
Makadara		-.7724 (3.08)		-.3983 (3.51)
Kamukunji		-.3165 (2.28)		-.2047 (1.83)
Embakasi		-.2925 (1.16)		-.1773 (1.55)
Langata		-.5383 (2.14)		-.3006 (2.64)
Starehe		-.3441 (1.40)		-.2282 (2.05)
Constant	1.2353 (8.22)	-.6475 (0.89)	.1382 (2.01)	-.7511 (2.29)
R^2	0.0173	0.1288	0.0189	0.1451
F-statistics (*p*-value)	5.55 (0.0191)	3.10 (0.0002)	6.10 (0.0140)	3.57 (0.0000)
Observations	318	309	318	309

Source: Author (2009)

The R^2 for employment model (1) is 0.0173, which is interpreted to mean that 1.73% of the variations in the employment of a firm can be explained by the use of a mobile phones in business, the p-value for F-statistic = 0.019. Similarly, the R^2 of the model with only the log number of employees is 1.89%, and the p-value of the F-statistic is 0.014. Therefore, the null hypothesis that the use of mobile phones for e-commerce has no effect on the number of employees of an MSE is rejected. The R^2 of the model having all the variable is 0.1288, meaning that 12.9% of the variations in the number of people employed by an MSE in the informal sector can be explained by all the explanatory variables in the model. The equation with all variables in the log number of employees has an R^2 of 14.5%. The p-values of the F-statistics indicate that the null hypothesis that the effect of all coefficients together on employment is equal to zero should be rejected. Therefore, all the variables jointly have an effect on employment.

Profitability is another measure of performance of an MSE, but data on cost of items sold was not available.

M-Pesa, a mobile phone money transfer service, is another form of usage of a mobile phone for e-commerce. Money transfer services have spread faster in Kenya than any other technological innovation in the country's history (Suri, 2009). According to Heyer and Mas (2009) M-Pesa affords the scale and efficiencies of corporate capitalism and the flexibility and contextual appropriateness of informal markets. They further state that an obvious prerequisite for mobile phone money transfer is the degree of mobile phone penetration within the population. As noted earlier, 95% of the MSEs interviewed possessed mobile phones, while 75% had registered with the M-Pesa service. This study estimated the impact of M-Pesa registration on the performance of MSEs using the probability of sales increase, the log of sales amounts and unit costs as performance indicators.

The results which are illustrated in appendix III show that M-Pesa increases the probability of sales going up by 15%. It should be noted that the 46% impact of mobile phone usage for e-commerce on the sales increase that is presented in table 6.3 includes many other mobile phone business transactions. The M-Pesa instead, is a specific transaction of mobile phone usage for e-commerce. Registration with M-Pesa was also found to increase sales amounts and unit prices for both fast and slow moving items. The increase in prices of items sold that is associated with M-Pesa contradicts the findings by Goldmanis et al (2009), which show that e-commerce

decreases prices of merchandise. This contradiction could be attributed to their survey being based on the internet where consumers buy items online at low transaction costs. More importantly, the use of mobile phone for e-commerce enables informal sector MSEs to sell items according to consumer preferences and thus to charge more for what customers want. Moreover, M-Pesa enables MSEs to buy or sell high value goods by facilitating access to credit and savings. The M-Pesa users also exploit specific market niches. For example, an MSE operator in Kenya is able to buy branded or high value products from a neighbouring country paying for them using an M-Pesa account and sell the products in Kenyan markets at premium prices.

6.7 Summary of the Results of Key Hypotheses Tests

The hypothesis that electricity has no effect on the possession of a mobile phone was strongly rejected, while the one stating that all readiness factors (owner characteristics, firm attributes and the environment under which the MSEs operate) together have no impact on the possession of a mobile phone could not be rejected. Electricity is the key determinant in the possession of a mobile phone.

The hypothesis that education of the owner of an MSE, the age of the business and number of employees together have no effect on the usage of mobile phone for e-commerce was rejected. Similarly, the hypothesis that readiness factors together have no influence on the usage of a mobile phone for business transactions was rejected. Education of both the owner and the neighbour, and the number of employees were found to be major determinants of mobile usage for e-commerce.

The hypothesis that the usage of a mobile phone for e-commerce has no impact on the performance of an MSE was rejected in all the three measures of performance used, namely, increase in sales, sales amounts and employment. The usage of mobile phone was found to be a strong determinant of the performance of an MSE.

CHAPTER SEVEN: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter gives a summary of the main findings and conclusions of the thesis and discusses policy recommendations in light of these findings.

7.2 Summary of Key Findings and Policy Implications

The initial purpose of this thesis was to investigate the role of information and communication technologies (ICTs) in e-commerce among micro and small enterprises (MSEs) in the informal sector in Nairobi. However, after an intensive field work among the MSEs within the informal sector in Nairobi, the focus shifted to the role of the mobile phone as it was found to be the prevalent ICT among MSEs in the sector. Accordingly, the study objectives were reformulated as follows: a) to analyze the determinants of mobile phone possession among MSEs; b) to establish the extent to which mobile phones are being used for e-commerce in the informal sector; and c) to determine the impact of mobile phones on performance of the informal sector MSEs.

Some of the MSEs investigated operated from City Council markets, but the majority of them operated from permanent or temporary shelters or in open air sites. The key findings of the study are: a) most of the MSEs operating in open air sites are extremely poor, but a few also, especially those in manufacturing or metal fabrication activities are quite wealthy, thus, there is a high degree of income inequality in the informal sector; b) most of the businesses in the MSE sub-sector are young, with 74% having been in operation for less than 10 years. Many of these businesses pay a daily fee of 20 shillings to the City Council, but a few MSEs are located in areas considered to be a security threat to the City Council officers and thus do not pay the fee; c) a substantial number of the operators keep records of their businesses; d) the average number of calls made by an MSE 2 days prior to the start of the survey was 5, the maximum number being 30; c) virtually everyone in this sector is literate with average education being lower secondary; only 3% of the operators had not gone to school; d) the sector is dominated by adults, with the average age being 33 years; e) availability of electricity is the key variable affecting possession of a mobile phone.

The impact of the mobile phone on business performance was measured using the probability of sales of an MSE going up due to mobile use, or the sales amounts and employment increasing for the same reason. The LPM, logit and probit models were used in the equation of sales going up. The MSEs that use a mobile phone for business have a 46% higher chance of their sales increasing as compared to the ones not using. The null hypothesis that mobile phone usage for e-commerce does not increase sales was rejected. Moreover the use of mobile phone increases sales of first moving and slow moving items of an MSE. It is clear that the hypothesis that using a mobile phone in business has no effect on sales amounts is strongly rejected. The keeping of business records positively impacts on sales amounts. The mobile phone has a large influence on the number of employees in a firm.

There is no clear categorization of MSEs that can be made. Grouping all small businesses in one category of small and micro enterprises, or using employment size can be misleading, as this could lead to some MSEs being left out of the bracket, especially during the formulation of policies intended to help these firms. Some MSEs are owned by people who are economically well off, and others have 1 employee but have large sales. In light of this, having all operators paying a daily fee of 20 Kenya Shillings is a policy measure that does not make sense. This encourages operators who are not sure of making any sales on a particular day to stay home rather than participate in market activities, and is not consistent with Vision 2030 plan of lifting incomes of all households.

The assertion of the recent Kenyan Economic Report (2009) that MSEs in Kenya have a high mortality rate whereby half die within the first three years is not supported by evidence generated in this study. The average business age was found to be 6 years, with the oldest being 35 years and the average age of the owners is 33 years. This means that the majority have been in the same business for more than 3 years; what might have changed could be diversification in the activities. Although diversification was not captured by this study, it was common to notice, for example, an MSE selling second hand clothes also selling fruits or vegetables. If business mortality rate among MSEs were as high as claimed in the Kenya Economic Report, most businesses would be less than one year old.

Suggestions by Bigsten et al (2004) that policies in Kenya should aim at integrating the formal and the informal sectors by improving the infrastructure, capacity building, credit delivery and supporting networks does not seem practical and would be difficult to implement. Each sector makes a contribution to the economy of the country, and therefore deserves government support. The 20 shilling daily fee to the City Council amounts to millions of shillings since there are many MSEs in Nairobi and some of the goods sold in the sector attract value added tax (VAT). VAT was not investigated in the study but some of the items in the informal structures were new, for example, electronics and clothes. The assumption is that they attracted tax although they are sold in the informal sector.

The early studies on the sector (Opiyo and K'Akumu, 2006; Moyi, 2003; Mitullah and Waema, 2005; Kinyanjui and McCormick, 2002) in Kenya have indicated that the informal sector has very low rates of ICT adoption. These findings are based on the definition of ICTs as computers and the internet usage rather than the mobile phones. The informal sector has high rates of mobile phone adoption; about 96% of MSEs had mobile phones. Drawing conclusions from evidence based on the internet gives a wrong picture of ICT diffusion in the informal sector. It can also mislead on the evidence of the impact of ICTs on the performance of MSEs. For example, Chowdhury and Wolf (2003) in their studies on the impact of ICTs on the performance of ICTs concluded that investment in ICTs had a negative impact on labour productivity. These findings could be true when based on the internet; in contrast investments in mobile phones by MSEs seem highly profitable.

The only ICT readiness factor that matters for an MSE to possess a mobile phone is availability of electricity. However, from observation and literature one cannot fail to see how entrepreneurship has come to the aid of the poor. Some of the MSEs that have access to electricity allow mobile users to charge their phones at an affordable fee as they wait for service or transact business at the same site. The level of education is important if an MSE is going to use a mobile phone for e-commerce. This is in line with reality, because a mobile phone unlike the computer or internet is an ICT that needs one to do most of the learning on their own. It has many features that can assist business people to become innovative in their firms, but some education is required for this to become a reality. Many applications that are included or added

to the existing phones require some level of education for one to turn them into business solutions.

There are many examples of complementarities between technical education and mobile related businesses inventions. For example, in a public exhibition, a young person demonstrated how a mobile phone can be charged using power generated while one is riding a bicycle. The battery of mobile phone is connected to the dynamo of a bicycle; a dynamo produces direct current which can be used to charge a mobile phone as the wheel of the bicycle rotates. A second person showed how the phone can be used to feed chicken; and a third one showed how a mobile phone can be used to track a stolen car. There was even one who was able to lock and open the door to the house from public transport using a mobile phone. The details of these technologies were not discussed which is understandable, since the idea could be stolen and owned by a different person. The case in point is the M-pesa money transfer invention, where an individual has gone to court claiming that he was the originator of the innovation (Gmeltdown, 2009). The above examples are an indication that younger people are capable of investing time in understanding the mobile phone and coming up with inventions on how mobile phones could be used for e-commerce.

Positive correlations between employment and use of mobile phones have many potential interpretations. For example, many employees can assist each other to come up with innovations on how to use the mobile for business. Having an educated neighbour also has a strong influence on whether an MSE would use the mobile for business or not. The same argument follows, as one can learn from a neighbour or another employee on how to use a mobile for e-commerce. The trust exhibited among the MSEs during field observations, where operators can entrust their goods to a neighbour as he or she runs other errands, shows how MSEs have understood that sometimes collaborating with competitors can assist your business. Therefore, it is understandable if an operator of a firm in the informal sector educates or learns from a next door neighbour how to use a phone for business transactions. Incidentally, technology is making businesses learn how to collaborate instead of competing. For example, there is now collaboration between Equity Bank and Safaricom who were initially competitors in money transfer services. The idea that many small businesses must compete due to limited markets may have little empirical support in many settings, as collaboration is also possible in the same

setting. The mobile phones have saturated the Nairobi informal sector, and many of those having them are using the phone for e-commerce.

7.3 Conclusions

Definitions and classification of the MSE sub-sector that exist in literature are misleading. Heterogeneous economic activities are all grouped into one category that is unable to capture the business reality on the ground. All the MSEs observed were micro enterprises having employees of 1 to 9, the owner of the MSE included, although the majority had less than 5 employees. It is not clear why the word small is included in the definition since small enterprises of 10 to 20 employees, as defined by the ILO; do not seem to exist in what is termed the informal sector. Literature tells us that the sector provides employment; this might be true for some of the MSE but not all. Observing some of the operators gives one an impression that they are overlooked by many researchers and by policy makers. Whatever they are doing cannot pass for what people desire as employment or a livelihood. The Kenyan government and some studies synonymously, use the word "Juakali", meaning working in the hot sun, when referring to the MSEs in the informal sector. This reference is wrong since the majority of MSEs operate from either permanent or temporary shelters, although the permanent structures in this sector are completely different from the permanent structure in the formal sector.

Not every operator in this sector is poor; the evidence generated in the thesis shows that some of MSEs make annual sales that run into millions of shillings per year. The work in this sector is not all tedious manual work as some of the studies claim. Manual work is mostly found in the manufacturing industry, where a lot of metal fabrication takes place. A few of the MSEs, particularly, those operating from the City Council markets have access to running water and sanitation. Therefore generalizing that MSEs lack sanitation resulting in poor health for the operators and their families should be done with care. Many MSEs operate away from their residential premises, but the description of the MSEs seem to tally with that of people living in slum areas in Nairobi, which should not be the case. The daily fee of 20 Kenyan shillings hurts MSEs, especially those at the bottom of the ladder, as this can translate into 120 Kenya shillings in six days, and 480 shillings in a month, assuming that the officers work on Saturdays. It was noted from field observations that many of the MSEs did not seem to generate income that would cover the daily fee and leave them a profit. The conclusion in some studies that the business

mortality rate in the sub-sector is high is not correct, as some of the MSEs in the informal sector have been operating for a long time. This assumption can discourage the government and other agents from assisting the sub-sector.

Studies that have been done so far on information and communication technologies (ICTs) in the informal sector have focused on the internet and computer usage rather than on applications of a mobile phone, and yet the mobile phone seem to be the only ICT that is so far being used for e-commerce transactions in the lower tier of the informal sector. The results of studies using the internet and computers as ICTs for MSEs in the informal sector in Kenya are misleading and do not give a clear picture of the state of e-commerce in there. Some of the determinants of ICTs mentioned in the literature do not apply to the mobile phone adoption. For example, this thesis has found that the only infrastructure strongly associated with ownership of a mobile phone is availability of electricity.

Infrastructures such as communication links, wireless communication boosters and cables are already in place in the country and are being improved on. Electricity is the one which is not easily available to operators in the informal sector, specifically those MSEs operating from temporary shelters and open air sites. The mobile phone handset performs the same tasks as input and output devices of a computer, and since the phone is widely spread among the MSEs in the informal sector, chances of customers and business people having the phone in the future are very high. It should be noted that computers and the internet play a big role in the success of mobile usage, in business transactions, but this role is hidden from the informal sector MSEs. For example, when a mobile phone user in an MSE saves money on the mobile phone, in reality, it is saved in the database of a computer system, and that is the reason why, even if the mobile phone handset is stolen, the person can still have access to the money. This role of computers is completely hidden from the MSEs, and the general public.

Mobile phones create jobs in the informal sector. In the study area, the MSEs were repairing phones, receiving and sending money for customers, selling airtime, selling mobile phone handset covers, and charging phones for customers, to name but a few. The mobile phones have become a springboard for MSEs to be entrepreneurial; they are helping operators in the informal sector to come up with solutions that are specific to their problems, as compared to those imposed on them by outside agencies. Education is strongly associated with mobile phone usage

for e-commerce. Some level of education is required for mobile phone innovations, and according to the results of the study, the average education in the informal sector in Nairobi is 10 years, i.e., lower secondary school. This sector is not dominated by illiterate people and unskilled workers as some of the studies have claimed. Technical skills are required for operators to be able to do such tasks as repairing mobile phones, repairing of watches, making of furniture, inventing a charcoal burners that do not use charcoal, economically making clothes, braiding hair and processing food.

Mobile phones are improving the performance of MSEs. All the measures of performance of MSEs, notably, sales, and employment are positively associated with the use of mobile phones in for e-commerce.

7.4 Implications of Findings for Entrepreneurship Theory

This study takes the business venturing approach whereby business opportunities are created by technological, political and social changes (Schumpeter, 1934). Although the Schumpeterian theory was based on large organizations, I believe the same applies to micro enterprises such as the ones investigated in this study. Technological has brought about change in the way operators in the informal sector are conducting business. Mobile phones have created business opportunities in the informal sector, and according to Kirzner (1985) entrepreneurs are alert to profit opportunities and improve the performance of the enterprise by operating more efficiently. The findings of this thesis support Kirzner's assertion, the performance of MSEs in the informal sector has improved because of using mobile phones for e-commerce.

Entrepreneurial businesses in the informal sector are being conducted electronically. Unlike before when technology, such as computers and the internet were beyond the reach of many operators in the informal sector, the mobile phone has proved that given an affordable technology MSEs in the informal sector are able to improve their performance which was measured by sales amounts and employment. The study has demonstrated that the poor respond to technology as long as this technology is affordable and available. These findings contradict Evans and Leighton's (1989) assertion that exploitation of opportunities by entrepreneurs needs financial capital. Some of SMEs in the informal sector start businesses with very little capital, and the findings of the study indicate that all they require is a mobile phone for the performance of their businesses to improve. According to Shane et al. (2003) entrepreneurs can pursue

opportunities in any industry at any time, although the interpretation of the opportunity may defer among individuals. Field perceptions of the study revealed that there were operators who interpreted the opportunity as the usage of mobile phones for business transactions. However, there were those who interpreted this opportunity as the starting up of new businesses, which were part and parcel of the MSEs that were investigated.

The ability to utilize technology within the organization is the centre of my study, not the creation of new businesses. My study supports Shane and Venkataraman's (2000) argument that entrepreneurship does not necessarily mean the creation of new businesses, but can also be found in existing organizations. Shane et al. (2003) suggest that entrepreneurs should not only be viewed as founders of new organization. Further, a trader can be an entrepreneur as well as a cooperative salesman who discovers and pursues opportunities for the creation of new products. Low and MacMillan (1988) note that entrepreneurship includes management of change and small business management. The operators in the informal sector are managing the change that has been brought about by the inclusion of mobile phones in business transactions. The mobile phones have given MSEs using the technology for e-commerce an entrepreneurial opportunity whereby they are exploiting new solutions to existing problems (Companys and McMullen, 2007). For example, cutting transportation costs by ordering for items via a mobile phone.

According to Shane and Venkataraman (2000) entrepreneurship cannot be explained solely by characteristics of a certain people that cut across all situations, independent of situations in which they find themselves. My study looked at the usage of mobile phones for business transaction which was taken to be entrepreneurial behaviour together with the environment under which the MSEs operated, in addition to the attributes of the firm and the owner. Shane et al (2003) argue that attributes of people making decisions about entrepreneurial activities influence decisions that they make. Shane and Venkataraman (2000) also noted that the attributes that increase the probability of opportunity exploitation might not increase the probability of success. my study supports this argument and extends it to discover that education increased the probability of an MSE using a mobile phone for e-commerce, but the influence it had on the performance of the MSE was not statistically significant.

Influence of culture on entrepreneurial activities as suggested by Hofstede (1980) and Casson (1982) could not be determined by this study, the assumptions I made are that since a high

number of people who had mobile phones used them for business transactions, culture does not have much influence on e-commerce when one is using a mobile phone. An interaction with this technology takes place across cultures and between the poor and the rich. However, according to Companys and McMullen (2007), consumer opportunities for innovation need to develop within cultural communities when a new technology is introduced. Innovation and entrepreneurship are highly related as entrepreneurship involves searching for a new innovation and taking advantage of it (Drucker, 1985). The innovation of mobile phone money transfer services is an entrepreneurial activity that has given a new meaning to the culture of banking services. The poor are able to save and transfer money at affordable prices. This development is supported by Hargadon and Douglas (2001) assertion that innovations succeed when they are understood by the community of interest. Drucker (1985) notes that innovation involves finding new and better ways of doing things, furthermore, to be effective the invention should be simple and clearly focused on a specific need. McClelland (1961) identified doing things in new and better ways as one of the characteristics of an entrepreneur.

Schultz (1980) assertion that education is a key factor in entrepreneurship is supported by my study. Education was found to be a significant determinant of mobile usage for business transactions. Allegation by Desai (2010) that necessity entrepreneurs engage in entrepreneurship to avoid unemployment whereas opportunity entrepreneurs pursue recognized opportunities for profit opportunity. Further, developing countries have a high rate of necessity entrepreneurs as compared to developed countries cannot be ascertained by the findings of this study. Employment might have pushed the operators of MSEs into the informal sector, but my findings indicate that the usage of mobile phones for e-commerce has improved the performance of MSEs in the informal sector in Nairobi.

The high percentage of people (85%) of people using mobile phones for e-commerce within the informal sector in Nairobi suggest that risk taking as advocated by Shane et al. (2003) may or may not be a motivation for entrepreneurship, although, it should be noted that they were referring to large industries, but the my assumption is that, the same could be attributed to micro enterprise. This finding also negates Rotter (1966) argument that internal locus control has influence on entrepreneurial activities. If this was the case, then fewer people would be using the phone for e-commerce. The empirical findings of this study suggest that MSEs are motivated

to use the mobile phone for business transactions because of the business opportunities perceived by operators of MSEs. This concurs with the assumptions of the logit model that a person is rational and therefore makes a decision based on perceived benefits. My argument is supported by a study done by Segal et al. (2005) which discovered that entrepreneurial intentions were formed when people anticipated or perceived positive outcomes from entrepreneurship.

7.5 Recommendations and Discussions

MSEs should be categorized by the value of the items sold, and not the number of employees as stated by many authors. The results of this thesis illustrate that the average number of employees is one, and that is the owner of the firm. In the informal sector, there are some MSEs selling many valuable items, while others have scanty items of noticeable value. Focus should be placed on the group of MSEs that is barely surviving, as they require special attention. Intervention methods should be sought to get them out of poverty. These business operators come to the market to sell the little they have because they want to improve their livelihood in a legal way. Measures should be taken to help these people continue with their economic activities, and to improve productivities of these occupations.

A clear distinction needs to be made between MSEs in the informal sector and MSEs in the formal sector. There is a big difference between the two types of firms and when the government officials talk about promoting entrepreneurship among MSEs by creating ICT villages for outsourcing jobs, they must be talking about MSEs in the formal sectors. The firms in the informal sector have very little knowledge of computers, let alone outsourcing. As the Kenyan Economic Report has shown, the MSE sector is important to the Kenyan economy. It receives special attention in Kenyan Vision 2030, but where regrettably, it gets mixed up with the youth sector or the manufacturing sector.

My observations from the field revealed that some of the informal operators like what they are doing, i.e., being self employed. However, others have no choice but to be in this sector, since as many studies show, the sector is easy to enter and exit. In my view, what the government and other agencies need to do is to ensure that these people operate from an environment that is secure and clean. The MSEs operating from City Council premises have the basic needs, i.e., sanitation and security, as compared to those operating from the sides of the roads and pavements. The premises for MSEs should be near residential areas rather than city centre since

most of the items sold by these MSEs are for home use and not office use. Appropriate premises would also ensure that the MSEs have access to electricity, which is crucial for e-commerce, and therefore electricity should be made available.

Policies to encourage innovation among the MSEs should be developed so as to create jobs within the sector, as stipulated in Kenyan Vision 2030. The people who publicly demonstrate new inventions in mobile phone applications should be identified and facilitated so as to continue with their inventions. These young people appear on television and are never heard of again. In a country like Kenya with weak enforcement of the law on intellectual property rights, ideas of such entrepreneurs can easily be stolen. Mobile innovations in the informal sector can increase the number of employees and the number of MSEs as well as increase the sales of an MSE. Since the sector has many literate people, an effort should be made to ensure that operators are made aware of new applications of mobile phones. Most of these applications are advertised on television, or an alert is sent on the mobile handset without any thorough explanation of how these new tools can assist an MSE improve its e-commerce transactions.

There are many institutions in Kenya that train people on computer usage, but none trains them on mobile phone usage, a technology that is transforming lives for the better in the informal sector. There is a lot of talk about third generation mobile phones 3Gs, Blackberries and mobile modems, but no effort is being made to educate the public on business benefits of these new technologies. It seems as if the target for public discussion of these innovations is a particular group in the society, yet many people in the country have mobile phones, and are using them extensively for e-commerce. The Communications Commission of Kenya has the mandate to ascertain that every citizen in Kenya makes an informed choice when using the mobile for e-commerce or any other purpose.

Literacy classes in computer science should continue to be encouraged. Computers are the platform for mobile usage. Innovations in mobile telephony would depend on how much one understands the functions of the computer. The training should not only concentrate on computer studies but on information and communication technologies. There is need to popularize the connection between computers and other ICTs, in particular, the mobile phone which is widely used. Field work for this thesis showed Kenyans are entrepreneurs; what might be lacking, is exposure and the right business environment and infrastructure.

Operators in the manufacturing field should be made aware of Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) Packages. These computer programs can help small business owners to come up with quality and standardized products. Since some mobile phones act as small computers, effort should be made to find out the possibility of having this programs run on the mobile. It could also be that mobiles are being used for designing products, but many small business people are not aware. This needs to be investigated.

It is commendable that the Kenyan government has removed tax from mobile handsets making mobile phones affordable by many people. Nevertheless, it should also assist in bringing down the cost of airtime. Airtime is one of the constraints to using a mobile phone, and during the interviews, many operators expresses the discontent with the cost of airtime.

Research on MSEs and e-commerce should concentrate on mobile phones in addition to the present focus on the internet or computers. Internet enabled mobile phones are already on the Kenyan market, and those who understand how to use the phones are able to decide on whether to use them or buy a computer. Training is required to enlighten people on the pros and cons of using the computer rather than the internet enabled phones. Safaricom, the largest mobile phone service provider is now venturing into selling laptops, facilitated by Equity Bank. This move points out that using an internet enabled phone has some short comings, such as screen size, that the public needs to know before investing in this new phone. The internet is important for the import or export of goods, and MSEs that would like to participate in global markets should be give a chance to make informed market choices by being enlightened on internet-based mobile phones. Globalization is one of the goals of Kenyan Vision 2030, and this goal cannot be achieved without widespread adoption of high-powered mobile phones in the informal sectors. Research is needed to measure the extent to which internet enabled mobile phones have diffused in the informal sector and their impact on import/export.

Further research on business start-ups and innovation within the informal sector, due to mobile phone usage should be done. This study used the number of employees within a firm as a measure of job creation, but a casual observation revealed that there are MSEs in the sector that have started because of the adoption of mobile phones. For example, MSEs for repairing mobile phones and MSEs for money transfer services. There are also innovations such as bags for holding mobile phones and different methods of charging mobile phones.

7.6 Research Limitations

The research only covered Nairobi province and therefore, the results might not be true for other parts of Kenya. It covered only the MSEs in the informal sector, while mobile phones are being used in both the formal and informal sectors of Kenya. Bidirectional relationship between mobile phone possession and usage was not investigated. Similarly, the relationship between mobile usage for e-commerce and performance was not studied, an assumption was made that the feedback relationship did not exist. Studies without these assumptions need to be conducted in future.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Section A: General Information about MSEs and Owner.

1. Serial No. _____
2. Division _____
3. Interviewer _____
4. Date _____

Please tick or fill the appropriate answer in the spaces provided beside each question.

1. Location _____

2. Type of Business _____

3. How long have you been in business? _____
4. How many employees do you have? _____
5. Have you registered your business? Yes [ ] No [ ]
6. Are your premises permanent/Temporary/rented/own?

i) Permanent [ ] Temporary with shelter [ ] Open air [ ]

ii) Rented [ ] Own [ ] Open air [ ]

7. Others Specify _____
8. Do you keep accounts of your business? Yes [ ] No [ ]
9. How old are you? _____ Years.
10. What is your level of education? None [ ] Primary [ ] Secondary [ ] Post Secondary [ ]
11. Gender? Male [ ] Female [ ]
12. What is your marital status? Married [ ] Single [ ]
13. Do you have neighbours without formal education? Yes [ ] No [ ]
14. Do your neighbours do the same business as yours? Yes [ ] No [ ]

Section B: E-Commerce and Related Factors

1. Do you have a mobile phone? Yes [ ] No [ ]
2. What make _____
3. Do you do business with it? Yes [ ] No [ ]
4. If No, Why? _____
5. If YES, when did you begin? Year _____
6. If YES, how do you do business with it?

	YES	NO
Calling/SMS to customers/suppliers	[ ]	[ ]
Receiving calls/SMS from customers/suppliers	[ ]	[ ]
Sending/receiving money to/from customers/suppliers	[ ]	[ ]
Communicate with employees	[ ]	[ ]
For Calculation	[ ]	[ ]

7. Have you register with M-Pesa? [ ] [ ]
8. Have your sales gone up recently because of the use of mobile phone? Yes [ ] No [ ]
9. If YES, how much? Little [ ] Moderately [ ] Great [ ]
10. How many calls do you make in a day? _____
11. Do you use a mobile phone to export/import? Export [ ] Import [ ] No [ ]
12. What are some of the problems you face in using your mobile phone?

_____

13. Do you have access to a computer? Yes [ ] No [ ]
14. If YES, do you use it to do business? Yes [ ] No [ ]
15. If No, Why? _____
16. If YES, how do you do business with it? _____

_____

17. What problems do you encounter when using the computer to do business? _____

_____

18. Have your sales gone up recently because of use of computer? Yes [ ] No [ ]
19. If YES, how much? Little [ ] Moderately [ ] Great [ ]
20. Do you use a computer to export/import goods? Export [ ] Import [ ] No [ ]

Section C: E-Readiness Factors and Performance Indicators

1. Do you have electricity at your premises? Yes [ ] No [ ]
2. How far is the nearest tarmac road? _____ km
3. How far is the nearest cyber café? _____ km
4. How far is the nearest mobile phone shop? _____ km
5. How far is the nearest mobile phone repair shop _____ km
6. What is your fast moving sale item? _____
7. How many units of the commodities were sold in the last 3 months? _____
8. What is the sale per unit? _____
9. What is the slowest moving sale item? _____
10. How many units of the commodities were sold in the last 3 months? _____
11. What is the sale per unit? _____

APPENDIX II: NAIROBI PROVINCE

From Wikipedia, the free encyclopedia

This article is about Nairobi Province, one of the eight provinces of Kenya . For other uses, see Nairobi.

Nairobi Province is one of eight provinces in Kenya. It shares common boundaries with Nairobi city, the capital of Kenya, but functions as a state unit. Nairobi has a Provincial Commissioner (James Waweru).

The province differs in several ways from other Kenyan provinces. The province is the smallest in area and is entirely urban. It has only one local authority, Nairobi City and only one district, Nairobi District. However, as with all districts in Kenya, it is further divided into "divisions" which are further divided into "locations".

Nairobi Province has eight constituencies, which follow same boundaries with administrative divisions (which is not the case on most districts in Kenya). Constituency name may differ from division name, such that Starehe Constituency is equal to Central division, Langata Constituency to Kibera division, Kamukunji Constituency to Pumwani Division in terms of boundaries.

Administrative divisions of Nairobi

Nairobi is divided into eight divisions and fifty locations, mostly named after residential estates. Kibera Division, for example, includes Kibera (Kenya's largest slum) as well as affluent estates of Karen and Langata.

Division	Locations
Starehe	Huruma · Kariokor · Mathare · Ngara · Starehe
Dagoretti	Kawangware · Kenyatta/Golf Club · Mutuini · Riruta · Uthiru/Ruthmitu · Waithaka
Embakasi	Dandora · Embakasi · Kariobangi South · Kayole · Mukuru Kwa Njenga · Njiru · Ruai · Umoja
Kasarani	Githurai · Kahawa · Kariobangi North · Kasarani · Korogocho · Roysambu · Ruaraka
Kibera	Karen · Kibera · Laini Saba · Langata · Mugumoini · Nairobi West · Sera Ngombe
Makadara	Makadara · Makongeni · Maringo · Mukuru Nyayo · Viwandani
Pumwani	Bahati · Eastleigh North · Eastleigh South · Kamukunji · Pumwani
Westlands	Highridge · Kangemi · Kilimani · Kitisuru · Lavington · Parklands

APPENDIX III: THE IMPACT OF M-PESA REGISTRATION ON PERFORMANCE

Table A1: The Impact of M-Pesa Registration on Performance, Dependent Variable is Probability of an increase in sales (absolute *t*-Statistics in parentheses)

Variables	Model parameters (marginal effects)					
	LPM (OLS)		Logit (MLE)		Probit (MLE)	
Communication Technology						
M-Pesa (1 = registered with M-Pesa)	.1508 (3.53)	.1262 (2.84)	.1509 (2.37)	.1361 (1.81)	.1509 (3.10)	.1597 (2.78)
Owner and business characteristics						
Education level		.0038 (0.66)		.0018 (0.44)		.0011 (0.23)
Owner age		.0008 (0.46)		.0012 (0.84)		.0016 (0.85)
Gender (1 = male)		.0275 (0.82)		.0157 (0.56)		.0187 (0.61)
Business registration (1 = registered)		.1177 (2.15)		.1317 (1.26)		.1411 (1.92)
Divisions dummies (Kasarani and Kamukunji are omitted)						
Westlands		.0365 (0.51)		.0251 (0.64)		.0300 (0.56)
Dagoretti		.0471 (0.65)		.0277 (0.76)		.0287 (0.57)
Makadara		.0418 (0.58)		.0331 (0.99)		.0370 (0.72)
Kamukunji		.1310 (1.83)				
Embakasi		-.0801 (-1.06)		-.0715 (-0.74)		-.0822 (-1.05)
Langata		.0006 (0.01)		.0097 (0.25)		.0104 (0.21)
Starehe		-.0047 (-0.07)		-.0067 (-0.13)		-.0071 (-0.13)
Constant	.8049 (20.67)	.6162 (5.48)				
R^2	0.0490	0.1070				
Pseudo R^2			0.0746	0.1779	0.0746	0.1801
F - statistics (p-value)	12.48 (0.0005)	2.26 (0.0103)				
χ^2 - statistics (p-value)			9.21 (0.0024)	20.07 (0.0444)	9.21 (0.0024)	20.32 (0.0412)
Observations	244	239	244	208	244	208

Source: Author (2009)

Table A2: Effects of M-Pesa Registration on Performance, Controlling for interaction of M-Pesa with gender; Dependent Variable is Probability of an increase in sales (absolute *t*-statistics in parentheses)

Variables	Model parameters (marginal effects)					
	LPM (OLS)		Logit (MLE)		Probit (MLE)	
Communication Technology						
M-Pesa (1 = registered with M-Pesa)	.1508 (3.53)	.1179 (1.71)	.1509 (2.37)	.1390 (1.14)	. 1509 (3.10)	.1419 (1.66)
Owner and business characteristics						
Education level		.0038 (0.64)		.0018 (0.44)		.0011 (0.22)
Owner age		.0008 (0.44)		.0013 (0.83)		.0015 (0.81)
Gender (1 = male)		.0162 (0.20)		.0168 (0.35)		.0098 (0.18)
Business registration (1 = registered)		.1178 (2.15)		.1323 (1.24)		.1386 (1.89)
Interactions						
M-Pesa x gender		.0138 (0.16)		-.0017 (-0.03)		.0119 (0.18)
Divisions dummies (Kasarani and Kamukunji are omitted)						
Westlands		.0360 (0.50)		.0252 (0.64)		.0299 (0.56)
Dagoretti		.0476 (0.66)		.0276 (0.75)		.0293 (0.58)
Makadara		.0423 (0.59)		.0330 (0.98)		.0377 (0.74)
Kamukunji		.1308 (1.83)				
Embakasi		-.0802 (-1.06)		-.0717 (-0.74)		-.0821 (-1.05)
Langata		.0003 (0.00)		.0098 (0.25)		.0100 (0.20)
Starehe		-.0053 (-0.07)		-.0067 (-0.13)		-.0078 (-0.14)
Constant	.8049 (20.67)	.6241 (5.05)				
R^2	0.0490	0.1071				
Pseudo R^2			0.0746	0.1779	0.0746	0.1804
F - statistics (*p*-value)	12.48 (0.0005)	2.08 (0.0165)				
χ^2 - statistics (*p*-value)			9.21 (0.0024)	20.07 (0.0658)	9.21 (0.0024)	20.35 (0.0608)
Observations	244	239	244	208	244	208

Source: Author (2009)

Table A3: The Effects M-Pesa on Sales Amounts (absolute *t*-Statistics in parentheses)

Variables	Specifications					
	Log Sales from fast moving items		Log Sales from slow moving items		Log Sales from both moving items	
Communication Technology						
M-Pesa (1 = registered with M-Pesa)	.6229 (2.43)	.4259 (1.58)	.6783 (2.06)	.4865 (1.45)	.6396 (2.63)	.4231 (1.69)
Owner and business attributes						
Education level		.0362 (0.87)		.1459 (2.72)		.0528 (1.36)
Owner Age		-.0100 (-0.84)		.0003 (0.02)		-.0083 (-0.75)
Gender (1 = male)		.4872 (2.15)		.8153 (3.02)		.5133 (2.43)
Division dummies (Kasarani is omitted)						
Westlands		1.6024 (3.35)		1.6349 (2.76)		1.7189 (3.86)
Dagoretti		1.4771 (3.13)		1.3020 (2.22)		1.6856 (3.83)
Makadara		1.8513 (3.85)		2.0878 (3.43)		1.9920 (4.44)
Kamukunji		1.9588 (4.15)		2.5417 (4.21)		2.2296 (5.07)
Embakasi		1.1949 (2.47)		1.4130 (2.35)		1.2922 (2.87)
Langata		1.5293 (3.23)		2.0016 (3.36)		1.7808 (4.04)
Starehe		1.3837 (2.95)		1.8323 (3.05)		1.5583 (3.57)
Constant	10.4607 (46.96)	8.8273 (12.27)	8.5570 (29.46)	4.9941 (5.45)	10.7427 (50.75)	8.7170 (13.00)
R^2	0.0197	0.1052	0.0165	0.1482	0.0230	0.1397
F - statistics (*p*-value)	5.92 (0.0156)	2.98 (0.0009)	4.22 (0.0409)	3.76 (0.0001)	6.91 (0.0090)	4.12 (0.0000)
Observations	296	291	253	250	296	291

Source: Author (2009)

Table A4: OLS Estimates of the effect of M-Pesa on Unit Prices

(absolute *t*-Statistics in parentheses)

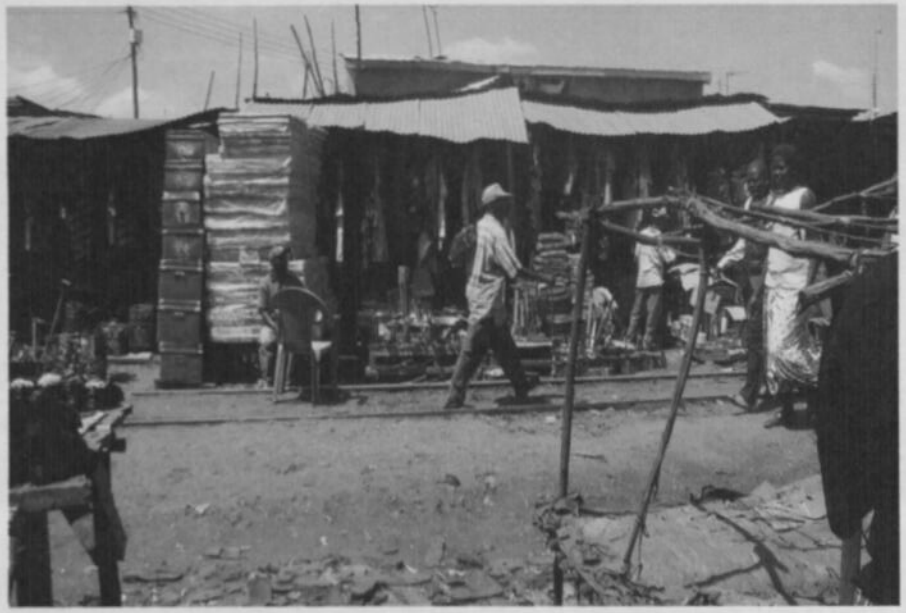
Variables	Specifications							
	Unit Cost (Ksh) from fast moving items		Unit Cost (Ksh) from slow moving items		Log Unit Cost from fast moving items		Log Unit Cost from fast moving items	
Communication Technology								
M-Pesa (1 = registered with M-Pesa)	804.45 (1.89)	739.43 (1.61)	841.98 (1.58)	552.06 (0.96)	1.0419 (4.38)	.8000 (3.16)	1.0738 (3.32)	.6167 (1.80)
Owner and business attributes								
Owner Age		50.95 (2.51)		28.89 (1.14)		.0179 (1.61)		.0106 (0.70)
Education level		53.16 (0.75)		88.45 (1.00)		-.0040 (-0.10)		.1569 (2.96)
Business account (1 = keeps accounts)		793.33 (1.75)		753.90 (1.34)		.7254 (2.92)		.4731 (1.40)
Gender (1 = male)		151.52 (0.39)		818.44 (1.70)		.4152 (1.96)		.1829 (0.64)
Division dummies (Kasarani is omitted)								
Westlands		-493.29 (-0.60)		65.19 (0.06)		.5175 (1.15)		.8659 (1.42)
Dagoretti		-601.63 (-0.73)		-307.35 (-0.30)		.1531 (0.34)		.3275 (0.53)
Makadara		-889.30 (-1.07)		-691.15 (-0.67)		.1181 (0.26)		.0228 (0.04)
Kamukunji		401.63 (0.49)		83.79 (0.08)		.1389 (0.31)		.1812 (0.30)
Embakasi		-34.22 (-0.04)		1119.26 (1.07)		.2294 (0.50)		.7862 (1.26)
Langata		-870.62 (-1.06)		-595.45 (-0.58)		-.3823 (-0.85)		.3266 (0.53)
Starehe		-229.27 (-0.28)		-29.00 (-0.03)		.2827 (0.64)		.7619 (1.27)
Constant	127.7083 (0.34)	-2345.12 (-1.89)	203.92 (0.44)	-2440.98 (-1.58)	3.9694 (19.17)	2.6964 (3.95)	3.4491 (12.24)	.9553 (1.03)
R^2	0.0120	0.0562	0.0084	0.0462	0.0611	0.1113	0.0360	0.0873
F - statistics (*p*-value)	3.57 (0.0597)	1.38 (0.1729)	2.51 (0.1141)	1.13 (0.3376)	19.19 (0.0000)	2.91 (0.0008)	11.01 (0.0010)	2.22 (0.0110)
Observations	297	292	297	292	297	292	297	292

Source: Author (2009)

APPENDIX IV: SELECTED PHOTOGRAPHS OF MSEs PREMISES

Exhibit I: Permanent Business Structures

Exhibit II: Temporary Business Structures with Shelter



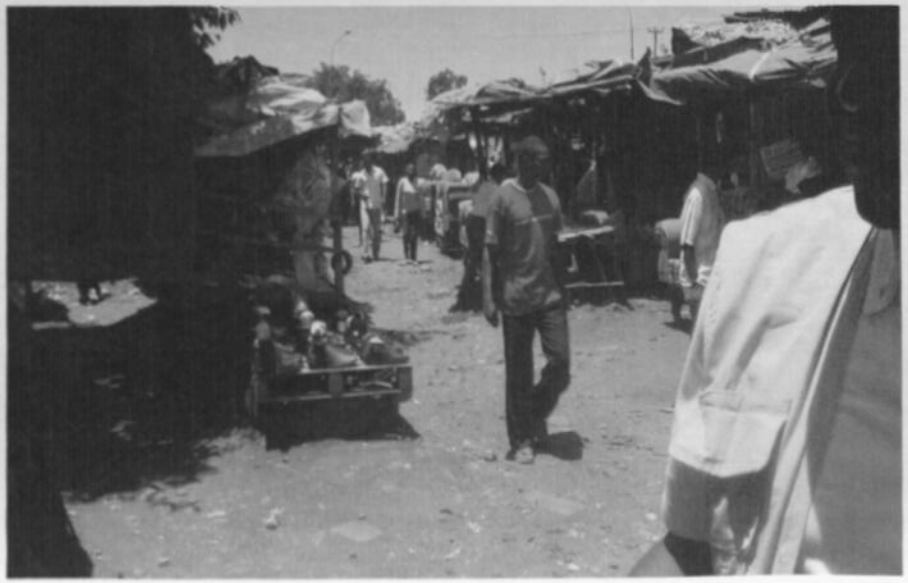


Exhibit III: Open Air Business Premises

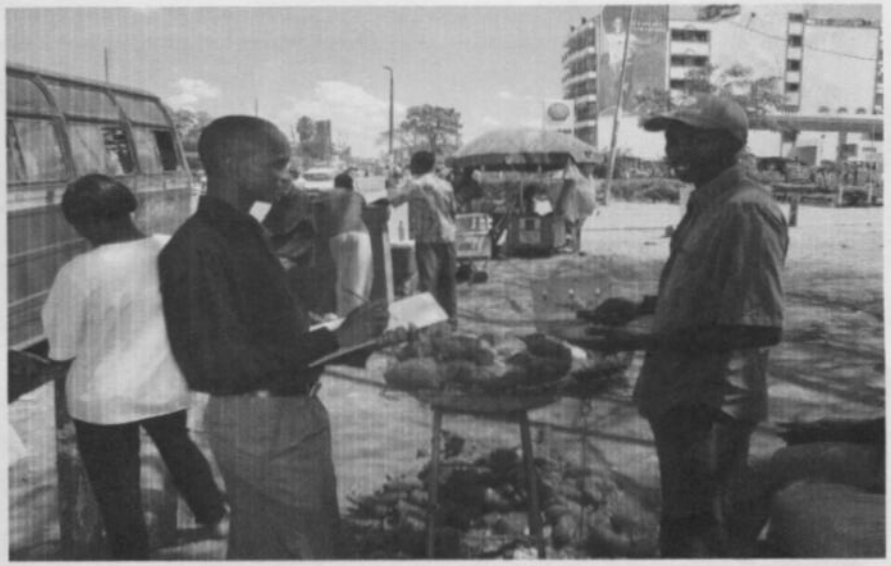


Exhibit IV: An Assortment of MSEs Premises