THE DETERMINANTS OF ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY BY SMALL AND MEDIUM ENTERPRISES WITHIN THE HEALTH SECTOR IN NAIROBI, KENYA

by

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or for any other award.

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DEDICATION

This thesis is dedicated to my family, and specifically to my wife Charity and our children Reginald, Faith and Gift. Many are the times they missed my attention as I spent many hours in the study room preparing this thesis.

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OPERATIONAL DEFINITION OF TERMS

Computer skill - Ability to use the main computer hardware components and software applications identified as essential for delivery of health services.

e-Health - Healthcare practice which is supported by electronic processes and communication.

Electronic commerce - Use of ICT by a business to help improve its interactions with customers or suppliers.

Hospital - An institution that has, in addition to resident medical practitioners, an operating theatre and a mortuary.

ICT - An umbrella term that encompasses a wide array of systems. In this study, ICT will be limited to the telecommunication technologies and networking technologies such as networks, computers, website, Internet, intranet, extranet as well mobile phones (computer, network hardware and software) required to process, store, protect, transmit, and retrieve information.

ICT adoption - A process in which SMEs invest and start using ICT facilities in their daily operations: 1 if adopted (integrated at least three departments; otherwise 0 (two and below).

Information system - A combination of people, hardware, software, communication networks, and data resources that collects,

transforms, and disseminates information in an organization.

Infostructure - The layout of information such that it can be navigated; for example, a table of contents.

Interoperability - Ability of systems to work with other systems through the use of agreed standards and specifications without special effort on the part of the customer.

Level of ICT adoption - Extent of use of ICT by an SME for a number of activities such as sales, marketing, procurement, and sharing of information.

Medium enterprises - For the purpose of this research, a medium enterprise has been defined as one having between 50 and 250 employees.

Multicollinearity - A statistical phenomenon where two or more predictor variables are highly correlated with each other such that it is difficult to come up with reliable estimates of their individual regression coefficients.

Organizational factors - Facilitating conditions that support the use of new ICT innovation.

Organizational culture - Collective programming of the mind that characterizes members of one organization from others.

Organizational readiness Factors internal to an organization that influence ICT adoption.

Small enterprises - For the purpose of this research, a small enterprise has been

defined as one having between 10 and 49 employees.

Technological context - Pool of technologies available to a firm for adoption from both the market and the firm's current equipment.

Tele-density - Number of landline telephones in use for every 100 individuals.

ABBREVIATIONS AND ACRONYMS

AMREF	-	African Medical Research Foundation
CEO	-	Chief Executive Officer
Df	-	Degrees of freedom
DTI	-	Department of Trade and Industry
ERS	-	Economic Recovery Strategy
GDP	-	Gross Domestic Product
ICT	-	Information and Communication Technologies
IFC	-	International Finance Corporation
ILO	-	International Labour Organization
IT	-	Information Technology
JAB	-	Joint Admissions Board
KDHS	-	Kenya Demographic and Health Survey
KP	-	Kenya Posts
LAN	-	Local Area Network
METI	-	Ministry of Economy, Trade and Industry (Japan)
MoH	-	Ministry of Health
NCCK	-	National Council of Churches of Kenya
OECD	-	Organization for Economic Cooperation and Development
PC	-	Personal Computer
PhD	-	Doctor of Philosophy
PTT	-	Postal and Telegram Telecommunication

P-value	-	Probability value
S.E	-	Standard Error
SMEs	-	Small and Medium Enterprises
TAM	-	Technology Acceptance Model
TC	-	Telecommunications Corporation
TPB	-	Theory of Planned Behaviour
TRA	-	Theory of Reasoned Action
TTF	-	Task Technology Fit
UK	-	United Kingdom
UNCTAD	-	United Nations Conference on Trade and Development
USA	-	United States of America
USAID	-	United States Aid for International Development
UNDP	-	United Nations Development Programme
UNIDO	-	United Nations Industrial Organization
UTAUT	-	Unified Theory of Acceptance and Use of Technology
VIFs	-	Variance Inflation Factors
WWW	-	World Wide Web

ABSTRACT

Small and Medium Enterprises (SMEs) play a very important role in the economy in terms of wealth creation and provision of employment opportunities. However, competition from more established firms poses a great challenge to their existence. With the adoption of Information and Communication Technologies (ICTs), it was envisaged that SMEs would compete more effectively and efficiently in both domestic and international markets, but recent research portrays a gloomy picture about the adoption of ICT by SMEs. Most SMEs have failed to adopt ICT citing significant impediments. Since literature on ICT adoption by SMEs in Kenya is limited and inconsistent, this study examined the effects of various contextual factors such as individual factors, organizational factors, technological factors, and the external environment on the adoption of ICT by health-related SMEs in Kenya. A cross-sectional descriptive survey design was used. The target population was 17 health-related SMEs. In addition, 172 end - users were sampled using purposive and simple random sampling techniques. Both primary and secondary data were used. Primary data was collected using a semi-structured questionnaire and an interview guide. Secondary data was collected through review of records and documents. Descriptive statistics were used to summarize the properties of the mass data. The Logit model was used to predict the potential effects on the determinants of ICT adoption by SMEs. Open-ended questions were analysed by capturing the common themes, categorizing them, and drawing conclusions from the findings. The research findings showed that age, CEO's ICT knowledge, quality of ICT systems, information intensity, ICT specialization, organizational readiness, relative advantage, government policies on ICT applications, and pressure from suppliers and patients were the main determinants of ICT adoption. The study concludes that, for the health related- SMEs to cope with the dynamics of the global competition and move Kenya towards middle level income country as envisaged in the Vision 2030, the above nine determinants must be addressed. The study therefore, recommends that government should develop a differentiated ICT policy and incorporate compulsory training in computer applications in the national school curriculum. In addition, SMEs should invest in quality systems that are functioning and also technically usable. They should set a mechanism for monitoring the changes in technological innovations as the electronic marketplace evolves. Finally, SMEs should adopt ICT within a participatory plan.

Key words: Kenya, SMEs, information, communication, technology, adoption, information intensity, relative advantage, and tele-medicine.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

1.1.1 ICT Use in Organizations and its Importance

Information and Communication Technology (ICT) is an umbrella term that encompasses a wide array of systems. These systems have been derived from previous terms like information technology (IT) and new technologies (Anderson and Glen, 2003). The addition of communication to information technology (IT) emphasizes the growing importance attributed to the communication aspects of new technologies. In this study ICT is related to those technologies that are used for gathering, processing, storing, protecting transmitting, and retrieving information. The technologies include telecommunication technologies and networking technologies such as networks, computers, website, Internet, intranet, extranet as well mobile phones (Anderson and Glen, 2003).

For over a decade, the Internet and the World Wide Web (WWW), as mainstream communication tools, have been used throughout the world by various organizations including private companies, universities, Small and Medium Enterprises (SMEs), and government departments (Samiee, 1998). Firms are now investing in sophisticated e-business Information and Communication Technology (ICT) systems to integrate internal and external communications along the supply chain so as to improve efficiency and effectiveness in service delivery (Maguire and Koh, 2004).

Sharif *et al.,* (2004) note that the period from late 1990s to the early 2000s was dominated by developments in Information Technology (IT) and related work practices. Caldeira and Ward (2002) assert that the constant growth of computer-based information systems has led to the transformation of organizations and economies. Furthermore, many organizations in all sectors have been converting to new innovations in technology, particularly ICT, to gain relative advantage. As a result, organizations frequently allocate huge sums of money to acquire, manage, and integrate information technologies within their operational activities to provide better products and services. This trend has led governments to also allocate billions of dollars to build infrastructure to support the reliable transfer and efficient management of information (Al-Gahtani, 2004). This is viewed as an innovation exercise since the adoption of any technology, in particular ICT, tends to change the associated work practices and often makes it necessary to redesign the human activity systems in which the technology is embedded.

Whereas there is a substantial amount of debate regarding the benefits and costs of such initiatives, organizations are increasingly looking to ICT as a means to increase efficiency and effectiveness in service delivery. SMEs have gradually recognized the positive effect that ICT can have on their businesses like efficiency in service delivery, competitive advantage, file sharing, and reduced operational costs.

Small and Medium Enterprises are often the main drivers of economic growth and their survival and success is crucial to economic stability (Lange *et. al.*, 2000). However, as the number of SMEs increases so does competition, which might then result in a decrease in prices, a low customer base, or both. This might in turn erode existing profits and create

less incentive for people to start business. As a counter-strategy to the increased competition, SMEs might lower their prices, increase promotion of the product, add new distribution channels, and/or improve internal processes. The challenge is to counter competition when the firm still has the financial resources to do so, or else once the pressure of competition sufficiently erodes profits an SME will no longer have the resources to counter competition and might have to exit the market.

Adoption of ICT plays an important role in the survival of SMEs because it helps to create business opportunities and combat pressure from competition. At some level, application of ICT can reduce operation costs by decreasing material procurement and transaction costs resulting in lower prices for intermediate and finished products. The website can also facilitate global connectivity resulting in new ways of creating and delivering products. Additionally, the website can be used as a marketing tool to access new markets and new sources of competitive advantage to drive income growth. Similarly, shared electronic files and networked computers can increase the efficiency of business processes such as documentation, data processing, and other back-office functions (OECD, 2002).

At inter-SME level, ICT has great potential for reducing transaction costs and increasing the speed and reliability of transactions. It also reduces inefficiencies resulting from lack of coordination between SMEs in the value chain. In fact, adopters of ICT tend to reduce transaction costs, increase transaction speed and reliability, and extract maximum value from transactions in their value chains (OECD, 2002).

Despite the potential benefits of ICT, there is still debate on the implication of ICT adoption in terms of complementary investments in skills, organization and innovation, and high investment costs (METI, 2001). While many studies point to the possibility of market expansion as a major benefit for SMEs, it is true that larger businesses also expand into areas dominated by SMEs. Moreover, it is difficult for SMEs to implement and operate an online business as this involves additional costs for training, organizational change, and direct costs of investing in hardware and software solutions.

1.1.2 ICT Adoption Process

Like any other firm, an SME determines the type of ICT products to adopt based on the concrete benefits that these products can bring to its core business, the ICT capacity of its employees, and the financial resources available (Chacko and Harris, 2006). Most firms are familiar with basic ICT products such as fixed phone lines, mobile phones, fax, computers, and basic document processing software (like Microsoft Office). Advanced communication technology, however, is more complex and relies primarily on the Internet and the intranet, which allow people within the firm to share files with each other over the same network.

During ICT adoption, SMEs generally go through distinct stages of careful analysis (Prananto *et al.*, 2003 and Rao, *et al.*, 2003). Initially, SMEs become aware of the benefits that ICT can bring to their core business through channels such as word of mouth, the media, and workshops. If they believe that ICT indeed has the potential to improve their businesses, then they proceed to the next stage. In the second stage, SMEs consider

adopting ICT and might start with the simple use of e-mail for text messaging and communication, while a web will typically be an online brochure without any interactivity.

Further developmental stages are built up gradually to the final goal of integrating most, if not all, internal processes of a business through the use of ICT (Sergeant, 2000 and DTI, 2000). The third stage in the adoption process is having a definite business plan for ICT adoption, but the SME may not be ready to implement such a plan because of possible obstacles like cost, unskilled employees, and lack of support from the SME manager. At the fourth stage of the ICT adoption process, once the SME owner becomes convinced that the benefits of ICT adoption outweigh the cost, implementation of the ICT strategy begins. Finally, the SME will have fully mature ICT facilities like Internet and website properly integrated with the business processes and information flow (Prananto *et al.*, 2003).

These five stages of the ICT adoption process concur with the five stages of progress in adoption of innovations: namely, knowledge of the innovation, persuasion by key persons, commitment to adopt, implementation, and confirmation of the decision (Karshenas and Stoneman, 1995). However, despite the benefits of ICT, there is little evidence that SMEs systematically follow the stages identified in ICT adoption (Poon, 2000).

Whereas few studies have been conducted to assess the adoption and use of ICTs by SMEs (Poon and Swatman, 1999), small-business researchers have examined factors that influence the ICT adoption process like the characteristics of the entrepreneur and a comparatively uncertain environment. The decision to adopt ICT is determined not only by characteristics of the enterprise but also by characteristics of the entrepreneur (Poon and Swatman, 1999). In addition, these authors argue that the decision to adopt ICTs depends

on the intuition of the entrepreneur, which is subject to influence from training and experience as well as to the optimism of the entrepreneur with respect to policy changes and economic conditions in the future. Similarly, the environment the enterprise operates in influences adoption. This explains why not all potential users introduce ICT technologies at the same time despite its advantages.

Studies on the determinants of the adoption process generally focus on three sets of factors: namely, adopters' characteristics, features of the competitive environment, and attributes of the technological innovation. Characteristics of the adopter include firm size, geographic location, age, managerial support, ICT skills of the CEOs, and experience of the owners or CEOs of the SMEs (Chapman *et al.*, 2000). The competitive environment can be described by the degree of firm concentration. This includes competitive pressure, which arises when organisations presume that competitors may gain comparative advantage as a result of adoption (Tung and Rieck, 2005). The competitive environment includes other factors such as culture, government policies, external pressure from customers and suppliers, infrastructure, and information spillovers among potential users (Müller-Falcke, 2001, and UNIDO, 2003).

Information spillovers from previous adopters encourage further adoption by those who prefer to imitate thus avoid the risk of choosing a relatively worse alternative. On the other hand, spillovers may be a source of inertia. If early adopters are aware of being a source of spillovers, they may delay adoption to avoid the risk of being stranded if, by choosing another alternative, followers end up enjoying higher benefits.

Attributes of technological innovation, as determinants of the adoption process, are usually related to technical features (like compatibility) and may vary depending on the perception of potential adopters. For purposes of this study, the researcher considered theoretical approaches on technology adoption at the micro-level (individual and organizational factors) and macro-level (technological and other factors) and examined their influence on adoption of ICT. There are two contributions that appear to be particularly influential in the literature review. The first one is the innovation-decision process framework which deals with the factors affecting the diffusion of innovations and draws upon different economic, psychological, and sociological traditions (Rogers, 1995). The second is the technology acceptance model that stems from the theory of reasoned action and aims at predicting the attitude of potential users towards a new technology by focusing on individual perceptions (Davis, 1989).

1.1.3 The SME Sector in Kenya

According to United Nations Industrial Organization (UNIDO), different countries support the contribution of SMEs in development due to their role in sustaining a broad and diversified private sector and job creation; generation of income and reduction of poverty; and absorption of redundant labour due to retrenchment and privatization activities carried out by governments (UNIDO, 2004). Further, Raynard and Forstater (2002) consider SMEs as the seedbed of entrepreneurship development, innovation, and risk-taking behaviour that provides the foundation for long-term growth dynamics and the transition towards larger enterprises.

In Kenya, nearly 500,000 people enter the labour force every year but only a portion of these new entrants find jobs leaving the country with a burgeoning unemployment rate estimated at 23 percent in the urban areas (USAID, 1996). However, the labour-intensive SME sector creates more than half of Kenya's jobs with an estimated employment rate of 80 percent (USAID, 1996). According to a Kenya SME country study commissioned by the International Finance Corporation (IFC), there are about 1.3 million SMEs in Kenya representing 66 percent of all formally registered private enterprises (IFC, 2005).

The International labour Organization (ILO) recognized the need to promote and support small-scale and informal enterprises in Kenya when employment in the formal sector failed to keep up with an expanding labour force (ILO, 1972). Since then, the Government of Kenya has made explicit commitments to SME development in Sessional Papers No. 1 of 1986, No. 2 of 1992, and No. 3 of 2005 (Republic of Kenya, 1986; 1992; and 2005). However, SMEs are facing competitive pressure and price continues to matter particularly in domestic markets. Factors such as quality of products, flexibility, reliability, and speed of delivery are the basis for dynamic competitiveness in SMEs. The SMEs in Kenya are expected to produce at Third World prices to First World standards (UNIDO, 2004). This is a reality that one cannot ignore regardless of whether SMEs are penetrating into global markets or defending themselves against increased foreign competitors in domestic markets.

UNIDO (2004) argues that to transit to the high road of competitiveness SMEs have to build and continuously enhance their endogenous capabilities. By adopting ICT, SMEs benefit tremendously by being able to overcome the drawback of distance from developed

markets and to compete in global markets. Nevertheless, presently only a minority of Kenyans, and by extension SMEs, are able to make use of personal computers (Adhola, 2004).

Bii and Gichoya (2006) observe that the adoption and utilization of ICT is still at its infancy in Kenya. Nguo (2004) asserts that the absence of suitable ICT infrastructure is a hindrance to the development of the ICT sector in Kenya. In addition, Nguo notes that moving ahead with implementation without a complimentary human resource development strategy would only result in failure or wastage of funds. Kabaara (2004) states that more than 90 percent of Kenya's population lives in rural areas and thus focusing on ICT as a sector would only have an impact on the small urban population that has access to ICT services. In addition, Kenya's National ICT Policy (Republic of Kenya, 2006) has no provision for harmonizing the efforts of the public and private sector, civil society entities, and communities (Kashorda and Mbui, 2007).

The ICT sector has been identified in the Kenya Vision 2030 as contributing significantly to the economic pillar whose target is to attain 10 percent GDP growth rate by 2012 (Republic of Kenya, 2007). However, as noted earlier, the decision to adopt ICT in SMEs depends on the intuition of the entrepreneur, which is in turn subject to the training received and experience as well as to the optimism or pessimism with respect to policy changes and economic conditions in the future. Despite the tremendous benefits that ICT can deliver, SMEs are reluctant to improve their ICT adoption level (Sun and Zhang, 2005). Thus, it becomes necessary to understand the determinants of ICT adoption by SMEs.

1.1. 4 Status of the Health Sector in Kenya

The history of modern health services and policies in Kenya dates back to the establishment of religious missions and the arrival of the Imperial British East African Company in the later part of the 19th century (Mwabu, 1995). At independence in 1963 the Kenya Government took responsibility for the health of its citizens and gave high priority to improvement of the health status of Kenyans by recognising that good health is a prerequisite to socio-economic development. This trend has continued up to today. In the Kenya Vision 2030 the health sector is one of the central pillars of the equity and socio-economic agenda (Republic of Kenya, 2007).

In the 1970s the country's health sector recorded tremendous growth especially in the public sector. This growth was attributed to the high priority accorded to improvement of the health status of Kenyans and to the socio-economic development of the country (Gakunju, 2003). Improvement in the health sector resulted in improvement of indicators of health status as well. For instance, the infant mortality rate declined from 120 to 62 per 1000 live births while the mortality rate dropped from about 200 to 97 per 1000 people between 1963 and 1991. Life expectancy increased from 40 years in 1965 to 60 years by 1990 (Gakunju, 2003). However, this trend of improvement in health status was later reversed. Between 1998 and 2003, the infant mortality rate increased from 74 to 77 per 1000 live births while mortality rate increased from about 112 to 115 per 1000 people. During the same period, life expectancy at birth for females declined to 48 years and 47 years for males (KDHS, 2003). This decline could partly be attributed to inefficiency in

service delivery, increased poverty levels, and widespread diseases like malaria and pneumonia.

The determination of the Government to continue improving health services to Kenyans means continued financing and provision of health services. However, with increased population, the demand for health care outstrips the government's ability to provide effective health services. This has led to a policy shift from purely government provision of health services to cost-sharing with those receiving such services. The cost-sharing policy was introduced in the health sector in 1989 followed by a brief suspension in 1990, only to be reintroduced a year later in August 1991 (Republic of Kenya; 1986, Mwabu; 1995, Stover, 1999).

In the 1990s, there was a further shift in health policy towards institutional and structural reforms and market orientation of health services (Republic of Kenya, 1994). The new health policy modeled on the World Bank's (1993) report emphasized the role of the non-governmental sector and sought to transfer the provision of curative care to this sector. In this regard, the government pledged to provide an enabling environment for private sector and community involvement in health service provision and financing (Gallachi *et al.*, 1998).

Since then, there has been an increase in the private-for-profit medical facilities. By 1994 for example, the number of private medical facilities had increased to 1,555, most of which were located in urban areas (Republic of Kenya, 1994). Currently, the main providers of health services are the central government, local authorities, mission hospitals, industrial

health units, and private institutions. The Ministry of Health (MoH) controls and runs about 52 percent of these facilities while the private sector, mission organizations, and the Ministry of Local Government run the remaining 48 percent (Republic of Kenya, 1994).

Healthcare is both a consumer good as well as an investment good (Mwabu, 1995). As a consumption good, healthcare improves welfare, but as an investment commodity it enhances the quality of human capital and improves labour productivity partly by increasing the number of days available for productive activities. Delivery systems of healthcare involve a variety of professionals including physicians, nurses, hospital administrators, and pharmacists many of whom interact with each other and with patients. Most of these actors, especially physicians, can influence the nature, quantity, efficiency and quality of healthcare goods and services delivered and consumed (UNDP, 2001 and Gakunju, 2003).

Although the private sector plays a big role in health delivery, it faces several problems like competition, poor service to customers, poor quality, and inefficiency in promoting coverage and access to healthcare (Republic of Kenya, 1989; 1994, and Berman *et al.*, 1995). These shortcomings are partly attributed to shortage of health personnel; poor management of health services; inadequate funding; gaps in laws affecting the private sector and which appear to regulate the quality of inputs only; lack of medical supplies; low level of hospital operational efficiency; and lack of proper public health information and education. These factors have a direct effect on the health of individuals and communities, and quality of health systems, in disease detection and prevention. They also affect

development and poverty reduction in a country. Therefore, the quality and general efficiency of service delivery and need to be addressed in order to achieve efficiency and effectiveness in the provision of health services (Republic of Kenya, 1989; 1994, Berman *et al.*, 1995, and Mcintyre *et al.*, 2005).

The situation described here for the health sector can be improved by adoption and utilization of ICT (Smith *et al.*, 2003, Yamuah, 2005 and WHO, 2005a). However, despite the recognition of ICT's profound potential in improvement of health care, access to medical information and coordination of research activities there seems to be limited investment and utilization of ICT in the health sector (Yamuah, 2005). ICT does not feature much in the distribution of health, improvement of operational efficiency, and disease prevention information to the general public (Yamuah, 2005).

1.2 Statement of the Problem

Kenya is faced with several developmental challenges including poor public health (Mwabu, 1995, and Noor *et al.*, 2003). To the majority of Kenyan consumers, health services are important features within lifestyle choices. Therefore, health providers need to give timely and up-to-date services. This can be achieved mainly through adoption of ICT. However, most health-related SMEs are faced with the critical decision of whether or not to adopt ICT (Payne, 2005).

There is need for SMEs in Kenya, particularly those in the health sector, to adopt ICT. Such a move will lead to effectiveness in terms of timely delivery of services; improved

communication between clinicians and suppliers; improved access to records; efficient link between health providers; proper monitoring of patients and trends in customer demand for health services; mitigation of the use of scarce knowledge like that of doctors through tele-medicine; promoting better health behaviour; improved decision-making; and enhanced overall effectiveness of health institutions (Yamuah, 2005, Smith *et al.*, 2003 and WHO, 2005a).

The perceived benefits of ICT have motivated a few SMEs to adopt and invest in it. However, many SMEs in the health sector are yet to adopt and implement ICT in their daily operations due to several barriers relating to organizational factors, technological factors, and individual factors (Sun and Zhang, 2005). Previous studies on ICT adoption provide empirical evidence that these factors are significant determinants of ICT adoption in small businesses (Noori, 1990, Rullani and Micelli, 1998, and Scupola, 2003). However, the studies give contradicting findings concerning the determinants of ICT adoption.

While Noori (1990) asserts that low level of ICT adoption in SMEs is due to lack of both financial resources and skilled manpower within SMEs sector, Berryman (1983) blames it on lack of expertise. Although lack of expertise as a reason for non-adoption of ICT seems to concur with Noori's explanation of lack of skilled manpower, it differs with the cultural factors reason supported by Rullani and Micelli (1998). Thong and Yap (1996) found competition insignificantly influencing ICT adoption in SMEs, while Premkumar and Roberts (1999) found competitive pressure as the only factor influencing ICT adoption. Tornatzky and Fleisher (1990) and Scupola (2003) categorized determinants of ICT

adoption into technological factors, organizational factors, and environmental factors but ignored the effect of individual factors. In addition, the effect of some of the explanatory variables like image and trust, which this study considers as a key determinant of ICT adoption, has not been examined.

In the Kenyan context, Kiarie *et al.,* (2006) found that factors such as the duration of computer experience and top management participation, enjoyment, and voluntariness had significant influence on computer use. However, in addition to not covering the health sector the study ignored the effect of external environmental factors as key variables influencing adoption of ICT. Furthermore, all the SMEs visited had adopted ICT; hence the study ignored the views of those that had not adopted. In addition, these findings were likely to be biased because all informants were employees. The study also ignored the inputs of SME owners or managers who are the key decision makers regarding the adoption of any new innovation by their enterprises. More recently Ochara, *et al.,* (2008) noted that ICT infrastructure and Government had role to play in influencing ICT adoption. However, the study ignored other determinants influencing ICT adoption like individual factors, and organization factors.

In focusing on the health sector, this study has incorporated the examination of external environmental factors influencing ICT adoption by SMEs like competitive pressure, government policies, technology support infrastructure, suppliers/buyer pressure, and national culture. In addition, other factors such as trust or security, organizational readiness, sex, age, and education level have also been incorporated.

This study answers two basic questions: (i) To what extent have health-related SMEs in Kenya adopted ICT? (ii) What are the determinants of ICT adoption by SMEs in the health sector?

1.3 Objectives of the Study

The general objective of this study was to establish the determinants of ICT adoption by SMEs within the health sector in Kenya. The specific objectives were to:

i) Establish the extent to which health-related SMEs in Kenya have adopted ICT.

ii) Analyze the determinants of ICT adoption by SMEs in the health sector.

iii) Draw policy implications from objectives (i), and (ii).

1.4 Significance of the Study

It is anticipated that the findings of this study will be broadly applicable to SMEs and will provide valuable insights into the current determinants of ICT adoption by SMEs in Kenya. Through findings of this study, the owners or managers of private health-related SMEs, who are also the policy makers in charge of ICT decision-making, will understand the determinants of ICT adoption in their SMEs. This will enable them to come up with sound policies regarding ICT adoption and utilization by SMEs. The Government of Kenya and other governments in similar conditions could borrow from the findings of this study and draw up policies that could strengthen the SME sector.

The study is expected to help in building the body of knowledge in this field by incorporating factors like age, ICT knowledge of CEOs, qualities of ICT systems, information intensity, ICT specialization, organization readiness, relative advantage,

government policies on ICT applications, and suppliers'/patients' pressure. This study could be of interest to academicians as part of their literature for future research. Finally, in testing the conceptual framework, the study provides the basis for future in depth investigation into the determinants of ICT adoption by SMEs.

1.5 Scope of the Study

According to Republic of Kenya (1994), there are approximately 1,555 health-related SMEs in Kenya. Studying all these SMEs could have been expensive in terms of funds and time. The study was therefore limited to ICT adoption by SMEs within the health sector. Health is an important item within lifestyle choices and customers would like to get adequate information for decision-making.

The study focused on all private health-related SMEs in Nairobi Province that had employed between 10 and 250 people as at July, 2007 and had been in operation for at least three years. The SMEs were categorized based on their location. The key informants were the CEOs of the SMEs because they make decisions to commit funds to ICT facilities. Other informants were the ICT end users and specifically those in key departments in each SME such as admissions or discharge, IT, accounts, customer care, marketing, stores, and human resources.

1.6 Limitations of the Study

The number of employees considered for each SME, especially the upper limit of 250, was mainly of small firms thus making the findings of this study biased towards smaller firms. Self-reporting was used to measure ICT adoption. As argued by Todd and Taylor (1995) and Marjan (2006), self-reporting might create self-generated validity and thus inflate

causal linkage. Furthermore, informants were suspicious of the intention of the researcher because the data were collected immediately after the post-election crisis experienced in Kenya following the December 2007 general election. However, the researcher managed to build rapport with the respondents by explaining to them the purpose of the study and also assuring them of confidentiality in using the information they were being asked to provide.

The current study lacks a longitudinal aspect related to the survey data. The data was collected at only one point in time, which limits the possibility of drawing causal relationships (Marjan, 2006). In addition, there was non-response by some informants due to their busy schedule. Following Saunders, *et al.*, (2007) recommendation this problem was tackled by administering the questionnaire to other informants in the same category at appropriate times when they were in a position to set aside time for the study.

Finally, all the SMEs sampled are located in the capital city of Nairobi, which is a metropolitan and highly industrialized area. This makes it difficult to generalize the results to regional areas in Kenya. Nevertheless, this research gives insights into the determinants of ICT adoption in the health sector.

1.7 Organization of the Thesis

This thesis is structured as follows: the foregoing chapter one provides the research background, research objectives, significance of the study, scope, and the limitations encountered in the course of the study. Chapter two presents literature review on the determinants of ICT adoption by SMEs and a conceptual framework.

Chapter three deals with the methodology employed in the study; the study findings and their interpretation are presented in chapter four; while chapter five has conclusions of the study, theoretical, and policy implications.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on the determinants of ICT adoption by SMEs. The chapter is organized under the following sub-topics: theoretical review, empirical review, overview of the literature, and conceptual model for the study.

2.2. Theoretical Foundation of ICT in SMEs

In the analysis of ICT adoption by SMEs, this study draws from the following theoretical models of ICT adoption and technology acceptance: development theory, diffusion of innovation theory, behavioural adoption theories, ladder model of ICT adoption, and equilibrium theory. Each one of these theories is reviewed briefly to highlight the appropriate theoretical foundation for ICT adoption in SMEs.

2.2.1. Development Theory

Development theory is concerned with changes in society and belongs to the research fields of economics and political science. Lind (1991) observes that many ICT projects in developing countries are launched where computer solutions were unsuccessfully implemented. This has often been the case due to failure to consider the reality of the situation represented by local values, authority patterns, rationality, and time concepts. Furthermore, Avgerou (2001) stresses that it is crucial to use information about the local context in developing ICT solutions. Keniston (2001) observes that one reason for failure in

developing countries is that ICT developers know little about factors that influence the success of ICT projects.

Therefore, for many ICT installations in organizations in developing countries, local factors are not taken into account. This results in outcomes that are incompatible with the needs of a developing nation (Okunoye, 2003). This study is therefore timely in attempting to provide a basis for understanding the determinants of ICT adoption in the health sector.

2.2.2 Diffusion of Innovation Theory

The theory of diffusion of innovation is normally applied to the dispersion of a technical innovation over a period of time by members of a social system. Karshenas and Stoneman (1995) indicate that the three main elements of the diffusion model are identification of the stages of diffusion, characteristics of the innovation that impact upon the rate of diffusion, and adopter categories.

There are five stages through which innovations are seen to progress: namely, knowledge of the innovation, persuasion by key persons, commitment to adopt, implementation, and confirmation of the decision. The five characteristics of an innovation which identify the extent to which performance of the innovation and related benefits are perceivable to the users are relative advantage, compatibility of an innovation with existing values, ease of use, trialability, and observability (Karshenas and Stoneman, 1995). However, the perception of potential users regarding the relative advantage of a new technology varies considerably according to SME-specific characteristics. In particular, Powell (1995) and

Tung and Rieck (2005) stress the importance of facilitating conditions, which reflect the availability of resources needed to engage in the process of adoption.

There are five adopter categories: namely, innovators, early adopters, early majority, late majority, and laggards with the number of adopters per unit of time forming an S-shaped adoption curve (Karshenas and Stoneman, 1995). Innovators and early adopters tend to be more highly educated, work in larger organizations, have greater exposure to various channels of communication, and have higher aspirations. These qualities seem to be lacking in small enterprises. Attewell (1992) has criticised the relevance of the diffusion model to new technologies and asserts that organizational learning and know-how have an important part to play in diffusion as well. Further, Newell *at al* (1998) observes that introducing complex IT systems presents a knowledge integration problem and more so that of awareness. Therefore, acquisition of the technical knowledge required to use a complex innovation successfully demands a lot from potential users (Davis, 1989 and Attewell, 1992).

Potential users also pay great attention to the compatibility of an innovation, which should be understood both in terms of the technical features of the innovation and the existing socio-cultural values, past experiences, and needs of potential adopters. Rip (1995) noted that trialability of innovations affects adoption since functioning, real-world examples is often more important than arguments about advantages and expected functions. Compatibility is especially important in the case of ICT whose adoption is influenced by the existence of network aspects (Church and Gandal, 2004). Trialability provides an opportunity for experimenting with a new technology before deciding whether to adopt.

This is an important benefit especially for early adopters since they only rely upon available information, unlike laggards who learn from the experience of other users.

However, as Rogers (1995) and Tidd *et al.,* (1997) point out, much of the traditional diffusion of innovation theory is based on studies of how individuals make independent adoption decisions, hence limiting applicability of the theory on the study of ICT adoption within an organisational context. Additionally, SMEs face specific problems when formulating their innovation strategies due to deficiencies arising from their limited resources and range of technological competencies (Gallivan, 2001). Similarly, the diffusion of innovation theory assumes all SMEs portray innovative behaviour, which is not always the case.

Nevertheless, the diffusion of innovation theory concurs with the Marcus' model (1986), which asserts that potential adopters of innovation evaluate the possible value that the innovation offers to them (Ankem, 2004). Value in this case can be measured in terms of cost and benefit and is determined by the balance between these two factors. Also, the process of introducing a new ICT solution in an organisation can be regarded as an innovation because of the changes it brings in work processes.

2.2.3 The Behavioural Adoption Theories

The behavioural adoption theories consist of the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), and the Theory of Planned Behaviour (TPB). The three models are among those most widely applied to explain general ICT adoption. The TRA was originally proposed by Fishbein and Ajzen (1975) in their argument that a

person's performance of a particular behaviour is determined by behavioural intent, which is in turn determined by attitude and the subjective norms within which the individual operates; for example, the cultural norms of the organization. However, if behaviour is the transformation of intention into action, then it is necessary to infer that TRA is related to voluntary behaviour. Therefore, using TRA becomes problematic if the behaviour under study is not under full volitional control.

The TAM was originally proposed by Davis in 1989 and initially applied for predicting user acceptance of computers but has gradually been used in a growing number of new fields of ICT. The TAM relates specifically to technology in contrast to TRA which is more general. Two variables can be derived from the TAM model, to determine attitude towards technology. These variables are the perceived usefulness of the technology and the ease or lack of effort to actually use the technology (Davis, 1989). These two variables are similar to two of the characteristics of technology outlined in the diffusion model; that is, relative advantage and complexity although TAM places more emphasis on psychological predispositions and social influences.

Nevertheless, authors like Pedersen and Nysveen (2003), Anckar *et al.* (2003), and Venkatesh *et al.*, (2003) have criticized the model by observing that dividing user perceptions of technology adoption into two categories ignores many other factors such as age, sex, experience, and voluntariness that are significant in ICT adoption. In addition, Manueli *et al.*, (2007) criticises TAM as less comprehensive compared to the diffusion approach which has more innovation characteristics, including time as an essential element of the theory. TAM was also criticised for not accounting for the influence and personal

control factors on behaviour, including the lack of consideration to other factors such as external influences from the environmental attributes, suppliers, customers and competitors (Manueli *et al.*, 2007)

The TPB model was proposed as an extension of TRA to account for situations where people have no complete control over their behaviour (Ajzen, 1991). This model takes into account "behavioural control" to predict behaviour in which individuals are incomplete control. As in TRA, the TPB includes behavioural attitude, subjective norms, intention to use, and actual use. Behavioural attitude and subjective norms are the same in TRA as in TPB. Successful performance of behaviour depends not only on favourable intention but also on sufficient level of behavioural control. To the extent that perceived behavioural control is accurate, it can serve as a proxy of actual control and can be used for prediction of behaviour. Perceived behavioural control consists of two components: the facilitating condition like finance and time to enable one to use a given system, and self-efficacy, referring to an individual's self-confidence to perform a certain behaviour (Todd and Taylor, 1995).

The TRB and TPB models have been criticized for not suggesting behavioural attitude and subjective norms and to some extent behavioural control. Battacherjee (2000) suggests that the TAM model could be incorporated in TPB with perceived usefulness and user friendliness as determinants of behavioural attitude towards use of ICT. Subjective norms could be determined by external and interpersonal influence and that the two components of behavioural control may also be treated as determinants of behavioural control. Riemenschneider *et al.* (2003) tried to bridge the gap between the adoption and acceptance

of ICT by integrating the TPB and TAM to explain adoption of a website by a small business. The integrated model representing the constructs of both the TPB and TAM provides a better fit than either model alone.

In response, Vankatesh *et al.,* (2003) unified the various models of IT/ICT acceptance by integrating elements of the following eight prominent models: TRA; TAM; motivational model; TPB; combined TAM-TPB; Model of PC utilization; innovation diffusion theory; and social cognitive theory into a Unified Theory of Acceptance and Use of Technology (UTAUT). They empirically validated the model with six longitudinal field studies of six large firms in different industries. These models have been well tested, validated and found to be reliable when used in the evaluation of user acceptance in studies involving business originations and corporations. However, little research has been done to evaluate technology adoption using TRA, TAM, and TPB within SMEs in health care and particularly in Kenya.

2.2.4 Ladder Model of ICT Adoption

The ladder/stage model of ICT adoption explains how the process takes place for existing small firms in their exploration and development of new communication technologies (Sergeant, 2000 and DTI, 2000). This model views firms as starting with the simple use of e-mail for the purpose of text messaging and communication. Further developmental stages build up gradually through to the final goal of integrating most, if not all, internal processes of a business through the use of ICT.

The ladder model may seem attractive as a simplified way to describe ICT adoption and use. However, it is based on a false assumption that firms progress from basic to more advanced use of ICTs in a linear process (Fallon and Moran, 2000). Furthermore, the model does not take into account the diversity of SMEs; where variety can lie in size, economic activity, geographic position, resource availability, and ICT adoption stage (Matlay, 1999). The adoption and implementation of ICT in smaller firms may rely more on individual factors such as innovation of the CEO, sex, and level of education.

2.2.5 Equilibrium model of ICT Adoption

In the equilibrium model, David (1969) and Davies (1979) assume that potential adopters are well informed about the existence of the innovation and evaluate the opportunity of adopting by comparing the gross benefits (drivers) and costs (obstacles) of the acquisition.

In the disequilibrium model, Griliches (1967) focuses on the role of information as the major driver of adoption and explains the differences between pioneers and laggards on the basis of awareness of the innovation and the individual's capability to evaluate its benefits. A number of variants of both types of models exist in the literature and contributions vary according to the attention placed on specific objectives, obstacles, and drivers. Only a few studies have been conducted to assess the adoption of ICTs by SMEs and there is need to develop a suitable model of ICTs adoption by SMEs (Poon and Swatman, 1999).

2.3 Health Sector and ICT Adoption

The ICT revolution brought opportunities and challenges to developing countries in their efforts to strengthen health management. In the wake of globalization, developing countries had no choice but to take advantage of the opportunities offered by ICT and face the challenges (Simba, 2004).

ICTs have an ever-growing impact on people's working and private lives and the healthcare sector is no exception. The need for new ways of providing more efficient health care services, coupled with major advancements in ICTs, have resulted in increased use of ICT applications over the past decade (Institute of Medicine, 2001). Application of ICT in health care has grown exponentially over the last 15 years and the potential of ICT to improve effectiveness and efficiency has been recognized by governments' worldwide (Institute of Medicine, 2001). National strategies aimed at developing health information infrastructure and infostructure have emerged across North America, Australia, and Europe (USA, 2001 and Department of Health and Children, 2005). These were united by a vision to improve the safety, quality, and efficiency of patient care by enabling access to electronic health records and by supporting clinical practice, service management, research, and policy through availability of appropriate evidence and data.

In addition, these strategies emphasized the importance of standards and policies for ensuring inter-operability and data security and many incorporated a commitment to facilitate consumer empowerment and patient self-care through provision of electronic information and/or tele-medicine facilities.

In many Western national healthcare services, extensive e-health infrastructure and systems are viewed as central to the future provision of safe, efficient, and high quality customer-centered health care (Silber, 2003). However, the language of healthcare IT has been changing and references to the concept of e-health have proliferated in international health policy, management, and research arenas (Silber, 2003).

While such initiatives have been taking place, the focus of healthcare information technology (IT) has been changing from an emphasis on hardware, systems architecture and databases to innovative uses of technology to facilitate communication and decision-making alongside a growing recognition of the importance of human and organizational factors (WHO, 2005a). These changes are viewed as central to the future provision of customer-centered health care which could include tele-consultation, electronic patient record, tele-education, e-prescription, e-referral, tele-monitoring, tele-care, and tele-medicine services that assist in relaying patient information and indicators that would help doctors to reach a diagnosis (WHO, 2005a). Although current technological developments are essentially limited to developed countries, e-health is now a global topic.

There is consensus from the literature on the benefits of e-health to service delivery. Eysenbach (2001) summarizes the potential benefits of e-health as efficiency, enhanced quality of care, evidence-based e-health interventions and empowerment of e-health service consumers, encouragement of true partnership between the patient and the health professional, and enabling geographically dispersed resources to be treated as if they were centralized. These benefits promote economies of scale and allow for time flexibility and responsiveness on the part of pharmacists, doctors, nurses, administrators, and health care managers.

Developed countries have already invested heavily in ICT connectivity. In individual hospitals across the United States for example, plans were developed to obtain clinical and financial data through both wire and wireless technology with a view to ensuring increased management efficiency and improved patient care in dispersed locations (Montague, 1996). In the United Kingdom, the government invested £6 200 million in establishing a national programme for IT in the National Health Service (Collins, 2004). This programme was meant to deliver efficient health services.

Despite these advances, however, it is noteworthy that the existing gap between the developed and the developing world in information and communication services is also present in a rather dramatic style in the health sector. The health sector was about fifteen years behind other sectors in application of ICTs (WHO, 2005a). At the same time, the gap between Africa and the developed world in the health sector is widening. In the mid-1990s, for example, there was an average of one physician for every 400 people in high-income economies, while there was only one physician for every 1,000 people in low-income economies (WHO, 2005b). In some African countries, the ratio is one doctor for every 7,000 people going to as high as one doctor for every 20,000 people in some rural areas (WHO, 2005b). Ironically, it is the African countries that should have implemented aggressive ICT application to bridge the technology gap and mitigate the shortage of health workers through tele-medicine and yet this has not happened.

2.4 Empirical Literature

The empirical literature review is modeled on previous studies of factors influencing ICT adoption. The review is based on individual factors, organizational factors, technological factors, and environmental factors (Rashid and Al-Qirim, 2001). This relationship is shown in Figure 2.1.

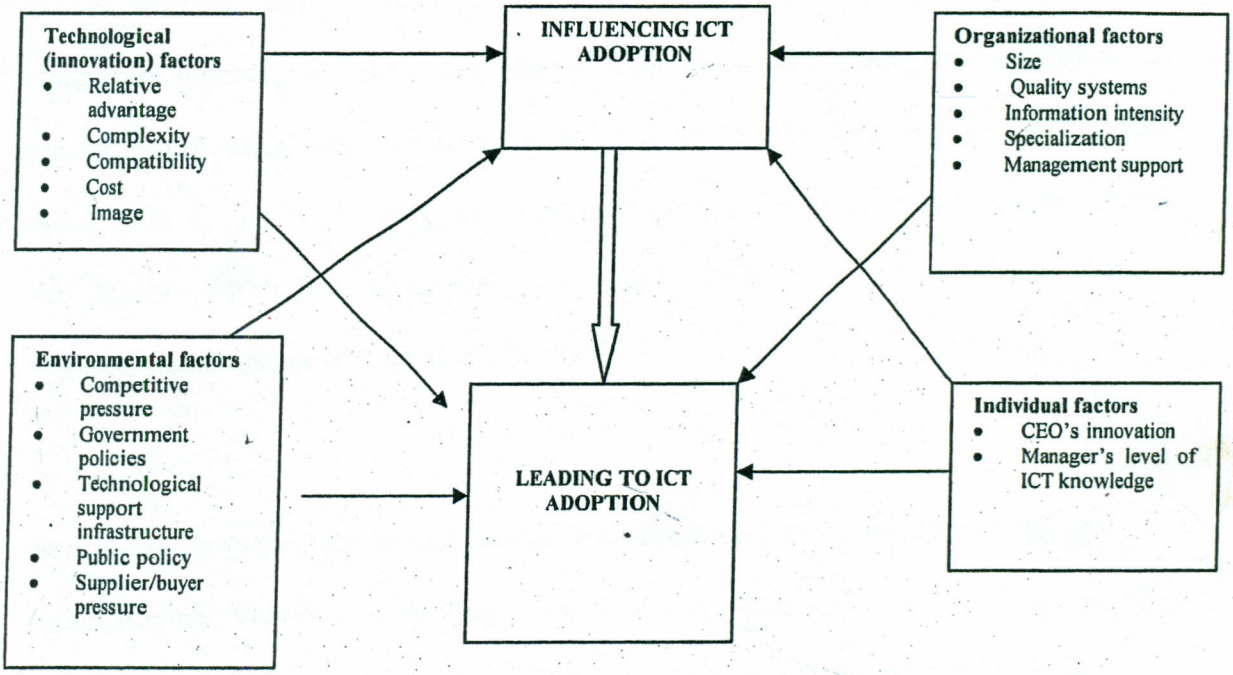

Figure 2.1 Factors influencing ICT adoption by SMEs

Source: Rashid and Al-Qirim (2001)

As shown in Figure 2.1, Rashid and Al-Qirim (2001) have identified four categories of determinants of ICT adoption, namely: individual factors; organizational factors; technological factors; and environmental factors. The relationship in this framework has been modified and adopted as the conceptual framework for this study. This representation was chosen because it connects succinctly the independent variables with the dependent variable. In addition, the researcher considered theoretical approaches on technology

adoption at the micro-level (individual and organizational factors) and macro-level (technological and other factors), which the framework seems to provide valuable insight into understanding the effects of these factors on ICT adoption by SMEs.

2.4.1 Individual factors affecting ICT adoption by SMEs

Successful ICT adoption by SMEs requires the active participation of the CEO or owner (Raymond and Magnenat-Thalmann, 1982). This is because the CEO/owner makes most of the long-term planning decisions, including ICT decisions, and has overall control of the organization's financial and human resources. It is usually the responsibility of the small business CEO or owner to recognize opportunities and threats within the chosen target market (Matlay, 2000). This argument was echoed by Rashid and Al-Qirim (2001) that the CEO's innovation affects ICT adoption by SMEs.

Kirby and Turner (1993) found that lack of knowledge on how to use technology and low computer literacy were contributory factors to non-adoption of ICT. Iacovou *et al.,* (1995), Mehrtens *et al.*, (2001) Bresnahan *et al.,* (2002), Erdener, *et al.,* (2005) , and Kiarie *et al.,* (2006) further indicates that the SME owner's lack of awareness of the technology and its perceived benefits is a major barrier to the take-up of e-commerce. SMEs generally lack the human and technological resources needed for ICT adoption because they focus on day-to-day operations and lack the time to understand the benefits of new technologies (Iacovou *et al.,* 1995, Avlonitis and Karavanni (2000), Mehrtens *et al.*, 2001, Bresnahan *et al.*, 2002, and Erdener, *et al.,* 2005). Even when they are aware of the potential benefits of adopting ICT, SMEs require know-how or qualified personnel. Those firms that adopt ICT are likely

to have within them someone who has a reasonable amount of knowledge of the specific technology and/or technology in general.

The development of ICT-related skills is central to the process of organizational change. Indeed, Iacovou *et al.,* (1995), Mehrtens *et al.*, (2001), Bresnahan *et al.,* (2002), and Erdener, *et al.,* (2005) suggests that organizational investment in assets that are complementary to ICTs might contribute more to raising the relative demand for skilled labour than the diffusion of ICTs themselves. In this context, firms with relatively high proportions of skilled workers would be expected to have a comparative advantage in minimizing the costs both of ICT adoption and of learning how to make the best and most intensive use of ICTs. Highly educated workers, for example, are likely to be better equipped in responding to the new product development opportunities made possible by ICTs. In the areas of production and service highly skilled workers would be expected to adapt more quickly to new forms of work organization than low-skilled workers. Regarding investment in ICT-related training, all other factors being equal, less of such training will be necessary in firms with pre-existing high levels of skill.

Gaskill *et al.*, (1993), and Allison (1999) argues that a skilled and knowledgeable workforce is closely linked to the successful implementation of technology. Indeed, a highly skilled workforce is the key to increased competitiveness and sustainable growth (Gaskill *et al.*, 1993, and Allison, 1999). Therefore, demand for highly knowledgeable and skilled workforce places enormous pressure upon companies to improve or update their current knowledge and skills. This is particularly important in SMEs compared with their

larger counterparts since SMEs are normally portrayed as lacking in appropriate skills and being in need of training to increase the extent to which SMEs adopt ICT (Pawar and Sharda, 1997, Bingi *et al.,* 2000, and Lange *et al.*, 2000). However, shortage of skills has been cited as one of the challenges facing ICT adoption and coping with the rapid changes brought about by ICTs demands continuous education and training, which SMEs are not able to provide because of their limited resources. In addition, Pawar and Sharda (1997), Lange *et al.*, 2000 notes that there is lack of established criteria for measuring the extent to which ICT applications are used in business. Avlonitis and Karavanni (2000), and Erdener *et al.,* (2005) measured the extent of ICT adoption using internet usage across different ICT applications and the significance was established through mean measure of the usage frequency. This measure was adopted for this study.

The Department of Trade and Industry (DTI) observed that most SME managers were not aware of the opportunities presented to them by advanced information technology and especially newly emerging e-commerce and Internet business (DTI, 1998 and 1999). Rashid and Al-Qirim (2001), Marjan (2006), and Gibbs *et al.*, (2007) indicate that closely linked to awareness, understanding, and acceptance of ICT was a distinct lack of ICT skills by the SME manager with the latter being perceived to be the most significant factor to uptake of ICT. Furthermore, while examining the dilemma of the African countries in the wake of ICTs, Sonaike (2004) argues that ongoing efforts by Western firms to expand connectivity in the continent are driven entirely by profit motives. This, Sonaike adds, may create a new and dangerous form of techno-dependence. This also makes SMEs techno-dependent and could be a factor in developing ICT applications that are customized to

health-related SMEs particularly in the Kenyan context and thus reducing their ability to adopt ICT.

Other studies have reported the significant influence of sex on ICT adoption. Venkatesh *et al.,* (2000), for example, found a high intention to use technology by men than by women. In addition, Morris *et al.,* (2005) notes that the subjects of prior technology acceptance research have been predominantly male, but currently females are joining the field of ICT and working in a female-dominated environment. However, these studies were based on developed countries like the United States of America (USA) but the situation might be different in developing countries such as Kenya where there is still gender inequality in many spheres.

The age of employees was also found to have significance influence on ICT adoption. For instance, in USA non-users of the Internet tend to be older (Rice and Katz, 2003). Age, however, may not be a significant factor in determining the use of all ICTs. Some studies in the USA have shown that with respect to the use of the mobile phone, age did not appear to be a significant predictor even though with respect to the Internet, a clear age threshold existed whereby inclusion falls after the age of 55 (Wareham, *et. al.* 2004). This means that Internet and mobile phone users are not necessarily the same group of people with the difference being attributed to the fact that mobile phones and the Internet do not necessarily fulfill similar needs or utilities.

Furthermore, Morris *et al.,* (2005) argue that in a country where the workforce is relatively young and homogeneous and is specifically in the 31-40 age range across both the public and private sector, ICT is more likely to be adopted. The effect of age as a demographic

variable is usually minimal because it is expected that younger people would be more motivated to use ICT especially now that technologies like the computer have only recently been introduced in the school curriculum in Kenya.

Although the studies reviewed have given vital insights into the effects of individual factors on ICT adoption, they are based on SMEs in the developed countries and little seems to have been done on African countries and more so on Kenyan. The current study fills this gap.

2.4.2 Organizational Factors affecting ICT Adoption by SMEs

Organizational factors such as SME size, quality systems, information intensity, specialization, management support, voluntariness, and organizational readiness facilitate the adoption of ICT by SMEs. The size of the SME is a determining variable in the decision to adopt ICT. Igbaria *et al.,* (1996), Thong (1999), Dutta and Evrard (1999), Premkumar and Roberts (1999), Ling (2001), Rashid and Al-Qirim (2001), Teo and Tan (2002), and Karki and Bauer (2004) notes that the size of the SME is one of the key parameters hindering adoption of the ICT by enterprises; large enterprises have the resources and the infrastructure necessary to facilitate the adoption of innovations. Small enterprises, by contrast, are less apt to adopt ICT because they often lack resources. This situation is brought about by such factors as operating in a strongly competitive environment, major financial constraints, lack of professional expertise, and greater sensitivity to external forces (Thong, 1999, Ling, 2001, Rashid and Al-Qirim, 2001, Teo and Tan, 2002, and Karki and Bauer (2004). Karki and Bauer (2004) study was based on agricultural sector in

Nepal. The model used for data analysis by Karki and Bauer fitted the study well and it was adopted for the current study. The functional relationship of the adopted model was:

$$P(Yi = 1) = \left[\frac{e^{X\beta + u}}{1 + e^{X\beta + u}} \right] \text{ ----------(1)}$$

$$\text{Ln}\left[\frac{p}{1-p}\right] = \alpha + \sum\beta_1 x_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + \varepsilon_I \text{ ----------(2)}$$

Where, Yi = a dichotomous dependent variable (P = 1 if technology adoption takes place, 0 otherwise), X_i includes vector of variables included in the model, α = Constant of the equation, β_i = parameters to be estimated, ε_I = error term of the model, e = base of natural logarithms.

Another variable affecting ICT adoption is system quality, which is an important driver behind user satisfaction, end-users' intention to use, and actual usage, which are in turn the key drivers behind net benefits (DeLone and McLean, 2003). Organizational readiness for Internet adoption is personified in the SME owner. Small and Medium Enterprises do not see Internet adoption as an IT issue but as a business one. Hence SMEs that are attracted to Internet commerce tend to be more entrepreneurial, risk takers, innovative, and invariably creative (Poon and Swatman 1999). A second organizational readiness factor is the requirement for SMEs to have adequate IT in place to access the Internet. The reactive or proactive approach of owners/managers to rapid technological changes in the marketplace is crucial to ICT adoption and implementation; managerial commitment and perceptions of ICT benefits are key features in this process (Poon and Swatman, 1999).

Moore and Benbasat (1991) have argued that behaviours are directed more by the perception of voluntariness than by actual voluntariness because users may still feel some compulsion to adopt ICT even when the setting is not strictly compulsory. Venkatesh *et al.*, (2003) asserts that voluntariness has been treated as binary by some authors while others have treated it as a continuous variable. The problem with a binary view is that it ignores differences in the requirement to use different functions of the system. For example, it might be mandatory to use Lotus Notes email but optional to use the discussion databases. Therefore, the requirement to use the system among different employees might make it challenging to think of voluntariness in strictly binary terms.

Furthermore, Moore and Benbasat (1991) and Agarwal and Prasad (1997) have suggested that in practice users might perceive different degrees of voluntariness in using an innovation. Therefore, voluntariness may be empirically ordinal but is sometimes treated as a binary concept (either mandatory or voluntary) in academic research. Given that perceived voluntariness is a range of various levels of choice it would be wrong to conclude that a system is mandatory only when the users do not want to use it at all but must use it (Venkatesh and Davis, 2000).

The theoretical role of voluntariness in technology acceptance has been examined in multiple ways. When use of a system is perceived as mandatory in the organization, the intention of using the system may be predicted by subjective norms. This view of voluntariness observes that attitude is more important when adoption is a matter of individual choice and less so when organizational pressure is applied (Venkatesh and Davis, 2000).

2.4.3 Technological Context of ICT Adoption by SMEs

The technical know-how required to use ICT can prevent its adoption. The complexity of technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision. It is expected that a high degree of perceived complexity of ICT would negatively influence the decision to adopt it (Rashid and Al-Qirim, 2001 and Seyal and Rahman, 2003).

Furthermore, enterprises choose forms of ICT that conform to certain internal values and experience, which enables them to reduce the perceived risks and to make minimal adjustments and changes and therefore less resistance to adoption. Rogers (1995) noted that in health-related SMEs, compatibility of a technology with the work practices, values, needs and experiences of the user becomes a crucial determinant in acceptance decision-making. The high value placed on the therapeutic relationship between a client and therapist cannot be underestimated as it is a crucial tool in the therapeutic process. In addition, an innovation that is perceived to be incompatible with this process will ultimately lead to rejection of the innovation by health care professionals (Rogers, 1995). Rashid and Al-Qirim (2001) and Teo and Tan (2002) argue that the incompatibility of a new ICT system with existing work procedures, value systems, and infrastructure negatively affects the attitudes of users and increases their resistance to change, thus hindering its adoption of ICT.

Similarly, compatibility may influence behavioural intention indirectly through performance expectancy and effort expectancy. Chau and Hu (2002) reported compatibility of tele-medicine technology as having significant influence on its perceived usefulness.

Hence, it is true that compatibility directly affects ICT adoption through end users perceiving a technology as being useful to their work.

Another factor influencing ICT adoption is relative advantage. Poon and Swatman (1999), Rashid and Al-Qirim (2001), and Seyal and Rahman (2003) argue that the positive perception of the advantages of ICT should provide an incentive for adoption. In this case, the degree of relative advantage is often expressed in terms of profitability, cost reduction or transaction acceleration, creation of a worldwide client database, rapid access to information, worldwide distribution of information, and improvement of customer service (Poon and Swatman, 1999, Rashid and Al-Qirim, 2001 and Seyal and Rahman, 2003).

In any enterprise the financial, human, and technological resources (computers, telephone lines and Internet) play a very important role in the adoption of new technologies (Thong, 1999). In the case of SMEs in particular, even if the managers perceive the adoption of ICT as important, the enterprises often do not have sufficient resources to adopt. This is a major obstacle to the adoption of new technologies in SMEs. Severe organizational and financial constraints often cause businesses in developing countries to lag behind their counterparts in developed countries in adopting ICT.

From a psychological perspective, innovation is more likely to take place in the presence of organizational slack because it buffers organizations from downside risk and also because the legitimacy of experimenting is less likely to be questioned in a more resource controlled environment (Singh, 1986). Singh argues that there is support in the literature for this assertion. Thus, slack resources are expected to facilitate risk taking and innovation.

Nolan (1979) suggested that organizations encourage innovation and extensive application by maintaining low control and high slack. In addition, Mone *et al.,* (1998) identified higher levels of uncommitted resources as a factor that positively affects innovation in response to organizational decline. Lack of resources and expertise are assumed to be a major reason that hinders the adoption of innovations by small businesses (Thong, 1999).

The owners of SMEs are concerned about a return on investments and are reluctant to make substantial investments when short-term returns are not guaranteed (Akkeren and Cavaye, 1999). The cost and availability of telecommunications determines the extent to which the new ICTs are used and these access costs are often higher in poor countries. The price of telecommunication services has a negative impact on the spread of Internet technologies as the transmission of data depends on the use of this infrastructure, which means that telephones and Internet are complementary (Kiiski and Pohjola, 2001 and Rashid and Al-Qirim, 2001). Most SMEs will not adopt ICT if the benefits do not outweigh the costs of developing and maintaining the system. Nevertheless, SMEs are generally concerned about the costs of establishing and maintaining ICT since they generally suffer from budget constraints and are less sure of the expected returns on their investment. Some SMEs cannot afford to adopt sophisticated ICT solutions, for example a website, with a secure environment for credit card transactions.

When end-users perceive the use of ICT device as enhancing their status within their working environment, this is likely to affect the adoption of ICT. Van Heerden and Puth

(1995) argue that enterprises try to improve their image in order to increase their credibility among customers. Therefore, customers' perception has become essential for success. Indeed, a strong image is an effective means for differentiation. Additionally, end-users are more likely to be influenced by the impact of the use of the new technology on their professional status (Succi and Walter, 1999 and Rashid and Al-Qirim, 2001). However, research has contested the idea that social processes of subjective norm and image would influence the decision to adopt ICT. This is seen to be a result of the pragmatic nature of end users in decision-making as well as reliance on their own assessment rather than that of others.

Trust in the technology in relation to handling transactions, securing systems, and maintaining relationships has considerable influence upon decision makers of SMEs in ICT adoption. Trust can result in positive networking with other businesses, Government, and consumers (Haynes *et al.,* 1998). Furthermore, the issue of trust between individuals within organizations is a significant issue especially when establishing business relationships for business-to-business online functions (Times, 2000 and Simpson, 2002). For example, research suggests that Australian SMEs are lagging behind similar businesses internationally regarding uptake of ICT thus placing them in a less competitive position. The online component of a business can be leveraged to deliver effective marketing, value added services to customers, and market reach.

Although several benefits are associated with the use of ICTs such as efficiency in business transactions arising from improved communication using e-mail; benefits obtained from the ability to do research and gather competitor information; economic benefits; social benefits;

and environmental benefits, few studies are available to substantiate these arguments (Poon, 2000, Foley *et al.,* 2002). It is also clear that each individual that uses ICT has different desires, needs, and abilities and all these factors influence the reasons for using ICT. Personal circumstances could also determine the benefits received from the Internet.

2.4.4 External Environmental factors affecting ICT Adoption by SMEs

The influence of the external environment is important throughout the adoption decision process. Several authors have studied the possible effect of competition pressure on the adoption of new technologies (Cragg and King, 1993 and Iacovou *et al.*, 1995). However, Thong (1999) expresses contrasting views by indicating that competition influences, to a very little extent, the adoption of new technologies in small enterprises. Tung and Rieck (2005) argue that competitive pressure on adoption decisions arises when organizations presume that competitors may have comparative advantage as a result of adoption of ICT. Furthermore, Tung and Rieck (2005) contradict Thong's (1999) conclusions hence the need for further investigation.

Despite the fact that African countries are expanding and extending communication systems, the current state of infrastructure is still a major problem and remains a threat to the continent's full participation in the information society (Mansell and Wehn, 1998). Cash-constrained national treasuries and limited investment opportunities are two major factors reducing rapid infrastructural development. Nevertheless, despite severe constraints in telecommunication and infrastructural development the most dynamic telecommunication market is the Internet, which is growing rapidly.

According to Anigan, (1999) and Kapuruandara *et al.,* (2004) lack of telecommunications infrastructure includes poor Internet connectivity, lack of fixed telephone lines for end user dial-up access, and the underdeveloped state of the Internet service providers. Although many countries have taken major steps to improve their infrastructure, great variation still remains between regions and countries. In Africa, over 30 countries still have less than one telephone line per 100 people (tele-density) compared to the average global penetration of 13 telephone lines per 100 inhabitants (Evusa, 2005, Wicander and Sundén, 2006). Kashorda (2007) adds that low tele-density of fixed telephone lines has led to low ICT usage in Kenya's SME sector. However, in many African countries, telecommunication networks are being extended and modernized, but rural areas where 70-80 per cent of the population still lives are largely uncovered by telephone service (Ochara, *et al.,* 2008).

Mulungua (1994) argues that Kenya's telecommunications monopoly policy approach would be incompatible with the corporation's objectives. However, the telecommunications policy and organizational structure have followed the Postal and Telegram Telecommunication (PTT) monopoly approach traditionally employed in European countries and most of Africa (Kenya Posts (KP) and Telecommunications Corporation (TC), 2000). Nevertheless, the telecommunications policy in Kenya is just beginning to be influenced by the wave of change towards increased competition that swept the United States, Japan, Europe, and other advanced industrial areas of the world. As noted by KP and TC (2000), the motivation to initiate the move toward liberalization was a desire to improve efficiency by introducing competition and to have the private sector share the

increasing financial burden of supplying terminal equipment and thus freeing KP and TC to concentrate its resources on major projects. However, neither a major expansion of competition nor privatisation appeared to be under serious consideration until the early 1990s.

In the provision of services, multiple operators are competing in various market segments based on a policy of the private sector operating in a competitive environment that also safeguards consumer interest. While the growth of the ICT sector in Kenya has been significantly influenced by global trends, it can be assessed in terms of the number of fixed and mobile telephone lines (Evusa, 2005). Telkom Kenya is today the only fixed national operator and one regional telecommunication operator (Bell Western Communications Ltd) has been licensed to provide services in the North Eastern region. The Kenya Government has liberalized the mobile cellular market which has four operators, namely: Safaricom Limited, Zain Kenya, Orange Kenya, and YU Mobile Network. External pressure is primarily from customers although suppliers also have influence. Sillence, *et al.*, (1998) and Poon (2000) recognized the influence of customer pressure on ICT adoption.

Rashid and Al-Qirim (2001) have addressed the relationship between the pressure of suppliers and that of buyers on the enterprise and the adoption of ICT. This influence depends on the characteristics of the suppliers and buyers such as geographical distance, habits, tradition, and purchase behaviour. Another common form of external pressure affecting the adoption of ICT comes from customer demands such as branded firms requiring their suppliers to adopt ICT. Multinational corporations, for example, create

coercive pressure on their subsidiaries and suppliers by requiring them to use e-commerce technologies to link to global production networks (Gibbs *et al.*, 2003).

There is also some evidence that problems caused by the impact of a political system, such as control and pressure by the authorities, include poor public data stores and lack of competitive market experience (Chepaities, 1996). According to Rashid and Al-Qirim (2001), governments can be among the most powerful institutional forces affecting innovation. Also, the Internet is used more widely where political and civil freedom exists (ILO, 2001). Palvia *et al.*, (2002) state that the political will affects the conditions in which IT is managed and developed.

Evusa (2005) has asserted that the greatest handicap for development of Internet services has been the regulatory restrictions since access to the customer and international bandwidth is through Telkom Kenya Limited. These sentiments are shared by Kashorda (2007) who has suggested that the problem of ICT adoption is partly caused by an inadequate legal and regulatory framework. Since legislation differs for every country so will its influence on ICT. In some countries, for example, certain types of telecommunications equipment may be banned in order to protect local data and information processing industries, while some other countries may require that hardware and software be purchased locally.

Mureithi (2003) reviewed the evolution of mobile telephony and found the need for policies aimed at removing barriers to the implementation of telecommunication infrastructure. This view is echoed by Adeya (2004) who argues that as the digital divide grows, the role of the

state in regulation of ICT development in Africa is becoming increasingly questionable. Furthermore, early in the decade the call for policy development in the ICT sector in Kenya had largely been ignored while policy makers focused on limited applications in libraries, information services, and local publishing. This was partly due to Government's interest in information as a source of power rather than as vital factor for development (Adeya, 2004). In addition, Adeya (2004) asserts that in 1993, there was a general neglect of internally and externally generated information in government and consequently a disregard for its role in policy making.

Hodas (1993) argued that cultural factors play an important role in creating a negative attitude toward computers. This is because of the tendency for computers to make life too mechanized thus building up resistance from employees in accepting them. Similarly, Straub (1994) noted that an important reason for the frequent disappointing results in transferring technology from one culture to another is that the decision-makers who engage in such transfer lack sufficient knowledge of either the importers' cultural conditions or the nature of the technology or both. Straub argued that importing a technology into developing countries without enough understanding of the national culture can result in incompatibility between the culture and the technology.

Silverstone and Haddon (1996), and Straub *et al.,* (1997) maintain that all individuals live and work within a cultural environment in which certain values, norms, attitudes, and practices are more or less dominant and serve as shared sources of socialization and social control. Such an environment could influence ICT decisions. As observed by Hofstede (1997) and Martinez (1999), one of the major challenges facing developing countries is to

make technology an essential part of the culture of the people. Furthermore, Myers and Tan (2002), Li (2002), Bagchi *et al.*, (2003), and Getao and Wausi (2005) have argued that ICT adoption decisions depend largely on individuals in organizations and that these decisions are also influenced by a given country's national cultural characteristics. In addition, Erumban and de Jong (2006) concluded that the significant variation in Internet diffusion and IT implementation and acceptance between countries could be attributed to national culture. Unfortunately, very few studies have tried to examine the effect of national culture on the adoption of ICT in Kenya. Therefore, given this gap in the literature the present research aimed at testing the effect of national culture on ICT adoption within health-related SMEs in Kenya.

2.5 Overview of Literature

Despite the growing number of studies on the adoption of ICT in SMEs, the literature still suggests the need for advanced understanding of the key factors experienced in different contexts around the world. In addition, this area of study is still under-researched in African settings. Most of the existing literature represents contexts in developed countries while far less research in this area has been carried out in African contexts.

From the literature reviewed, the key determinants noted by the researchers to date include sex, age, education, and manager's level of ICT knowledge. The other factors were SME size, quality systems, information intensity, specialization, management support, organizational readiness, voluntariness, and relative advantage. Also studied were factors such as complexity of innovation, compatibility of ICT systems with other factors in the

organization, cost, competitive pressure, government policies, technological support infrastructure, supplier/buyer pressure, and national culture.

Whilst health is an increasingly information-intensive sector where ICT adoption can significantly contribute to improved quality of service, efficiency, and accessibility, there seems to be little uniformity in how these factors affect ICT adoption particularly in African countries and more so in the health sector in Kenya. Noori (1990) asserted that low the level of ICT adoption in SMEs was due to lack of both financial resources and skilled manpower within SMEs sector, Allison (1999) blamed it on lack of expertise. Although lack of expertise as a reason for non-adoption of ICT seemed to concur with Noori's lack of skilled manpower, it differed with government policy reason supported by Mureithi (2003). Getao and Wausi (2005) argues that ICT adoption is influenced by cultural factors which seem to contradict Kiarie, *et al.,* (2006) argument that ICT adoption by SMEs is influenced by individual, organizational and technological factors, while Kashorda, (2007) argues that ICT adoption is influenced by telecommunication infrastructural development. Furthermore, Gibbs *et al.*, (2007), and Ochara, *et al.,* (2008) ignored the contribution of technological context in ICT adoption by SMES.

There seems to be no study that has examined the influence of individual factors, organizational factors, technological factors, and external environment factors on ICT adoption by SMEs in Kenya. This study, therefore, attempted to fill the gap in existing literature by considering the fact that less developed countries are not alike as noted by Gibbs *et al.*, (2007) and there was need to investigate the common factors influencing ICT adoption for Kenya and other developing countries .

2.6 Conceptual Framework for the Study

Tornatzky and Fleischer (1990) came up with a framework where factors affecting ICT adoption were grouped into three. These explanatory variables are the organizational context, the technological context, and the external environmental context. However, Tornatzky and Fleischer's model failed to incorporate the effects of individual factors. Poon and Swatman (1999) acknowledged the role of the individual manager as being a significant influencing factor of the adoption of ICT in SMEs. The role of the manager involves making high-risk decisions thus potentially affecting the performance of the business.

Rashid and Al-Qirim (2001) developed a model consisting of four factors, namely, technological factors, organizational factors, environmental factors, and individual factors. However, other determinants like trust, organizational readiness, voluntariness, sex, age, and education were not included in the Rashid and Al-Qirim model. Also, the Rashid and Al-Qirim model failed to recognise that all the categories of ICT adoption could be referred to as environmental factors.

Mahesha and Robyn (2006) developed a conceptual framework that grouped factors of ICT adoption by SMEs into internal factors that an SME has control over like lack of time or resources, lack of awareness on the part of the CEO or owner, organizational factors, and return on investment. The other category consisted of external factors that cannot be resolved by the SME such as inadequate telecommunication infrastructure, inadequate bandwidth, social and cultural factors, and absence of a proper legal and regulatory

framework in the country. However, this model omitted factors like employees' ICT knowledge and the CEO innovation, which are very critical to ICT adoption among SMEs.

From the literature reviewed, most studies developed models that group together all the factors into either two or three of the following principal, components: the technological component, the organizational component and the environmental component. This study used a modification of the Rashid and Al-Qirim (2001) model. In the revised model, the determinants of adoption of ICT are categorised as technological factors, organizational factors, external environmental factors, and individual factors as shown in Figure 2.2. Organizational factors collectively impact on the resources of the business in relation to adoption of ICT innovations. Environmental factors provide significant impetus for adoption where the issues relating to the market and the firm's standing in the market directly influence the uptake of technology. Increased incorporation of ICT within SMEs directly impacts on the functionality of the SME; hence increasing productivity and profitability of the business. Individual factors incorporate the management aspects attributed to the business and thereby influence significantly any decisions to enhance the business using ICT systems.

Based on the theoretical models reviewed and an attempt to integrate the findings of this study with existing literature, a model describing the key determinants of ICT use by SMEs was adopted. The conceptual framework draws insight from earlier studies of ICT adoption by SMEs (Tornatzky and Fleischer's 1990, Rashid and Al-Qirim, 2001), generic theories on technology acceptance (Venkatesh *et al.,* 2003, Rogers, 2003), and the success of information systems (DeLone and McLean, 2003, Marjan, 2006). The core variables

predicting ICT adoption are borrowed from the TAM model of Davis (1989) and the Unified Theory of Use and Adoption of Technology (Venkatesh *et al.,* 2003). These variables include technological factors, organisational factors, and demographic factors. Davis (1989), Tornatzky and Fleischer's (1990), and Rashid and Al-Qirim (2001) models provide the external environment components on the conceptual framework. The study used the modified conceptual framework incorporating other variables like trust, organizational readiness, voluntariness, sex, age and education as presented in Figure 2.2.

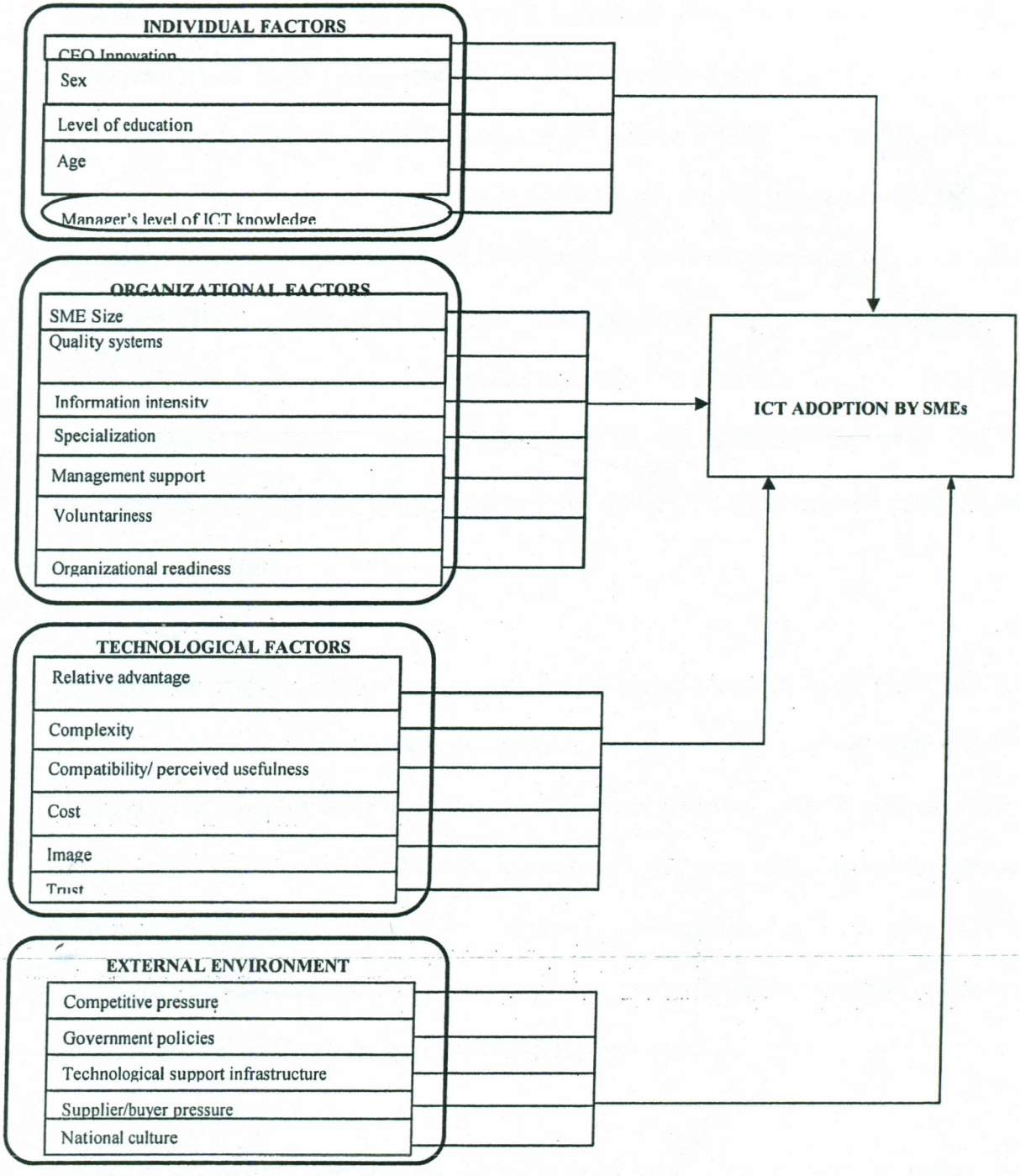

Figure 2.2 Conceptual framework

Source: Adopted from Rashid and Al- Qirim (2001) and modified by the researcher (2007)

From the modified conceptual framework, sex, age and education have been added to the individual factor category. This is based on literature reviewed where Rice and Katz (2003)

asserted that the age of employees had a significant influence on ICT adoption, while Venkatesh *et al.,* (2000) and Morris *et al.,* (2005) reported significant influence of sex on ICT adoption. In addition, Gaskill *et al.*, (1993), Allison (1999), Lange *et al.*, (2000), and Bingi *et al.,* (2000) argued that shortage of skills was one of the challenges facing ICT adoption. However, these authors did not categorize the determinants of ICT adoption into four categories as is the case in this study. Therefore, in this study, the collective impact of the variables was tested. One would expect age, sex, and education to have some effect on ICT adoption. Similarly, organizational readiness and voluntariness have also been incorporated under the organizational factors. In addition, trust has been incorporated under technological factors.

ICT adoption is expected to increase with better education and training (Rice and Katz, 2003). While age and voluntariness are likely to have some effects in this study, the effect of sex is more complex and may differ from previous research on technology acceptance. Morris *et al.,* (2005) observes that the subjects of prior technology acceptance research have been predominantly male, but currently females are joining the field of ICT and working in a female-dominated environment. Thus, it is probable that sex does not have the same influence as has been the case in male-dominated contexts.

Finally, it is expected that trust in the technology in relation to handling transactions, securing systems, and maintaining relationships to positively affect ICT adoption by SMEs. Trust between individuals within organizations is a significant issue, especially when establishing business relationships for business-to-business online functions.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter highlights the research design and methods that were applied in addressing the research problem and the research objectives. The chapter is divided into sections covering the following areas: research design, the empirical model, operationalization and measurement of variables and hypotheses, target population and study area, sampling design, data collection instruments, data collection procedure, validity and reliability, and data analysis.

3.2 Research Design

The overall research design chosen for this study was a cross-sectional descriptive survey using quantitative approach to data collection, analyses and reporting though some elements of qualitative approach of data collection were used. Orodho (2003), Malhotra and Birks (2003), Mugenda and Mugenda (2003), and Saunders, *et al.*, (2007) notes that no single approach exists in isolation and can be mixed and matched to achieve optimal results of the study. The choice of the survey research design was made based on the fact that it allows collection of quantitative data from a sizeable population in a highly economical way (Orodho, 2003, Malhotra and Birks, 2003 Mugenda and Mugenda, 2003, and Saunders, *et al.*, 2007). In addition, as noted by Mugenda and Mugenda (2003), and Saunders, *et al.*, (2007) survey method is perceived as authoritative by researchers. It allows use of both descriptive and inferential statistics in data analysis. In addition, the data collected using this design can be used to suggest possible reasons for particular

relationship between variables. It allows you to have more control over the research process and, when sampling is used as it was the case in this study; it is possible to generate findings that are representative of the whole population at a lower cost. Thus, the descriptive survey design was found to be more consistent with the general objective of the study, which was to establish the determinants of adoption of ICT by SMEs within the health sector in Nairobi, Kenya.

3.3 The Empirical Model

The model used in this study was adopted from Karki and Bauer (2004) as noted in the literature review. The present study conceptualized the SME as a consumer of ICT. The study assumed that the SME makes decisions to adopt ICT in order to maximize expected utility. Guided by the utility maximization objective, therefore, ICT (t_1) is adopted if and only if the utility derived from it is greater than the utility of not adopting (t_0). The i^{th} SME adopts ICT (t_1) if:

$$U_{it1} > U_{it0} \quad \text{----------(1)}$$

Where: i = 1, 2, 3…n denote the different SMEs making decisions to adopt. U_{it1} and U_{it0} denote utility derived by SME (i) from adopting ICT (t_1) and not adopting ICT (t_0). The utility function ranking the i^{th} SME's preference for adopting ICT (t_1) is represented as:

$$U_{it1} = U_{it1}(R_{t1}, A_{t1}) \quad \text{----------(2)}$$

Where:

i) R_{t1} describes the distribution of net returns from ICT (t_1)

ii) A_{t1} is a vector that describes the other attributes associated with ICT

Since the variables R_{t1} and A_{t1} are ideally non-observable in this study, the utility derived from the ICT (t_1) by an SME was postulated to have a relationship with a vector of observable explanatory variables (X_j) and a random zero mean disturbance term (u_i) such that

$$U_{it1} = U_{it1}(X_j, u_i) \quad \text{----------(3)}$$

$$U_{it0} = U_{it0}(X_j, u_i) \quad \text{----------(4)}$$

Where $X_j = X_1, X_2 \ldots X_{23}$ represent the different explanatory variables (1 to 23) that influence the decision to adopt ICT.

In economic theory, utility functions are used only to represent ordinal indexes of preference so that it is possible to rank satisfaction derived from different consumption bundles. Utility itself is non-observable and is difficult to measure (Nicholson, 1992). It can only be derived indirectly from observable variables so that shift parameters are determined that explain how it varies with different situations. Use of probability models is therefore appropriate in undertaking an adoption study.

The SME is faced with two options: to adopt or not to adopt ICT. The general model is a binary choice model involving the estimation of ICT adoption as a function of a vector of explanatory variables. Taking Y to represent the SME's adoption decision then,

$Y_i = 1$ if t_1 is adopted implying $U_{it1}(X_j, u_i) > U_{it0} = U_{it0}(X_j, u_i)$ and

$Y_i = 0$ if otherwise and it is assumed that the probability to adopt has a relationship with the explanatory variables.

If the probability of adopting is given by the equation

$$P(Y_i = 1) = f(X,\beta) \text{----------} (5)$$

Then the probability of not adopting is represented as follows:

$$P(Y_i = 0) = 1 - f(X,\beta) \text{----------} (6)$$

Where:

i) $P(.)$ = is probability that a given decision is taken

ii) Y_i = is the observed response so that for the i^{th} SME, $Y_i = 1$ if adoption, $Y_i = 0$ if otherwise

iii) X = is a vector of explanatory variables that affect the probability of ICT adoption

iv) β = is a vector of the coefficients of the explanatory variables that describe how changes in the variables influence probability of adopting ICT

The function $f(.)$ may take the form of a normal, logistic, or any other probability function (Karki and Bauer, 2004).

Four alternative functional relationships can be used to estimate the probability of ICT adoption, especially for analyzing the relationship between dependent discrete variable

(adoption) and explanatory variables (Karki and Bauer, 2004): linear probability, discriminant analysis, probit model, and logit model.

However, the Logit and Probit models are preferred because they help in overcoming weaknesses inherent in linear probability models such as heteroskedasticity and linearity problems. Although discriminant analysis can be used to predict binary dependent variables, it is only suitable for use with continuous independent variables (Agresti, 1996). Thus, in instances where the independent variables are categorical or a mix of continuous and categorical, Logit or Probit models are preferred. Logit or Probit models provide efficient and consistent parameter estimates. Although the two models yield similar results in binary choice situations, it is difficult to distinguish them statistically (Abebaw and Belay, 2001). Different studies choose between the two on the basis of convenience, hence the one to use is a matter of personal preference (Greene, 1990, Abebaw and Belay, 2001).

The Logit model was preferred for this study because it is easier to estimate, simpler to interpret; it is applicable to a broader range of research situations and is able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables (Abebaw and Belay, 2001, Karki and Bauer, 2004). In addition, it is a more robust specification because it overcomes the limiting assumptions of discriminant analysis, the predicted probabilities are guaranteed to lie between 0 and 1, and the marginal effects are not constant. Furthermore, variables in Logit model do not have to be normally distributed, linearly related, or show equal variance within each group. Also, the Logit model does not assume homoscedasticity and generally has less stringent requirements. The model

provides knowledge of the relationships and strengths among the variables (Karki and Bauer, 2004).

The Logit model was used to predict the determinants of adoption of ICT by SMEs in the health sector. The "forced entry" method was used where all predictor variables were included in the model. Karki and Bauer (2004), and Field (2005) argued that this is the appropriate method for theory testing. Another argument in support of this model is that the stepwise method is influenced by random variation in data and therefore seldom gives replicable results if the model is re-tested within the sample. The model uses a logistic cumulative distribution function and estimates the probabilities as follows:

$$P(Yi = 1) = \left[\frac{e^{X\beta + u}}{1 + e^{X\beta + u}}\right] \text{----------(7)}$$

$$P(Yi = 0) = 1 - \left[\frac{e^{X\beta + u}}{1 + e^{X\beta + u}}\right] = \left[\frac{1}{1 + e^{X\beta + u}}\right] \text{----------(8)}$$

Where e is the base of natural logarithms

Taking $P(Y = 1) = P$ and $P(Y = 0) = 1-P$, then

$$\frac{P}{1-P} = e^{X\beta + u} \text{----------(9)}$$

Taking natural logarithms from both sides gives

$$Ln\left[\frac{P}{1-P}\right] = X\beta + u \text{ ;----------(10)}$$

So that

$$\frac{\partial \text{Ln}}{\partial X}\left[\frac{P}{1-P}\right] = \beta \text{ ----------(11)}$$

The model is non-linear and normal distribution is not guaranteed; hence the parameter estimates are obtained by use of the Maximum Likelihood method and not the Ordinary Least Square method, which only gives efficient and consistent estimates when the distribution is normal (Greene, 1990).

The parameter estimate,β, in this case is not interpreted as a marginal value of change in probability. The marginal changes are computed according to the following equation:

$$\frac{\partial P}{\partial X} = \frac{[e^{X\beta + u}]\beta}{[1 + e^{X\beta + u}]^2} = [f(X, X\beta)\,(1-f(X,\beta)]\,\beta \text{ ----------(12)}$$

$$\text{Ln}\left[\frac{P}{1-P}\right] = f(X_1, X_2 \ldots X_{23})$$

Where:

X_1 = CEO innovation

X_2 = Sex of employees

X_3 = Age of employees

X_4 = Level of education

X_5 = CEO's ICT knowledge

X_6 = SME size

X_7 = Quality of ICT systems

X_8 = Information intensity

X_9 = ICT specialization

X_{10} = Management support

X_{11} = Organizational readiness

X_{12} = Voluntariness

X_{13} = Relative advantage

X_{14} = Complexity

X_{15} = Compatibility

X_{16} = Cost

X_{17} = Image

X_{18} = Trust

X_{19} = Competitive pressure

X_{20} = Government policies

X_{21} = Technological support infrastructure

X_{22} = Suppliers'/patients' pressure

X_{23} = National culture

The linear form is given as follows:

$$\mathrm{Ln}\left[\frac{P}{1-P}\right] = \alpha + \beta_1 x_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_{23} X_{23} + \varepsilon_I \quad \text{.....(13)}$$

Where:

P = Probability of adopting ICT

1-P = Probability of not adopting ICT

Ln = Natural logarithms

α = Constant of the equation

β_1 to β_{23}= The parameters to be estimated

$X_1, X_2, X_3 \ldots X_{23}$ = The explanatory variables

ε_1 = error term

3.4. Definition and Measurement of Variables

The explanatory variables included in the model are described and categorized into individual factors, organizational factors, technological factors, and external environmental factors. They are operationalized and hypothesized to influence ICT adoption either positively, negatively or uncertain as shown in Table 3.1.

Table 3.1 Operationalization, measurements of variables and hypotheses

Category	Variable	Operationalization	Measurement	Hypothesized direction of predictor
Dependent variable	ICT adoption (Y)	Efforts made by SME to invest and use ICT facilities	Dummy Variable based on actual data: 1 if adopted (integrated at least three departments; otherwise 0 (two and below)	None
Predictor variable				
Individual factors	CEO innovation (X_1)	Process innovation comprising of continuous implementation of new technology to significantly enhance service delivery	Sum of management judgment on 1-2 scale focusing on the number of departments integrated by use of ICT	Positive
	Sex of employees (X_2)	Male or female	1 Male 2 Female	Uncertain
	Age of employees(X_3)	The cumulative age in years	Sum of management judgment on 1-5 scale	Uncertain
	Level of education (X_4)	The highest level attained in a school system	Years of schooling on 1-5 scale	Uncertain
	CEO's level of ICT knowledge (X_5)	ICT know-how	Sum of management judgment on 1-2 scale	Positive
Organizational factors	SME size (X_6)	The number of employees in the organization.	Sum of management judgment on 1-5 scale	Positive
	Quality systems (X_7)	Functionality and technical usability	Sum of management judgment on 1-2 scale	Positive
	Information intensity (X_8)	Frequency of information use	Sum of management judgment on 1-2 scale	Uncertain
	Specialization (X_9)	Alignment with current work practices. A good fit between the software and the task which the user has to perform	Sum of management judgment on 1-2 scale	Positive
	Management support (X_{10})	Support garnered from the CEO/Owners of the SMEs for the purchase and use of ICT facilities	Sum of management judgment on 1-2 scale	Positive

	Organizational readiness (X_{11})	Factors internal to an organization that facilitate ICT adoption such as skills and knowledge of the technology and internal IT support facilities	Sum of management judgment on 1-2 scale	Uncertain
	Voluntariness (X_{12})	The degree to which use of the innovation is perceived as being voluntary or of free will	Sum of management judgment on 1-2 scale	Uncertain
Technological factors	Relative advantage (X_{13})	The degree to which an innovation is perceived as better than the idea it supersedes	Sum of management judgment on 1-5 scale	Positive
	Complexity/computer self-efficacy (X_{14})	The degree to which an innovation is perceived as difficult to understand and use	Sum of management judgment on 1-5 scale	Uncertain
	Compatibility/ Perceived usefulness (X_{15})	The degree to which an innovation is perceived as being consistent with existing values, past experience, technical feature, and needs of potential adopters	Sum of management judgment on 1-5 scale	Positive
	Cost (X_{16})	The market price of the ICT facilities	A continuous variable categorized in sale of 1-5	Uncertain
	Image (X_{17})	Degree to which ICT adoption is perceived to enhance one's image in a social system	Sum of management judgment on 1-5 scale	Uncertain
	Trust (X_{18})	Having confidence in the ICT applications in relation to handling sensitive transactions that require secure security systems	Sum of management judgment on 1-5 scale	Uncertain
External environment al factors	Competitive pressure (X_{19})	The degree to which competitors' adoption of ICT puts pressure on an SME. Pressure exerted by trading partners	Sum of management judgment on 1-2 scale	Uncertain
	Government policies (X_{20})	The legal framework developed to support investment in ICT	Sum of management judgment on 1-2 scale	Positive
	Technological support infrastructure (X_{21})	Existing national infrastructure supporting ICT adoption by SMEs	Sum of management judgment on 1-2 scale	Positive
	Supplier/buyer pressure (X_{22})	The degree to which suppliers'/ customers' demand for services affects the SME	Sum of management judgment on 1-2 scale	Uncertain
	National culture (X_{23})	Shared values, beliefs, meanings, and norms within a nation	Sum of management judgment on 1-2 scale	Positive

Source: (Author, 2007)

3.5 The Study Area

Kenya is located on the Eastern Coast of Africa. The country covers a surface area of 582,664 square kilometers and has a population of about 34 million (Republic of Kenya, 2005). The country's capital city of Nairobi borders Central, Eastern, and Rift Valley

provinces. Nairobi Province has the majority of the hospitals (SMEs) and hence the researcher chose Nairobi as the study area because of the availability of relevant data and the dynamic nature of the city which has continued to attract entrepreneurs from various nationality social and cultural backgrounds giving this study its heterogeneous outlook. This mixture was a good source of data that helped to achieve the objectives of this study and test the conceptual model.

3.6 Target Population

The list of all private hospitals located in Nairobi and registered with the Kenya Medical Practitioners and Dentists Board served as the sampling frame for the study. As at July 2007, there were 17 private hospitals in Nairobi with 10 to 250 employees and which had been in operation for at least three years. This characteristic is consistent with the generally accepted definition of small and medium enterprises as provided by the European Commission (UK Department of Trade and Industry, 2000). Therefore, based on this information, the 17 health – related SMEs in Nairobi formed the target population for the study. The 17 SMEs had a total of 1,431 employees distributed as shown in Table 3.2.

Table 3.2 Distribution of employees in the seventeen private hospitals in Nairobi

Hospital	Frequency	Percentage (%)
Coptic Hospital	98	6.8
Guru Nanak Hospital	89	6.2
Jamaa Hospital	120	8.4
Langata Hospital	52	3.6
Lions Sight First Eye Hospital	105	7.3
Mariakani Cottage Hospital	44	3.1
Masaba Hospital	102	7.1
Melchizedek Hospital	40	2.8
Menelik Hospital	19	1.3
Metropolitan Hospital	115	8.0
Nairobi Equator Hospital	45	3.1
Nairobi South C Hospital	30	2.1
Nairobi West Hospital	170	11.9
Nairobi Women's Hospital	118	8.2
South B Hospital	55	3.8
St. Mary's Hospital	189	13.2
Westlands Cottage Hospital	40	2.8
Total	**1431**	**100.0**

Source: Kenya Medical Practitioners and Dentists Board (2007)

St. Mary's Hospital had the highest number of employees at 189 while Menelik Hospital had the lowest number with 19. Six hospitals, namely, Menelik Hospital (19 employees), Nairobi South C Hospital (30 employees), Melchizedek Hospital (40 employees), Mariakani Cottage Hospital (44 employees), and Nairobi Equator Hospital (45 employees) could be classified as small enterprises. Eleven hospitals were classified as medium enterprises, namely, Langata Hospital (52 employees), South B Hospital (55 employees), Guru Nanak Hospital (89 employees), Coptic Hospital (98 employees), Masaba Hospital (102 employees), Lions Sight First Eye Hospital (105 employees), Nairobi Women's Hospital (118 employees), Jamaa Hospital (120 employees), Metropolitan Hospital (115 employees), Nairobi West Hospital (170 employees), and St. Mary's Hospital (189 employees).

3.7 Sampling Technique

A census of the 17 health-related SMEs was carried out. This provided information-rich subjects and since the CEOs are the ones who make decisions to commit the institutions' funds to ICT infrastructure development (Patton, 1990), they were interviewed. In addition, employees (the end users) were sampled. The decision to include employees in the study served as a mutually validating mechanism to ensure the information given by the CEOs was objective. First the key departments in each SME such as Admissions/Discharge, IT, Accounts, Customer Care, Marketing, Stores, and Human Resource were purposively sampled. Secondly, Simple random sampling technique was used to choose the required sample size from each department to ensure representativeness. Simple sampling technique guaranteed that every member of the key departments had a known and equal chance of being selected into the sample (Burns and Bush, 1998, Sekaran, 2000, Mugenda and Mugenda, 2003, Saunders, *et al.*, 2007).

Based on the total population of 1,431 employees, a sample of 306 respondents was determined using published tables at 95 percent level of certainty [Appendix 2 Table A17 and *Figure* A1 (Sekaran, 2003; Saunders *et al.*, 2003). Interviewing all the 306 informants would have been too costly hence the study resorted to Mugenda and Mugenda's (2003) assertion that a representative sample is one that constitutes at least 10 percent of the total population.

However, since there were only 1,431 employees in the hospitals, taking 10 percent of this number as a sample was considered inadequate and therefore a sample of 12 percent, which translated to a sample size of 172 respondents, was picked. This higher sample was made to minimise the occurrence of both type I and Type II errors as recommended by Yates *et al.*,

(1988), Karki and Bauer (2004), and Field (2005). The 172 respondents were obtained using a ratio of 0.12 from each category to represent the entire population. The higher ratio of 0.12 was meant to increase the sample size and hence the degree of confidence in generalization of the findings. Table 3.3 shows the distribution of employees sampled for each hospital.

Table 3.3 Sampling and sample size

Hospital	Population Frequency (Number)	Multiplier factor (12%)	Sample Frequency (Number)	Percentage (%)
Coptic Hospital	98	0.12	12	6.8
Guru Nanak Hospital	89	0.12	11	6.2
Jamaa Hospital	120	0.12	14	8.4
Langata Hospital	52	0.12	6	3.6
Lions Sight First Eye Hospital	105	0.12	13	7.3
Mariakani Cottage Hospital	44	0.12	5	3.1
Masaba Hospital	102	0.12	12	7.1
Melchizedek Hospital	40	0.12	5	2.8
Menelik Hospital	19	0.12	2	1.3
Metropolitan Hospital	115	0.12	14	8.0
Nairobi Equator Hopital	45	0.12	5	3.1
Nairobi South C Hospital	30	0.12	4	2.1
Nairobi West Hopital	170	0.12	20	11.9
Nairobi Women's Hospital	118	0.12	14	8.2
South B' Hospital	55	0.12	7	3.8
St. Mary's Hospital	189	0.12	23	13.2
Westland Cottage Hospital	40	0.12	5	2.8
Total	**1431**	**0.12**	**172**	**100.0**

Source: Author (2007)

St. Mary's Hospital, which had the highest number of employees at 189, had the highest number of employees sampled at 23. Menelik Hospital, which had the lowest number of employees at 19, was the least represented with two employees in the sample.

3.8 Data Collection Instruments

3.8.1 Survey Questionnaire

The study used mainly primary data, which were collected using a semi-structured questionnaire administered to the sampled employees of the hospitals and from a series of

interviews with the CEOs. The use of a semi-structured questionnaire enabled the researcher to collect both quantitative and qualitative data. This study also made use of secondary data obtained through document review of hospital reports and medical and IT journals.

The researcher developed the questionnaire based on knowledge obtained from a literature review of studies related to development of new technologies in developing countries (Rogers, 1995; Al-Oteawi, 2002) and from own experience as operationalised in table 3.1. The questionnaire was a means of collecting self-reported data from the participants. Questions were designed to cover general background information on the informants relating to ICT adoption. The questionnaire also covered items contained in the conceptual framework. This included the four main categories of individual factors, organizational factors, technological factors, and external environmental factors that were considered as important in influencing the adoption of ICT by SMEs in the health sector in Kenya. The informants were also given the opportunity to provide any other information that they considered as critical in influencing ICT adoption in the SMEs.

The questionnaire consisted of a covering letter (Appendix 3a) and four sections that correspond to the main variables of the study (Appendix 3b). Section A captured individual factors such as sex, age, education level, CEO's innovation, and manager's level of ICT knowledge. Items 5, 6, 8, 9, 12, 13, 14, 15, 16 and 17 in the questionnaire were used to collect data on these variables. Section B sought information on organizational factors such as SME size, quality systems, information intensity, specialization, management support, organizational readiness, and voluntariness. Items 20, 21, 22, 24, 26, 27, 28, 30, 31, 33, 34,

35, 37, 38(a), and 38(b) in the questionnaire were used to collect data on these variables. Section C dealt with technological factors such as relative advantage, complexity, compatibility, cost of ICT applications, image, and trust of ICT systems. Items 40, 41, and 42 in the questionnaire were used to collect data on these variables. Section D dealt with external environmental factors such as competitive pressure, government policies, technology support infrastructure, supplier/buyer pressure, and national culture. Items 45, 46, 47, 49, 50, 52, 53, 54, 55, 57 and 58 in the questionnaire were used to collect data on these variables.

3.8.2 Interview Schedule

Following Gay and Airasian's (2000) assertion that interviews are used to probe further into issues that are unanswered by questionnaire method, a semi-structured interview schedule (Appendix 5) was administered to all CEOs (key informers') to obtain more detailed information relating to the survey data collected using the questionnaire. The interviews were intended to probe further into those issues that may not have been answered by data collected through the questionnaire such as ascertaining the number of employees in each SME and the cost of ICT applications. Saunders, *et al.*, (2007) notes that key interview can be used to cross-validate research findings obtained using others methods thus improving confidence in the research conclusion.

3.9 Validity and Reliability

3.9.1 Validity of the instruments

A pilot test was carried out with ten conveniently selected respondents. The ten respondents did not form part of the final sample. The primary purpose of the pilot test was to check

face validity and content validity of the instruments. In addition, the pilot test estimated the average completion time of the questionnaire. The results of the pilot test revealed that structured questions were easy to answer while unstructured questions were found to be discouraging to the informants. The questionnaire was therefore, revised based on the feedback from the pilot test to eliminate ambiguities and inadequate wording in the research instrument. The outliers and missing data that arose were taken care of when the researcher utilized the valid percentage from the SPSS output.

3.9.2 Reliability of the Instruments

Reliability of the instrument was achieved through two steps. First, the researcher drew from literature those items which have been tested for reliability by other researchers and adapted for this study (Rogers, 1995; Al-Oteawi, 2002, and Karki and Bauer (2004). Second, Cronbach's alpha was used to estimate internal consistency reliability by determining how items of the instrument related to each other and to the entire instrument (Gay and Airasian, 2000).

It has been suggested that a reliability level of 0.70 is enough on predictor tests or hypothesized measures of a construct (Ehlers, 2000). Indeed, it is recommended that, a minimum of 0.70 for exploratory work and a standard 0.90 for advanced practice should be applied. However, Cooper and Schindler (2003) argued that a Cronbach's alpha value of above 0.50 is regarded as an indication of reliability. In this study, 0.50 was used to indicate reliability of the research instruments and the results for all the items are summarized in Table 3.4.

Table 3.4: Reliability of instruments

Factor	Variable	Number of items	Reliability (Cronbach alpha)
Individual factors	Innovation of CEO	2	0.57
	Sex of employees	2	0.08
	Age	2	0.55
	Level of education	2	0.23
	CEO's knowledge in ICT	2	0.60
Organizational factors	SME Size	2	0.55
	Quality systems	2	0.50
	Information intensity	2	0.71
	Specialization	2	0.63
	Management support	2	0.51
	Organizational readiness	2	0.58
	Voluntariness	2	0.67
Technological factors	Relative advantage	2	0.71
	Complexity/computer self-efficacy	5	0.73
	Compatibility/perceived usefulness	5	0.73
	Cost	5	0.73
	Image	5	0.73
	Trust	5	0.73
External environmental factors	Competitive pressure	2	0.54
	Government policies	2	0.57
	Technological support infrastructure	2	0.50
	Supplier and buyer pressure	2	0.58
	National culture	2	0.76

Source of data: Survey (2008)

The questionnaire lacked internal consistency in two variables that had Cronbach's alpha of less than 0.5. These variables were sex of employees and level of education with Cronbach's alpha of 0.08 and 0.23 respectively. These two variables were excluded in the data analysis. The quality of ICT systems and technological support infrastructure each had Cronbach's alpha value of 0.50. Hence, these two variables were used with caution. The remaining nineteen variables had an alpha value of above 0.5 indicating that they were reliable as suggested by Cooper and Schindler (2003).

3.10 Data Collection Procedures

The cross-sectional data collection process involved obtaining clearance (Appendix 4a) and a research permit (Appendix 4b) from the Office of the President to conduct the research. It

was also necessary to obtain consent from the CEOs or administrators of each selected SME before conducting the survey. Data were collected using a semi-structured self-administered questionnaire and key informants interviews with the CEOs of the health related SMEs from 30th September, 2008 to 15th January, 2009. The adoption of both instruments enabled the researcher to get both quantitative and qualitative data besides validating the data. The quantitative data were necessary to guarantee a generalization of the results and to statistically test the research model. In addition, qualitative data were collected to ensure consistency with previous research for comparison. The qualitative data were necessary to provide plausible explanations for the quantitative data (Isleem, 2003).

Using both the questionnaire and interview schedule to collect data also served as a mutually validating procedure. This was consistent with Lincoln and Guba's (2000) assertion that double measure of the same construct enables the researcher to get more accurate data and thus reduce measurement errors whether random or systematic. Hence, this approach increased the trustworthiness of the conclusions from the study.

The researcher delivered the questionnaires, including an explanation of the specific objectives of the study, to the office of each hospital administrator for distribution to the respondents identified from the end users' category. The informants were expected to voluntarily provide data and confidentiality of the information provided was promised. The informants were given four weeks to complete the questionnaire at their own convenience. Three days before the dateline, the researcher requested the hospital administrators, via mobile phone, to remind the informants to complete the questionnaire. The researcher collected the completed questionnaires from the hospital administrator of each hospital with a fifteen-week period.

Interviews were conducted with CEOs through face-to-face method by the researcher. This approach allowed the researcher to adapt the questions as necessary and to clarify any doubts to ensure that the questions were clearly understood by the informants as per Kerlinger's (1986), and Sekaran's (2000) assertion. In addition, a face-to-face interview allowed the researcher to explore issues raised by the informants, which would not have been possible through email, mail questionnaires, or telephone interviews (Kerlinger, 1986, and Sekaran, 2000). The period of data collection was from 30th September 2008 to 15th January 2009

3.11 Data Analysis

The study addressed two objectives. The first objective was to establish the extent to which the health-related SMEs in Kenya have adopted ICT. This objective was empirically analysed using a mean measure of the usage frequency across a set of nine ICT application tools. Adoption and usage of ICT was measured using user self-reporting tools following procedures by Igbaria *et al.*, (1996), Al-Gahtani and King (1999), and Avlonitis and Karavanni (2000). The scores' significance was tested using Friedman two-way ANOVA test (Erdener *et al.*, 2005). The second objective, which was to analyse the determinants of ICT adoption by SMEs' in the health sector, was attained using descriptive specifically multiple response analysis of data.

In addition, empirical analysis was done using Logit model, this was necessary for drawing inferences about the population on the basis of a sample as noted by Karki and Bauer (2004), and Field's (2005). The overall fit of the model was tested using the log likelihood

and the associated Chi-square statistics following Field's (2005) method. The contribution of each predictor variable was tested using Wald statistic.

Before testing the fit of the model, however, multicollinearity analysis was performed to establish the possibility of a collinearity problem of the predictor variables having some explanatory power over each other. Menard (1995) has suggested that a tolerance value of less than 0.1 almost certainly indicates a serious collinearity problem. Furthermore, Field (2005) has suggested that if the variance inflation factors (VIFs) are more than 10 then there is cause for concern about multicollinearity. Nevertheless, as Field (2005) argues, there is no way of knowing which variable to omit. Bowerman and O' connel (1990) have recommended that one could use factor analysis and report the resulting factor scores as predictor but there is need to acknowledge the unreliability of the model as unsatisfactory. All analyses were carried out with SPSS 11.5 to test the multicollinearity, usage frequency, and the effect of the determinants of ICT adoption.

To arrive at the correct conclusion, it was also necessary to reduce the possibility of committing Type I and Type II errors. Yates *et al.,* (1988) argue that in hypothesis testing, a Type I error occurs when the null hypothesis is rejected when it is in fact true. Furthermore, a Type II error occurs when the null hypothesis is not rejected when it is in fact false. For any given set of data, Type I and Type II errors are inversely related. The smaller the risk of one the higher the risk of the other (Yates *et al.,* 1988); hence, reducing the possibility of committing a Type I error increases the possibility of committing a Type II error and vice versa.

In addition, based on the real-life application of the errors, a Type I error is considered to be more serious and therefore more important to avoid than a Type II error (Yates *et al.*, 1988). In this study, care was focused on minimising the occurrence of both types of errors. Yates *et al.*, (1988) and Field (2005) argue that an increase in the sample size is the only way to reduce the risk of committing both types of errors. Hence in the study, the sample was increased from 143 to 172 informants. In addition, the *P*-values, which are important in estimating the probability of committing Type I error when the null hypothesis is rejected when in fact it is true, were compared at the significance level of 5 percent.

Finally, the open-ended questions were analysed through content analysis where the researcher grouped common themes together and drew inferences from the findings (Glesne, 1998). Cooper and Schindler (2003) note that content analysis helps to bring issues into the fore that would not have otherwise been captured through the use of structured questions in the questionnaire. The results are reported in chapter four of this study. This is followed by conclusions and recommendations drawn from the findings in chapter five.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Introduction

This chapter presents the findings of the study. It covers demographic characteristics of the informants, descriptive statistics, and the extent to which health-related SMEs have adopted ICT in Kenya. Empirical results of the determinants of ICT adoption by SMEs are also presented and discussed.

4.2 Analysis of the Response Rate and Descriptive Statistics

Out of the 172 questionnaires distributed, 136 were correctly filled and returned. In addition, all the 17 CEOs were interviewed over a fifteen-week period, which represents a response rate of 81 percent. Avlonitis and Karavanni (2000), Mugenda and Mugenda (2003), Erdener *et al.,* (2005) and Saunders, *et al.*, (2007) have argued that a response rate of 50 percent is adequate, a response rate of 60 percent is good, and a response rate of 70 percent is very good. Therefore, the 81 percent response rate reported for this study formed an acceptable basis for drawing conclusions.

Table 4.1 presents descriptive statistics of the respondents' characteristics in terms of demographic information such as sex, age, distribution within the organization, working experience, and the highest completed educational level.

Table 4.1: Characteristics of the Informants

	Classification factor	Frequency	Percentage
Sex	Male	65	47.8
	Female	71	52.2
	Total	**136**	**100**
Age	Less than 20 Years	1	0.7
	21-30 years	71	52.2
	31-40 years	55	40.4
	41-50 years	4	2.9
	Over 50 years	5	3.7
	Total	**136**	**100.0**
Distribution within organization departments	Purchasing	10	7.4
	IT/IS	18	13.2
	Marketing	8	5.9
	Admissions	35	25.7
	Discharge	18	13.2
	Nursing	9	6.6
	Accounts	17	12.5
	Customer Care/ Receptionist	5	3.7
	Lab technologist	5	3.7
	Medical record officer	4	2.9
	Debt collection	1	0.7
	Pharmacist	4	2.9
	Data analysis	1	0.7
	Audit	1	0.7
	Total	**136**	**100.0**
Working experience	1-5 years	87	64.0
	6-10 years	41	30.1
	11-15 years	3	2.2
	16-20 years	4	2.9
	Over 20 years	1	0.7
	Total	**136**	**100.0**
Highest academic level	Diploma	99	72.8
	Bachelor's	36	26.5
	Master's	1	.7
	Total	**136**	**100.0**

Source of data: Survey (2008)

From Table 4.1, 47.8 percent of the informants were male while 52.2 percent were female. One informant was less than 20 years and the age range 21 to 30 had 52.2 percent of the informants, 40.4 percent of the informants were within 31 to 40 age range, 2.9 percent were within 41 to 50 age range, and 3.7 percent were over 50 years old. Informants' responses on their working experience showed that 64 percent were in their first five years of working, while 30.1 percent had 6 to 10 years of experience. The most experienced employee had worked for over 20 years (0.7 percent). The distribution of informants by departments was as follows: Admissions (25.7 percent), IT/IS (13.2 percent), Discharge (13.2 percent),

Accounts (12.5 percent). Debt Collection (0.7 percent) Data Analysis (0.7%), and Audit (0.7 percent) were the least represented departments.

4.3 Extent of adoption of ICT by health-related SMEs in Kenya

The SMEs in the health sector have continued to make significant progress in the adoption of ICT. The extent of ICT adoption for the seventeen sampled SMEs was empirically analysed using a mean measure of usage frequency across a set of nine ICT applications as shown in Table 4.2.

Table 4.2: Opinion of the informants on usage frequency of ICT applications

	Frequencies	Rank
ICT applications is mainly used for administrative purposes	85	1
ICT applications is mainly used for admission	84	2
ICT applications is mainly used for discharge	82	3
ICT applications is mainly used for purchasing & supplies	77	4
ICT applications is mainly used for internal communication	62	5
ICT applications is mainly used for external communication	58	6
ICT applications is mainly used for strategic planning purposes	55	7
ICT applications is mainly used for marketing development	44	8
ICT applications is mainly used for inventory tracking	44	8
n = 136 Chi-Square = 110.275 Df = 8 Asymp. Sig. = .000		

Source of data: Survey (2008)

The ranking of ICT applications based on their frequencies from the most widely used to least widely used was as follows: administrative purposes, admission, discharge, purchasing and supplies, internal communication, external communication, strategic

planning purposes, marketing development, and inventory tracking. In that order, scores were significantly different on the Friedman two-way ANOVA test (χ^2 (8) = 110.275, P = 0.000). These findings support Igbaria *et al.*, (1996), Al-Gahtani and King's (1999), Avlonitis and Karavanni (2000), and Erdener e*t al.*, (2005) studies, which revealed that the extent of ICT adoption and usage was frequently measured using user self-reporting as was the case in this study. The high ranking of ICT application in administrative purposes, admission, and discharge showed that SMEs were more interested in electronic recording keeping. Thus ICT was used as a tool to safeguard the utilization of medical records.

The adoption and use of ICT improves the overall efficiency of SMEs since ICT applications make paper records obsolete and enable the storage of all patients' information in electronic form. Therefore, the study sought information on the distribution of the modes of communication within and without the SMEs. The results are shown in Table 4.3.

Table 4.3: Mode of communication used by SMEs

Dichotomy label	Employees		CEOs	
	Frequency	Percent	Frequency	Percent
Letters	105	25.3	15	23.8
E-mail	102	24.6	15	23.8
Telephone	86	20.7	15	23.8
Intranet	68	16.4	7	11.1
Mobile phone	54	13.0	11	17.5
Total	**415**	**100.0**	**63**	**100.0**

Source of data: Survey (2008)

The percentage use of the various modes of communication was as follows: letters 25.3 percent, e-mail 24.6 percent, telephone 20.7 percent, intranet 16.4 percent, and mobile phone 13 percent. It is noted that even with ICT adoption and use, paper-based modes of communication like memos were still the most widely used at 25.3 percent for the

employees and 23.8 percent for the CEOs. These results were unexpected because most SMEs (81.6 percent) visited had invested in ICT (Table A1). However, these results supported the argument advanced by Mehrtens *et al.*, (2001), Iacovou *et al.*, (1995), and DTI (1998 and 1999) that lack of awareness of the technology and its perceived benefits was a major factor influencing the uptake of e-commerce by SMEs.

Nevertheless, these results revealed that most of the SMEs (81.6 percent) that had invested in ICT were still dealing with stacks of paperwork, which had the effect of slowing down service delivery and reducing the overall benefits of ICT adoption. This is a critical observation given that ICT professionals have continued to encourage SMEs to adopt ICT. This observation challenges assertions by UNIDO (2004) that to transit to the high roads of competitiveness, SMEs have to build and continuously enhance their endogenous capabilities through adoption of ICT. The adoption of ICT will benefit SMEs tremendously by helping to overcome the drawback of distance from markets and thus enabling them to compete in global markets.

4.4 Determinants of ICT adoption by SMEs in the Health Sector

In the second objective, which was to analyze the determinants of ICT adoption by SMEs in the health sector, descriptive statistics specifically multiple response analysis were used. Before presenting results of the determinants of ICT adoption, a description of the benefits of ICT is highlighted. The results of an inquiry into benefits derived from adoption of ICT are shown in Table 4.4.

Table 4.4: The benefits derived from adoption of ICT by SMEs

Dichotomy label	Frequency	Percent
Improvement in communication	123	12.3
Improvement in information storage and retrieval	122	12.2
Improvement in business efficiency	122	12.2
Improvement in customer service	121	12.1
Improvement in stock control	117	11.7
Improvement in contact with patient	109	10.9
Reduction in administration burden	99	9.9
Reduction in business cost	94	9.4
Reduction in workforce	90	9.0
Total	**997**	**100.0**

Source of data: Survey (2008)

The study established that SMEs adopted ICTs so as to reach new customers and markets, improve customer services, strengthen relationships with business partners, and reduce costs. The most important benefits of ICT, as indicated by informants, were improvement in communication (12.3 percent); improvement in information storage and retrieval (12.2 percent); improvement in business efficiency (12.2 percent); improvement in customer service (12.1 percent); improvement in stock control (11.7 percent); improvement in contact with patient (10.9 percent); reduction in administration burden (9.9 percent); reduction in business cost (9.4 percent); and reduction in workforce (9 percent). Furthermore, two CEOs indicated that investing in a corporate website that provides information on products or services could enhance the quality of service delivery to customers and attract new ones. In addition, since ICT applications can store information for a long time, hospitals are able to keep track of their treatment records and compile statistics that could be useful in research. Furthermore, medical personnel could have instant access to patients' medical history irrespective of which health facility patients had visited in the country. Using ICT, it is also possible to digitize all medical data such that a

patient can receive test results via mobile phone thus reducing the number of visits to the doctor. Some of the CEOs, 41.2 percent, indicated that SMEs were using ICT to keep track of customers' needs, follow up on patients after discharge, and book appointments with doctors (Table A2).

The findings show that one of the motivations for ICT adoption was improved overall efficiency of service delivery, particularly in terms of communication, and information storage and retrieval. This finding concurs with OECD (2002) study which revealed that ICT adoption was driven by the need to reduce transaction costs and accelerate business transactions.

However, one informant indicated that ICT undermines the quality of the doctor-patient relationship by de-personalizing the patient through transfer of information in shared electronic files and networked computers. This observation has implications on the ethics of the medical profession, which requires them to maintain confidential their clients' information.

Despite the informants' knowledge of the numerous benefits of ICT adoption, it was found that some SMEs were still using paper-based memos in their operations. This implies that SMEs were still reluctant to replace the manual way of doing business with ICT applications and were operating parallel systems thereby incurring double costs. The following is therefore an explanation of the factors that influence the ICT adoption in these organizations, categorised into individual factors, organizational factors, technological factors, and external environmental factors.

(a) Individual factors

The following table shows the results of the extent to which individual factors affect ICT adoption.

Table 4. 5: Individual factors affecting ICT adoption by the health-related SMEs

		Employees		CEOs	
Factor	**Responses**	**Frequency**	**Percent**	**Frequency**	**Percent**
Innovation of CEO	Yes	127	93.4	15	88.2
	No	9	6.6	2	11.8
	Total	**136**	**100.0**	**17**	**100.0**
Age	Yes	116	85.3	13	76.5
	No	20	14.7	4	23.5
	Total	**136**	**100.0**	**17**	**100**
Level of CEO's ICT knowledge	Yes	76	55.9	15	88.2
	No	60	44.1	2	11.8
	Total	**136**	**100.0**	**17**	**100.0**

Source of data: Survey (2008)

The adoption and use of ICT can be regarded as a strategic decision in which the intuition of the CEO plays an important role. Therefore, innovation of the CEO is a key factor in the adoption of ICTs. The study showed that majority of the informants (93.4 percent) indicated that innovation of the CEO was a key factor influencing ICT adoption. This finding implies that innovation of the CEO could enable SMEs to adopt and utilize ICT applications to improve service provision. The innovation of the CEO should therefore give SMEs the ability to seize technological opportunities. This observation was validated by the interviews conducted with the CEOs who indicated that they made the decisions on the adoption of ICT. The CEOs also incorporate employees' suggestions regarding ICT adoption and usage. This observation is in line with earlier studies by Poon and Swatman

(1999) and Thong (1999), who have argued that the decision to adopt ICT is determined not only by enterprise characteristics but also by intuition characteristics of the entrepreneur.

Age was expected to influence ICT adoption positively since younger people are more likely to be more motivated to use ICT. From the results, 85.3 percent of the informants agreed that age contributed to ICT adoption. In addition, 76.5 percent of the CEOs also agreed that the age of an employee affected ICT adoption. This observation concurs with Morris *et al.,* (2005) who argued that in a country where the workforce is relatively young, ranging from 31 to 40 years, ICT is more likely to be adopted. This implies that younger people would be more motivated to use ICT. Therefore, computer training that has been introduced in secondary schools in Kenya will go a long way in influencing ICT adoption since young people will gain the needed skills.

In this study, the majority of informants (55.9 percent) indicated that the CEO's knowledge of ICT influenced its adoption. This means that the CEO's ICT knowledge is a crucial contributor to the adoption of ICT. Interviews conducted with the CEOs showed that 11.8 percent of those without ICT knowledge were reluctant to use computers and spent less money on ICT. This finding is in line with the Kirby and Turner's (1993) study that lack of computer skills by CEOs contributed to low adoption of ICT by SMEs.

(b) Organizational factors

The researcher sought to find out whether SME size in terms of the number of employees was an important predictor of ICT adoption. The results are shown in Table 4.6.

Table 4. 6: Organizational factors affecting ICT adoption

		Employees		CEOs	
Organizational factors	**Responses**	**Frequency**	**Percent**	**Frequency**	**Percent**
Size of SME (Number of employees)	Yes	120	88.2	12	70.6
	No	16	11.8	5	29.4
	Total	**136**	**100**	**17**	**100**
Quality systems	Yes	120	88.2	11	64.7
	No	15	11.0	6	35.3
	Sub-total	135	99.3	10	0
	Missing	1	0.7	0	0
	Total	**136**	**100.0**	**17**	**100**
Information intensity	Disagree	7	5.1	1	5.9
	Agree	129	94.9	16	94.1
	Total	**136**	**100.0**	**17**	**100**
ICT specialization/alignment	Yes	113	83.1	13	76.2
	No	23	16.9	4	3.8
	Total	**136**	**100.0**	**17**	**100**
Management support	Yes	121	89.0	17	100
	No	14	10.3	0	0
	Sub-total	135	99.3	0	0
	Missing	1	0.7	0	0
	Total	**136**	**100.0**	**17**	**100**
Voluntary use of ICT applications	Yes	93	68.4	8	47.1
	No	43	31.6	9	52.9
	Total	**136**	**100.0**	**17**	**100**
Organizational readiness					
a) Adequate financial resources	Yes	111	81.6	7	41.2
	No	25	18.4	10	58.8
	Total	**136**	**100.0**	**17**	**100**
b) Adequate technological resources	Yes	89	65.4	9	52.9
	No	47	34.6	8	47.1
	Total	**136**	**100.0**	**17**	**100**

Source: Survey data (2008)

The majority of the informants (88.2 percent) supported the view that the numbers of employees in the SME affected the level of ICT adoption. This view was validated by the interviews with the CEOs, 70.6 percent of whom believed that the number of employees in an enterprise affected ICT adoption. This observation was in agreement with Teo and Tan (2002) who argued that size of the SME is one of the key parameters influencing the

adoption of internet technology by enterprises. These findings imply that larger SMEs are more likely to adopt ICT as they have more resources and the knowledge to invest in ICT. Therefore, the adoption of ICTs is associated with the size of the SME. This is because as an SME grows, communications with customers becomes more difficult thus creating the need to adopt ICT.

The quality of ICT systems is critical to its adoption. Results of this study revealed that most informants (65.4 percent) were happy with the quality of their ICT systems (Table A3). On further probing, 54.8 percent of the informants indicated they were satisfied with the quality of their ICT systems, while only 3.7 percent indicated that they were very dissatisfied (Table A4). In addition, the majority of the informants (88.2 percent) indicated that the quality of their ICT systems affected ICT adoption. This observation supports findings by DeLone and McLean (2003) that end-users satisfaction is essential for ICT adoption. Hence, for SMEs to successfully adopt ICT the management should ensure it acquires ICT systems that meet user expectations.

From the literature reviewed, information intensity is one of the contributors to ICT adoption. When the Informants were asked its level in their SMEs, they rated it as intense (93.4 percent) and weak (6.6 percent) [Table A5]. In addition, the majority (94.9 percent) of the informants indicated that information intensity affected the level of ICT adoption in their organizations.

When asked to rate the level at which they thought information intensity had contributed to the level of ICT adoption in their SMEs, informants gave the following rating: very little (0.7 percent), moderate (33.6 percent), very much (17.2 percent), and much (41 percent) [Table A6]. This result implies that the high volumes of data handled by health-related SME had forced them to seek better ways of processing to improve service delivery by investing in ICT.

Although most (25.3 percent) healthcare SMEs were still maintaining and accessing patients' diagnosis and treatment records manually (Table 4.3), they placed more emphasis on integration of IT applications as a business tool especially for marketing, inventory tracking, and strategic planning. In this study, the majority of informants (82.4 percent) were in agreement that ICT specialization/alignment was in line with the current work practices in their SMEs (Table A7). When they were probed on whether ICT specialization/alignment influenced their decision to adopt ICT, 83.1 percent of the informants were in agreement. In addition, the informants were asked to rate their level of agreement with the assertion that ICT specialization/alignment had contributed to ICT adoption. The majority (51.5 percent) agreed with this view. However, 27.2 percent were neutral and 15.4 percent strongly agreed (Table A8). The implication of this finding is that ICT adoption will be encouraged where ICT application is in line with specific tasks carried within the SME.

One of the major factors influencing ICT adoption, particularly tele-health usage, is support from the management. This study showed that the majority (89 percent) of the informants had management support in ICT adoption. This was echoed by 100 percent of the CEOs.

Hence, the results are in line with Raymond and Magnenat-Thalmann's (1982) and Matlay's (2000) findings that successful adoption of ICT by SMEs requires the active participation of the CEOs/owners since they make most of the long-term planning decisions and control the organization's financial and human resources. Therefore, management support is essential for the adoption and use of ICT by SMEs. This is because top management is responsible for allocation of funds to buy the necessary ICT facilities and for training in addition to creating conducive atmosphere and the organizational culture that allows SMEs to adopt ICT.

To assess the readiness of SMEs for ICT adoption, the informants were asked for their opinion concerning their readiness, both financially and technologically. The results showed that 81.6 percent of the informants thought their SMEs had adequate financial resources for ICT adoption while 65.4 percent indicated that their SMEs had adequate technological resources to support ICT adoption. These results would seem to explain why most of the SMEs had adopted ICT. Indeed, further exploration into this issue revealed the majority of the informants (39.7 percent) agreed that adequate resources in an organization facilitate ICT adoption (Table A9). The findings are in agreement with Poon and Swatman's (1999) study that asserted that SMEs need to have adequate IT and financial resources in place before Internet adoption.

The other factor that was investigated regarding ICT adoption was the voluntary use of ICT by the employees. The majority of the informants (68.4 percent) indicated that the voluntary use of ICT applications is what made them more willing to learn and thus adopt the use of ICT facilities in their daily duties. When they were asked to rate the level at

which the use of ICT facilities was voluntary 8.8 percent strongly agreed, 38.2 percent agreed, 23.5 percent were neutral, 16.9 percent disagreed, and 11.8 percent strongly disagreed (Table A10). These results are in agreement with Moore and Benbasat (1991) and Agarwal and Prasad (1997) who suggested that in ICT practice, users might perceive different degrees of voluntariness in using an innovation.

(c) Technological Factors

ICT applications can provide several benefits for health-related SMEs across a wide range of business processes. This could lead to improved information and knowledge management thus reducing transaction costs while increasing the speed and reliability of services. However, the adoption of ICT is affected by several factors that are related to technology. The results regarding the technological aspects of ICT adoption are shown in Table 4. 7.

Table 4. 7: Technological factors affecting ICT adoption in health-related SMEs

Technological factors	Responses	Frequency	Percent
Relative advantage of technology	Yes	122	89.7
	No	14	10.3
	Total	**136**	**100.0**
Complexity of technology	Very weak extent	14	10.3
	Weak extent	9	6.6
	Neutral	42	30.9
	Strong extent	34	25.0
	Very strong extent	37	27.2
	Total	**136**	**100.0**
Compatibility/ perceived usefulness of technology	Very weak extent	18	13.2
	Weak extent	15	11.0
	Neutral	34	25.0
	Strong extent	36	26.5
	Very strong extent	33	24.3
	Total	**136**	**100.0**
Cost of technology	Very weak extent	29	21.3
	Weak extent	25	18.4
	Neutral	28	20.6
	Strong extent	30	22.1
	Very strong extent	24	17.6
	Total	**136**	**100.0**
Image created by the technology	Very weak extent	17	12.5
	Weak extent	32	23.5
	Neutral	37	27.2
	Strong extent	25	18.4
	Very strong extent	25	18.4
	Total	136	100.0
Trust/security of technology	Very weak extent	22	16.2
	Weak extent	15	11.0
	Neutral	23	16.9
	Strong extent	21	15.4
	Very strong extent	55	40.4
	Total	**136**	**100.0**

Source of data: Survey (2008)

The majority of informants (89.7 percent) were of the view that by adopting ICT their enterprises could gain some relative advantage over competitors. This means that gaining relative advantage affected the decision to adopt ICT. The observation supports Seyal and

Rahman's (2003) argument that positive perception of the advantages of ICT should provide an incentive for adoption.

Like any other technology, ICT adoption and usage, particularly in tele-health, needs to be perceived as user-friendly in order to be adopted. The results of this study show that the majority (30.9 percent) of the informants were non-committal on whether complexity of an ICT application affected its adoption. The informants indicated that the complexity of an ICT application affected adoption to a very strong extent (27.2 percent), to a strong extent (25 percent), to a very weak extent (10.4 percent), and to a weak extent (6.6 percent). Interviews with the hospital administrators highlighted the need for user-friendly ICT facilities because most employees were not technical ICT staff but had only received the basic skills on how to operate computers. This observation is in agreement with Seyal and Rahman's (2003) findings that the complexity of a technology creates greater uncertainty for its successful implementation and therefore increases the risk in the adoption decision. Therefore, making the system complicated could discourage employees from using it.

In the study, ICT compatibility was included to establish whether the decision to adopt was influenced by an organization's values and beliefs. The results show that 26.5 percent of the informants thought that ICT adoption was influenced by compatibility of ICT technologies with their current organization's values and beliefs to a strong extent, while 13.2 percent of the informants thought that compatibility only influenced ICT adoption to a very weak extent. These results imply that lack of compatibility may impose constraints on the level of ICT adoption and use if ICT technologies are not in line with the firm's organizational structure or strategy. This explains why interviews with the CEOs revealed that one of the

reasons why SMEs were slow in adopting ICT was resistance from employees. These results are in support of Teo and Tan's (2002) findings that the incompatibility of a new ICT system with existing work procedures, value systems, and infrastructure, negatively affects the attitudes of users and increases their resistance to change thus hindering its adoption. The results also support Rogers' (1995) argument that in health-related SMEs, compatibility of a technology with the work practices, values, needs, and experiences of the user is a crucial determinant in acceptance decision-making. In addition, an innovation that is perceived to be incompatible with this process will ultimately be rejected by healthcare professionals.

While the strength of SMEs lies in their flexibility in adjusting to a changing market environment, their small size is a limitation when dealing with market changes that require high initial costs. SMEs will not adopt ICT if the benefits do not outweigh the costs. As was shown in Table 4.10, when the informants were asked to rate how cost affected ICT adoption in their SMEs, the rating was as follows: to a very strong extent (17.6 percent), to a weak extent (18.4 percent), neutral (20.6 percent), to a strong extent (22.1 percent), and to a very weak extent (21.3 percent). The results seem to be balanced and were expected given the fact that government had reduced the tariff on computer parts.

The CEO whose SME had not adopted ICT indicated that they were generally concerned about the initial costs of investment, maintenance, Internet service provider (ISP) charges, website hosting, and upgrades, due to budget constraints. Moreover, they indicated that adoption of ICT would force the SME to either retrench those employees who are ICT illiterate or incur costs in training them. The same CEO indicated that the hospital was donor-dependent and that although they were aware of the benefits of ICT in improving

healthcare provision, any major investment in ICT could only happen with specific donor support. Additionally, channeling funds to such investment would mean higher patient charges to meet the cost of investment. These findings seems to be in agreement with Akkeren and Cavaye (1999) who argued that SME owners are concerned about return on investments and are reluctant to make substantial investments when short-term returns are not guaranteed. Furthermore, Thong's (1999) argument that even if the managers perceive the adoption of ICT as important, the enterprises often do not have sufficient resources to adopt since they generally suffer from budgetary constraints.

ICT adoption, particularly for doing business online, can improve an SME's image and credibility. However, as shown in Table 4.10, when the informants were asked whether they thought image influenced their ICT adoption, the answers were as follows: neutral (27.2 percent), to a weak extent (23.5 percent), to a strong extent (18.4 percent), to a very strong extent (18.4 percent), and to a very weak extent (12.5 percent). The results show mixed views, where some informants agreed that the image contributed to the decision to adopt while others disagreed with this view. The mixed views could be attributed to the sample used in the study, which drew informants from the medical field that is highly respected in Kenya. The implication is that the image factor was less likely to be influenced by whether an SME chose to adopt ICT or not. This finding contradicts arguments by Succi and Walter (1999) and by Van Heerden and Puth (1995) that enterprises try to adopt ICT to improve their image and to increase their credibility among customers.

Security is seen as a major factor in the adoption of ICT within SMEs. The key concerns are attack by viruses, spies, and hacking the intranet. Moreover, clients who use credit cards

to make payments are also concerned about security. Informants rated security concerns as influencing ICT adoption as follows: to a very strong extent (40.4 percent), neutral (16.9 percent), to a very weak extent (16.2 percent), to a strong extent (15.4 percent), and to a weak extent (11 percent).

These results were expected given that hospitals process large volumes of sensitive patients' data every day. Patients' data are also shared between several departments and with other hospitals, which poses security risks. Hence, data security is of paramount importance to the health-related SMEs. Of great concern is how to protect patients' confidential information from unauthorized people and against modification to avoid the health information being used wrongly. For example, employees being sacked because their health records show that they are sickly. In addition, insurance companies could use health data of potential clients to discriminate against them because of being sickly and posing high risks. This finding supports Times' (2000) and Simpson's (2002) studies, which found that trust in the technology in relation to handling transactions, securing systems, and maintaining relationships was an issue of considerable importance in influencing decision makers within SMEs regarding ICT adoption.

(d) External environmental factors

In addition to individual, technological, and organizational factors, the external environment in which a firm conducts its business was considered as influencing the adoption and usage of ICT. Several factors within the external environment were analyzed to establish their contribution to ICT adoption by SMEs including competitive pressure,

government policies, technological support infrastructure, supplier/buyer pressure, and national culture. Table 4.8 presents the results.

Table 4.8: External environment factors affecting ICT adoption by SMEs

		Employees		CEOs	
External Environment factors	**Responses**	**Frequency**	**Percent**	**Frequency**	**Percent**
Competitive pressure	Yes	102	75.0	10	58.8
	No	34	25.0	7	41.2
	Total	**136**	**100.0**	**17**	**100**
Government policies	Yes	36	26.5	13	76.2
	No	100	73.5	4	3.8
	Total	**136**	**100.0**	**17**	**100**
Technological support infrastructure	Yes	47	34.6	13	82.4
	No	89	65.4	3	7.6
	Total	**136**	**100.0**	**17**	**100**
Supplier and patient pressure	Yes	105	77.2	12	70.6
	No	31	22.8	5	29.4
	Total	**136**	**100.0**	**17**	**100**
National culture	Yes	73	53.7	11	64.7
	No	63	46.3	6	35.3
	Total	**136**	**100.0**	**17**	**100**

Source of data: Survey (2008)

Most of the informants (75 percent) were of the view that competitive pressure influenced their decisions to adopt ICT. This opinion was also echoed by 58.8 percent of the CEOs. This implies that competitive pressure increases rivalry in the market and this factor drives the adoption of ICT. This observation seems to be in agreement with Cragg and King's (1993) argument and that of Iacovou *et al.*, (1995) that competitive pressure on adoption decisions arises when organizations presume that competitors may have comparative advantages as a result of adoption of ICT. Thus, the use of ICT might be of high strategic value for all SMEs seeking to escape from competition.

When asked to compare themselves with their competitors in ICT usage, the majority of the informants (58.8 percent) indicated that they were at par with the leaders, 32.4 percent indicated that they were lagging behind, while a minority (8.8 percent) indicated an average adoption rate (Table A11). These findings indicate that innovative SMEs have discovered and began to exploit the potential of ICT by integrating it into their service, thus keeping competitors at bay.

The informants were asked whether they thought there was adequate legislative policy to influence ICT adoption. The majority (73.5 percent) indicated that the government had not put in place adequate policies, while 26.5 percent agreed that the government had legislated adequate policies that influence ICT adoption by enterprises. When the informants were probed further to rate the extent to which government policies had influenced ICT adoption in their enterprises, 80.1 percent indicated that government policy had not affected them to a great extent while 19.1 percent indicated that it had done so to a great extent (Table A12).

One CEO noted that although the national ICT policy was formulated in 2006 to stimulate ICT adoption in Kenya, the policy was silent on ICT application in the health sector. Thus the healthcare SMEs were adopting ICT applications in general, such as introduction of electronic health card and computerization of the accounts, which are neither specific to healthcare issues nor comprehensive. This observation supports argument by Mureithi (2003), Evusa (2005), and Kashorda (2007) that the problem of ICT adoption is caused partly by inadequate legal and regulatory framework.

The SMEs also face infrastructural challenges. These challenges include how to ensure interoperability with a range of different ICT systems and how to improve ICT management and organizational skills. The challenge is not only interoperability between the health-related SMEs and other organizations, but also within a single SME. In the study, informants were asked whether they felt there was adequate technological support infrastructure for ICT adoption. The results indicated that 65.4 percent did not think that the SMEs had adequate technological support infrastructure, while 34.6 percent thought there was adequate technological support infrastructure for ICT adoption. These results are in agreement with assertions by Anigan (1999) and Kapuruandara *et al.,* (2004) that lack of infrastructure leads to poor Internet connectivity.

In addition, when the informants were asked to rate their level of agreement with the statement that there is adequate national ICT infrastructure, their rating was as follows: neutral (38.2 percent), not adequate (33.1 percent), adequate (20.6 percent), very inadequate (5.1 percent), and very adequate (2.9 percent) [Table A13]. This result implies that Kenya lacks of adequate ICT infrastructure to support its adoption and usage in SMEs. The findings support Mansell and Wehn's (1998) argument that the state of African ICT infrastructure is a major hindrance to adoption and use of ICT due to cash constraints. However, in the Kenyan context, this is bound to change within the next five years as the government is in the process of laying down the necessary infrastructure like the fibre optic. The plan is to spread this to the rural areas and work is in progress to actualise this.

The study found that small businesses adopted ICTs so that they could reach new customers and markets, improve customer services, strengthen relationships with business partners,

and reduce costs. Indeed, the study found that many SMEs (85.3 percent) had pressure from patients for services (Table A14). Furthermore, the CEOs reported that hospitals procure a large variety of inputs in order to provide their services. These inputs include food, bedding, stationery, drugs, and medical equipment. Due to a large number of transactions, ICT adoption could provide in real time the flow of materials and other services as they move from supplier to hospitals. When the informants were asked whether pressure from patients influenced adoption of ICT in their enterprises, the majority (77.2 percent) agreed as indicated in Table 4.11. This finding supports Rashid and Al-Qirim's (2001) study that there was a relationship between pressure from suppliers and buyers and SME decisions to adopt ICT.

Another factor that affects ICT adoption is culture as captured by shared values. From the study, slightly more than half of the informants (53.7 percent) indicated that shared values contributed to ICT adoption, while only 46.3 percent indicated that shared values did not contribute to ICT adoption. These results are in agreement with the argument by Hofstede (1997), Myers and Tan (2002), Li (2002), Bagchi *et al.,* (2003), and Erumban and de Jong (2006) findings that ICT adoption decisions depend largely on individuals in organizations. The decisions are in turn influenced by a given national country's cultural characteristics. Furthermore, culture may inhibit the diffusion of technologies and the changes they entail. For instance, within the health sector, if the technology is viewed as likely to render employees service irrelevant, the employees' are likely to resist adoption of such a technology.

The above findings were also supported by 64.7 percent of the CEOs. However, the CEOs also indicated that an additional factor influencing ICT adoption was lack of proper planning. Moreover, SMEs might not be able to manage effectively the complicated implementation and change processes that are implied in ICT applications. This drawback applies particularly to health-related SMEs in which the CEOs/ administrators are doctors or scientists and are not specialists in business. Thus, failure to plan for ICT investment, implementation, and management affects its adoption.

4.5 Regression Results and Interpretation

The previous section has presented descriptive statistics on the determinants of ICT adoption by SMEs in the health sector. However, to draw inferences about the population on the basis of the sample there was a need to empirically analyse the data using the Logit model. In addition, to estimate the fit of the model, the "forced entry" method of Logit regression was used. This was in line with Karki and Bauer (2004), and Field (2005) argument that this is an appropriate method for theory testing. However, it was important first to determine whether or not multicollinearity would pose a problem. The collinearity test was conducted using correlation analysis, tolerance, and variance inflation factors analysis. The results show that most of the variables were weakly correlated (Table A15). Hence, there was no serious multicollinearity problem with the data. However, information intensity had a zero correlation, but as Field (2005) argues, there is no way of knowing which variable to omit. Therefore, there was need for further multicollinearity testing using tolerance and variance inflation factors analysis. The collinearity statistics are summarized in Table 4.9.

Table 4. 9: Results of Collinearity Statistics.

Predictor Variables	Collinearity Statistics	
	Tolerance	VIF
Age of the employees	0.598	1.673
Innovation of CEO	0.545	1.834
CEO's knowledge in ICT	0.666	1.501
SME size (Number of employees)	0.674	1.484
Quality of ICT systems	0.640	1.562
Information intensity	0.695	1.439
ICT specialization/alignment	0.605	1.652
Management support	1.000	1.000
Voluntariness	0.812	1.232
Organizational readiness	0.799	1.251
Relative advantage	0.627	1.595
Complexity of the ICT facilities	0.596	1.677
Compatibility of the ICT facilities	0.475	2.107
Image	0.590	1.696
Cost of ICT facilities	0.513	1.949
Security/trust of ICT facilities	0.560	1.786
Competitive pressure	0.736	1.360
Government policies on ICT facilities	0.779	1.283
Technological support infrastructure	0.820	1.219
National culture	0.722	1.385
Suppliers'/patients' pressure	0.640	1.564

Source of data: Survey (2008)

Most of the predictor variables in this study had their VIFs less than 10 and a tolerance value of more than 0.1, thus ruling out any possibility of multicollinearity (Menard, 1995 and Field, 2005). However, management support had both VIFs and tolerance value equal to one and hence was dropped from regression analysis.

The variables used in the model were as follows: age of employees, CEO's innovation, CEO's ICT knowledge, SME size, quality of ICT systems, information intensity, ICT specialization, voluntariness, organizational readiness, relative advantage, complexity, compatibility, image, cost, trust of ICT facilities, competitive pressure, government policies, technological support infrastructure, national culture, and suppliers' and patients' pressure. Table 4.10 presents the logit model estimation results on factors affecting the probability of ICT adoption.

Table 4.10: Logit regression: Factors affecting the probability of ICT adoption.

	β	t=β/ S.E.	Wald	*P*-value
Age	-4.556*	-2.06	4.237	.040
Innovation of CEO	2.774	1.38	1.916	.166
CEO's knowledge in ICT	4.236*	2.30	5.285	.022
SME size (Number of employees)	-1.898	-0.40	1.607	.205
Quality of ICT systems	-12.923**	-3.03	9.193	.002
Information intensity	8.605*	2.07	4.288	.038
ICT specialization/alignment	5.088*	2.22	4.918	.027
Voluntariness	1.749	1.03	1.063	.303
Organizational readiness	4.526*	2.17	4.732	.030
Relative advantage	-9.939*	-2.44	5.931	.015
Complexity of ICT facilities	1.533	0.84	.707	.400
Compatibility of the ICT facilities	-3.023	-1.68	2.817	.093
Image	-.739	-1.19	1.412	.235
Cost of ICT facilities	-1.503	-1.8	3.244	.072
Security/trust of ICT facilities	-.110	-0.23	.053	.818
Competitive pressure	-.257	-0.17	.030	.862
Government policies on ICT applications	-5.749*	-2.47	6.107	.013
Technological support infrastructure	-1.028	-0.80	.636	.425
National culture	-.105	-0.09	.008	.930
Suppliers'/patients' pressure	6.238*	2.46	6.053	.014
Observations (n)		136		
Nagelkerke R Squared		.786		
Model Chi-square	(20 df)	89.779		.000
Classification Rate		94.9%		
-2 Log likelihood		40.003		
Hosmer and Lemeshow Chi-square Test	(8 df)	1.804		.986
Total # steps	10			
Notes: ** $p \leq 0.01$, * $p \leq 0.05$				

Source of data: Survey (2008)

The likelihood ratio, chi-square of 89.779 with 20 degrees of freedom (df) and a P-value of 0.001 shows that the model as a whole is significantly sound. The -2Log likelihood is 40.003, which shows that the model fits the research data. The Nagelkerke R Squared was 0.786 implying that 79 percent of the changes in ICT adoption are explained by the variables identified. The classification table (Table A16) shows the sensitivity of prediction

(percentage of occurrence correctly predicted) as 110/111 which is equal to 99.1 percent, while specificity of prediction (the predicted event did not occur) as 19/25 which is equal to 76 percent. The prediction had an overall success rate of 94.9 percent. Hosmer and Lemeshow chi-square test of 1.804 with 8 degrees of freedom (df) and P-value of 0.986 is non-significant indicating that the data fit the model well. This is in agreement with Andy's (2005) study.

The Wald chi-square statistic, which tests the unique contribution of each predictor variable in the context of the other predictor variables, has nine variables meeting the conventional 0.05 standard for statistical significance; eight at the five percent level and one at the one percent level. However, not all estimated coefficients had the expected sign. In the individual factors category, age ($p = 0.014$) and CEO's knowledge in ICT ($p = 0.022$) were statistically significant. In the organizational factors category, quality of ICT systems ($p = 0.002$), information intensity ($p = 0.038$), ICT specialization/alignment ($p = 0.027$), and organizational readiness ($p = 0.030$) were statistically significant. In the technological factors category, relative advantage was statistically significant ($p = 0.015$). Finally, in the external environment category, government policies on ICT applications ($p = 0.013$) and suppliers' and patients' pressure ($p = 0.014$) were statistically significant. These results imply that ICT adoption in the health-related SMEs is strongly influenced by these nine variables.

The coefficient of age of employees was negative and significant, which implies that the older the employee, the less the probability of adopting ICT. Hence, the risk aversion factor associated with ICT adoption increases with increase in age. This characteristic implies that

old employees are skeptical to technology and resistant to change. The findings are in agreement with the argument by Rice and Katz (2003) and by Morris *et al.,* (2005) that in a country where the workforce is relatively young and homogeneous, specifically in the 31 - 40 age range across both the public and private sector, ICT is more likely to be adopted. Hence, younger people would be more motivated to use ICT than old ones. Therefore, introduction of computer studies in the school curriculum in Kenya is consistent with these results.

The positive and significant coefficient of CEO's knowledge in ICT was as expected. It implies that CEOs with ICT knowledge enhance ICT adoption by SMEs. These results are in support of the assertion by Iacovou *et al.,* (1995) and by Rashid and Al-Qirim (2001) that the CEO's/owner's lack of awareness of the technology and its perceived benefits was a major factor influencing take-up of e-commerce.

The coefficient of quality of ICT systems was negative but significant, which implies that the poorer the quality of systems, the less the probability of adopting ICT applications. This is in agreement with the observation by DeLone and McLean (2003) that system quality is an important driver behind user satisfaction, adoption, and actual usage.

The coefficient of information intensity was positive and significant, which indicates that adoption of ICT increases with increase in the intensity of information. This implies that SMEs with high information intensity were more likely to adopt ICT. The positive and significant coefficient of ICT specialization or alignment was as expected. This implies that the more the ICT applications were specialized or aligned the more likely the SMEs were to

adopt them. The coefficient of organizational readiness to adopt ICT was expected to be uncertain but it turned out to be positive and significant. This implies that SMEs which had organizational readiness were more likely to adopt ICT. This result is consistent with the findings of Iacovou *et al.,* (1995), Poon and Swatman (1999), and Thong (1999) that SMEs need to have adequate IT resources in place to adopt ICT. Furthermore, an enterprise's financial, human, and technological resources play an important role in the adoption of new technologies. Lack of such resources may be a major hindrance to the adoption of innovations by small businesses.

The coefficient of relative advantage was found to be negative and significant, implying that ICT adoption is inversely related to relative advantage. Similar results have been reported by Poon and Swatman (1999), Rashid and Al-Qirim (2001), and Seyal and Rahman (2003). The coefficient of government policies on ICT applications was found to be negative and significant, implying that lack of appropriate government policies on ICT was a hindrance to the rate of adoption. Moreover, favourable government policies on ICT applications popularise ICT applications and provide the necessary information on adoption of ICT. This finding is in support of the assertions by Chepaities (1996), Rashid and Al-Qirim (2001), ILO (2001), Palvia *et al.*, (2002), Evusa (2005), and Kashorda (2007) that the problem of ICT adoption is partly caused by inadequate legal and regulatory framework.

Finally, the positive and significant coefficient of suppliers' or patients' pressure implies that the more the ICT suppliers' and patients' pressure on SMEs in demand for services, the more the SMEs were likely to adopt ICT. This finding is in conformity with other studies, for example, Sillence, *et al.*, (1998), Poon (2000), Rashid and Al-Qirim (2001) and, Gibbs

et al. (2003). Therefore, the Logit model results confirm that the variables which were significant affect the adoption of technology in health-related SMEs in Kenya either positively or negatively.

However, from Table 4.10, the coefficients for SME size (p =0 .205) and the CEO/owner innovation (p = 0.166) variables were found not to be statistically significant. This implies that the CEO/owner was not the only one that made ICT decisions. Indeed, the CEOs indicated that they were willing to listen to employees' suggestions regarding ICT adoption because the employees were the end-users and needed to be listened to. In addition, the sample for this study seems to be biased towards smaller firms and the organizational structures of such firms are likely to be specialised departments that are usually associated with large business enterprises. Therefore, the effects of size of SME on ICT adoption as observed in this study are different from earlier findings such as Igbaria *et al.*, (1996), and Premkumar and Roberts (1999). In the Igbaria *et al.,* study, the sample contained only firms with 20 to 100 employees, while in Premkumar and Roberts' study; the sample consisted largely of micro-businesses and not SMEs. The sample for the present study consists of SMEs with 10 to 250 employees. In addition, the Kenya government has zero-rated taxes on computers and other ICT hardware and therefore all levels of organization whether small or large can access and use ICT facilities.

The results of this study show that the coefficients of voluntariness; complexity, compatibility, image, cost, trust, competitive pressure, technological support infrastructure, and national culture are not statistically significant. Hence these variables do not influence ICT adoption by SMEs. However, given that the majority (81.6 percent) of the informants

surveyed had adopted ICT in their SMEs; they seem to have taken appropriate measures to deal with these variables (Appendix 8). For instance, SMEs had invested in secure payment services such as PayPal and other systems that guarantee security of credit payments. This implies that SMEs are becoming more proactive in their ICT investment decisions. This observation seems to concur with the findings in Table 4.5 in which informants' ranked use of ICT applications in strategic planning as number three out of its nine applications. National culture as a factor to ICT adoption could be understood because culture is complex and takes time to change. This explains why the CEOs indicated that part of the reason why they had not fully adopted ICT was resistance to change from employees and this could be attributed to culture.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study, conclusions, contribution of the study to knowledge, recommendations, and areas for further research.

5.2 Summary

Earlier studies on ICT adoption show contradicting findings concerning the determinants of ICT adoption. In addition, studies on ICT adoption in Kenya have not specifically focused on the health sector. However, as noted in the Kenya Vision 2030 the health sector is critical to equity and socio-economic agenda. In addition, provision of good health satisfies one of the basic human needs and contributes significantly towards maintaining and enhancing the productivity of the people. Therefore, the current study sought to establish the extent to which health-related SMEs in Kenya have adopted ICT, and analyze the determinants of ICT adoption by SMEs in the health sector.

The study used a cross-sectional descriptive survey design. Data were collected using a semi-structured questionnaire and an interview schedule. The collected data were analysed using descriptive, inferential statistics, and content analysis. Descriptive statistics were used to describe and summarise data, while inferential statistics, particularly the Logit model estimation was used to predict the effects of the determinants of ICT adoption by SMEs in the health sector. The overall fit of the model was tested using the log likelihood and associated chi-square statistics. Content analysis was used to group common themes together and to draw inferences.

The study findings revealed that some SMEs had adopted ICT applications whose usage frequency cut across the functions administrative purposes, admission, discharge, purchasing and supplies, internal communication, external communication, strategic planning purposes, marketing development, and inventory tracking. The highest ranking ICT applications were concerned with administrative purposes, admission, and discharge showed that SMEs were more interested in electronic recording keeping. Thus ICT was used as a tool to safeguard the utilization of the medical records.

The study also found that one of the driving forces of ICT adoption was the perceived benefits derived from the adoption such as improvement in communication, information storage and retrieval, business efficiency, customer service, stock control, contact with patients, and reduction in administration and business costs. Although the majority of the SMEs had invested in ICT, some were still using the manual filing system.

Nine variables were found to significantly predict the adoption of ICT by the health-related SMEs. Those that had a positive influence include: the CEO's knowledge of ICT; information intensity; ICT specialization/alignment; organizational readiness; and suppliers' and patients' pressure. Those that had a negative significant influence include: age of employees, quality of ICT systems, relative advantage, and Government policies.

5.3 Conclusion

To move towards middle level income country as noted in the national economic goals contained in Vision 2030; the ICT sector is supposed to contribute significantly to the

economic pillar whose target is to attain 10 percent GDP growth rate by 2012. Under the believe that such economic growth will bring about high quality life to all citizens and turn Kenya into a new industrializing nation. This is expected to enable Kenyans to realize the vision of universal access to health by 2015. However, health related - SMEs seem to be disadvantaged and are slower in adopting ICT. This led to increased research in an attempt to try and resolve the determinants influencing ICT adoption in Kenya.

However, review of various studies on technology adoption among SMEs shows lack of a model to guide ICT adoption among SMEs and more so health-related SMEs in Kenya. The studies recognize not only the unique characteristics of SMEs but also the roles of the owners/CEO's ICT knowledge, in addition to other elements identified in technology adoption literatures. It is on this basis that the current study was conceptualized to investigate the determinants of adoption of ICT by SMEs within the health sector in Kenya.

As expected, the current study shows that there was increased adoption and usage of ICT applications in different processes in health-related SMEs across nine ICT applications. The key driving forces of ICT adoption were the perceived benefits. However, the health sector is yet to experience the big leap to high sustained competitive advantage in services delivery. Although the current adoption and usage of ICT seem to be on upward trend this is not guaranteed if the determinants influencing ICT uptake are not addressed. From the results, mechanisms need to be put in place to ensure that awareness creation is in place to popularise ICT adoption and utilization in the health sector since in Vision 2030, the health sector is one of the central pillars of the equity and socio-economic agenda. The challenge

lies in how SMEs mobilize resources for such worth course for them to contribute significantly towards bringing the Vision 2030 to pass successfully

5.4 Contributions of the Study to Knowledge

This study essentially was investigating the determinants of adoption of ICT by SMEs within the health sector in, Nairobi Kenya. Although there is strong evidence that ICT has been widely used by firms and individuals, most of this is limited to developed countries. While prior research shows that the SMEs in emerging markets and African content are still in the infant stage of ICT adoption, they do not explain why they are lagging behind. In addition, there is insufficient research in identifying issues that may assist managers in the adoption and utilization of ICT by health - related SMEs in Kenyan context.

The current study focused on relatively unexplored research area in health – related SMEs within the health sector in Kenya. In view of the fact that different countries support the contribution of SMEs in development due to their role in sustaining a broad and diversified private sector and job creation (UNIDO, 2004). Therefore, the current empirical study is significant for two reasons. First, it presents new insights into the determinant of ICT adoption by health - related SMEs in Kenya. The study contributes to the empirical literature on determinants of ICT adoption by revealing nine significant determinants influencing ICT adoption by health-related SMEs' namely: age, CEO's ICT knowledge, quality of ICT systems, information intensity, ICT specialization, organizational readiness, relative advantage, government policies on ICT applications, and pressure from suppliers and patients. Second, the study contributes to the body of knowledge by developing and testing a "forced entry" logit model. The model prediction had an overall classification rate

of 94.9 percent which suggests that the model can be used as a guideline for ICT adoption by SMEs in the health sectors in Kenya. However, given the diversity of the SME sector, the application of logit model in different contexts can produce interesting results with crucial academic and managerial implications.

5.5. Policy Implications

The policy implication is categorized into two key sections. First it is policy implication based on the first objective which was to establish the extent to which health-related SMEs in Kenya have adopted ICT. Second is policy implication based on the second objective which was to analyze the determinants of ICT adoption by SMEs in the health sector. In addition, policy implication on objective two is further categorized into individual, organizational, technological and external environmental factors.

The study found that there was increased usage frequency of ICT across a set of nine applications. To this end key players in the health – related SMEs like the owners and the government agencies particularly the ministry of trade should position ICT adoption as a strategic tool in coping with the dynamics of the global competitive market and contribute positively to the health sector.

a) Individual factors

For the ICT sector to play a leading role in achieving the Vision 2030, SMEs should lobby the Government to encourage ICT training for the young people since age was found to be

a significant predictor of ICT adoption. Such training should focus on technical computer skills, Internet, and other ICT applications.

The Government, and especially through Ministry of Information and Communication need to embark on effective awareness creation of the various benefits of adopting ICT by SMEs. This is because CEO's knowledge of ICT was found to be a significant predictor of ICT adoption. By creating awareness, the CEOs will realize the benefits of ICT and therefore, commit the enterprise resources to purchasing ICT facilities.

Since computer technology is constantly changing, re-training is required. SMEs should supplement the government effort in this matter through in-house training for all employees. Focus should also be placed on achieving a manageable level of IT literacy among the top management particularly the CEO who make the decisions to commit the financial resources of their enterprises to ICT investment. This is because the findings of the study show that CEO's knowledge of ICT is a significant predictor of ICT adoption.

b) Organizational factors

To enhance the adoption and use of ICT by the end-users' in the SMEs sector, the government in conjunction with the SMEs owners should enforce standardized, and uniform ICT systems in all health related SMEs. This is because the study findings show that quality of ICT systems to be significant predictor of ICT adoption.

Regulatory bodies like Kenya Bureau of Standards and Kenya Medical Practitioners and Dentists Board should ensure all SMEs in the health sector are operating using quality ICT systems since quality of ICT systems was found to be a significant predictor of ICT

adoption. This could improve the quality of health care significantly and motivate the non-adopters to adopt.

Health-related SMEs need to invest in ICT to improve effectiveness and efficiency since information intensity was found to be a significant predictor of ICT adoption. This will improve the safety, quality, and efficiency of patient care by enabling access to electronic health records and supporting clinical practice, service management, research, and policy through availability of appropriate evidence and data.

Health-related SMEs need to lobby the Government through the Ministry of Higher Education to ensure that Kenyan Universities offering degrees in Medicine incorporate, within their curriculum, short courses on medical informatics and ICT for health management since information intensity was found to be a key factor influencing ICT adoption. This will be crucial in managing the volume of information they handle on daily basis.

As the country embarks on the implementation of the Vision 2030, the Government, through the Ministry of Finance, should provide financial incentives to the SMEs in the health sector. This will not only enable acquisition of the necessary healthcare supplies but also the necessary healthcare-related ICT applications that are specilised to the health sector. This will be in line with the findings of this study that ICT specialization/alignment was a significant predictor of ICT adoption.

The Government, through the Kenya Bureau of Standards, should come up with strategies for emphasizing to SMEs the importance of standards for ensuring inter-operability. This is because the findings if this study show that ICT specialization/alignment to be a significant predictor of ICT adoption.

Computer professionals working in the health-related SMEs need to work with manufacturers of ICT applications in order to advise them on the need to develop specialised ICT facilities for the health sector to enhance adoption. This is because ICT specialization/alignment with current work practices was found to be a key factor in ICT adoption.

Clients of ICT need to also invest in ICT facilities which are compatible with the facilities within the health-related SMEs premises in order to bring interoperability and reduce operating problems related to lack of systems compatibility. This is because the study found ICT specialization/alignment to be a significant predictor of ICT adoption.

There is need for national capacity building in the use and application of a variety of ICT applications. To this end, the Government should incorporate compulsory training in computer applications and other aspects of ICT in the national curriculum from primary school to the tertiary level of education. This is because the findings of this study show that organizational readiness to be a significant predictor of ICT adoption. Thus, the training will prepare labour force ready for absorption in the job market. This will enable SMEs to employ staff who already have ICT skills thus, leading to organizational readiness.

The Government, particularly the Ministry of Education, should mainstream ICT in all the subjects offered in schools. This includes ICT components in business, geography, mathematics, and biology. This will provide potential employees with ICT skills. This will enhance organizational readiness that was found to be a significant predictor of ICT adoption.

For the SME sector to fully adopt ICT and play a leading role in economic development, health-related SMEs should ensure they set aside adequate financial and technological resources. This will ensure the enterprises achieve organizational readiness.

For the SMEs sector to contribute positively towards achieving Vision 2030, the Government should stimulate ICT adoption through providing financial incentives. This will enable the sector to be proactive and to set aside enough resources (both financial and technological) that are necessary to achieve organizational readiness.

c) Technological factors

Since ICT adoption gives SMEs relative advantage over their competitors as was found from the study, SMEs need to develop a mechanism for monitoring the changes in technological innovations. This calls for CEOs to be proactive in ICT-related matters.

Players like the Kenya Medical Association should raise awareness among the medical personnel about the potential of ICT and encourage them to develop suitable programmes that support adoption. This is because adopting ICT was found to give SMEs competitive advantage over its competitors.

d) External environmental factors

The SMEs should adopt ICT within a well-developed participatory ICT plan. This could make them proactive in adjusting their plans as demand and supply changes with the market environment. This could enhance their efficiency and effectiveness and could also minimize suppliers' and patients' pressure in terms of demand for services and how this affects SMEs. This is because the findings of the study were that suppliers' and patients' pressure significantly predict ICT adoption.

Health-related SMEs should develop a clear concept on the future of e-business in hospitals since suppliers' and patients' pressure was found to be a significant predictor of ICT adoption. This could enable them to continue strengthening the process of monitoring the changing needs of their customers so that they can react proactively.

The SMEs need to lobby the Government, through the Ministry of Health in conjunction with the Ministry of Information and Communication to develop ICT policies that are specific to health-related SMEs. This will be in line with the findings of this study that the Government had not developed adequate ICT policies but rather a generalised sectoral approach policy. This will provide the health-related SMEs in Kenya with an ICT healthcare policy that could address the challenges faced in this sector.

Finally, in order to improve access to healthcare, especially for the majority of Kenyans living in remote rural areas, Human Rights Groups need to lobby the Government to boost the availability and utilization of e-health services in all hospitals through ICT adoption

since Government policies was found to be a significant predictor of ICT adoption. This could, over time, enable Kenyans to realize the vision of universal access to health by 2015.

5.6 Areas for further Research

Future research could build on the results of this study to enrich the existing knowledge of the determinants of adoption of ICT by SMEs. Such studies, for example, could consider changing the sample size and sampling procedures used in this study to validate the study, and also to produce more knowledge in this area.

The study could also be extended to public health related institutions and large firms which have more complicated organizational structures and store larger volumes of data.

Due to the importance attached to SMEs by the Kenyan government, a comparative study of urban and rural SMEs should be undertaken to arrive at wider generalizations of the determinants of ICT adoption in Kenya.

Furthermore, this study concentrated on a sample of physically able persons but future research could cover the relationship between socially excluded groups like disabled persons and ICT adoption.

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APPENDICES

Appendix 1: Descriptive and Regression Results

Table A1: Number of SMEs with ICT applications

	Employees		CEOs	
	Frequency	**Percent**	**Frequency**	**Percent**
Adopted ICT	111	81.6	1	94.1
Not adopted ICT	25	18.4	16	5.9
Total	**136**	**100**	**17**	**100**

Source of data: Survey (2008)

Table A2: Using ICT to keep track of Customers

	Frequency	Percent
Yes	7	41.2
No	10	58.8
Total	**17**	**100**

Source of data: Survey (2008)

Table A3: Informants happy with the quality of ICT facilities used

	Frequency	Percent
Yes	89	65.4
No	47	34.6
Total	**136**	

Source of data: Survey (2008)

Table A4: Informants satisfied with the quality of ICT facilities used

		Frequency	Percent	Valid Percent
Valid	Very dissatisfied	5	3.7	3.7
	Dissatisfied	20	14.7	14.8
	Neutral	27	19.9	20.0
	Satisfied	74	54.4	54.8
	Very satisfied	9	6.6	6.7
	Total	135	99.3	100.0
Missing	9.0	1	0.7	
Total		**136**	**100.0**	

Source of data: Survey (2008)

Table A5: Level of information intensity in the SMEs

	Frequency	Percent
Intense	127	93.4
Weak	9	6.6
Total	**136**	**100**

Source of data: Survey (2008)

Table A6: Effect of information intensity on ICT adoption

		Frequency	Percent	Valid Percent
	Very little	1	0.7	0.7
	Little	10	7.4	7.5
	Moderate	45	33.1	33.6
	Much	55	40.4	41.0
	Very much	23	16.9	17.2
	Total	134	98.5	**100.0**
Missing	9.0	2	1.5	
Total		**136**	**100.0**	

Source of data: Survey (2008)

Table A7: ICT Alignment with work Practices

	Frequency	Percent
Agreed	112	82.4
Do not agree	24	17.6
Total	**136**	**100**

Source of data: Survey (2008)

Table A8: ICT Specialization contributes to its adoption

	Frequency	Percent
Agree	70	51.5
Neutral	37	27.2
Strongly agree	21	15.4
Disagree	8	5.9
Total	**136**	**100**

Source of data: Survey (2008)

Table A9: Adequate Resources influence ICT adoption

	Frequency	Percent
Strongly disagree	5	3.7
Disagree	11	8.1
Neutral	25	18.4
Agree	54	39.7
Strongly agree	41	30.1
Total	**136**	**100**

Source of data: Survey (2008)

Table A10: Use of ICT facilities is Voluntary

	Frequency	Percent
Strongly disagree	16	11.8
Disagree	23	16.9
Neutral	32	23.5
Agree	52	38.2
Strongly agree	12	8.8
Total	**136**	100

Source of data: Survey (2008)

Table A11: Level of ICT adoption compared with Competitors

	Frequency	Percent
At par with the leaders	80	58.8
Lagging behind	44	32.4
Average	12	8.8
Total	**136**	**100**

Source of data: Survey (2008)

Table A12: Effect of Government policies on ICT adoption

	Frequency	Percent
Not to a great extent	109	80.1
To a great extent	26	19.1
Average	1	0.8
Total	**136**	**100**

Source of data: Survey (2008)

Table 13: Level of agreement with adequacy of National ICT Infrastructure

	Frequency	Percent
Neutral	52	38.2
Not adequate	45	33.1
Adequate	28	20.6
Very in-adequate	7	5.1
Very adequate	4	2.9
Total	**136**	**100**

Source of data: Survey (2008)

Table A14: Pressure from Supplier and Customers influence ICT adoption

	Frequency	Percent
Yes	116	85.3
No	20	14.7
Total	**136**	**100**

Source of data: Survey (2008)

Table A15: Correlation Matrix of the 21 Predictor Variables

Variable																							
Sex	Pearson	1																					
	Sig. (2-	.																					
Age	Pearson Correlatio	0.03	1																				
	Sig. (2-	0.727	.																				
Education	Pearson	-.254(**)	0.137	1																			
	Sig. (2-	0.003	0.114	.																			
Innovation of CEO	Pearson	0.057	-0.069	0.078	1																		
	Sig. (2-	0.508	0.423	0.37	.																		
CEO's ICT knowledge	Pearson	0.156	.216(*)	-0.089	-.409(**)	1																	
	Sig. (2-	0.072	0.012	0.305	0.01	.																	
SME size	Pearson	-0.016	0.096	0.008	0.122	0.073	1																
	Sig. (2-	0.852	0.268	0.929	0.16	0.4	.																
Quality	Pearson	0.164	0.025	-0.108	.267(**)	-.199(*)	-0.093	1															
	Sig. (2-	0.057	0.772	0.213	0.002	0.021	0.286	.															
Information intensity	Pearson	0	-.198(*)	-0.016	.398(**)	-.277(**)	-0.006	.286(**)	1														
	Sig. (2-	0.997	0.021	0.855	0.01	0.001	0.948	0.001	.														
Specialization	Pearson	-0.043	0.024	-0.062	.280(**)	-0.12	0.128	.289(**)	.327(**)	1													
	Sig. (2-	0.618	0.786	0.473	0.01	0.167	0.14	0.01	0.01	.													
Management support	Pearson	-0.018	-0.033	-0.101	.245(**)	-0.154	0.042	.261(**)	.212(*)	.363(**)	1												
	Sig. (2-	0.839	0.708	0.243	0.004	0.074	0.628	0.002	0.014	0.01	.												
Voluntariness	Pearson	0.036	0.081	-0.012	-0.013	-0.074	-0.019	-0.024	0.08	0.094	0.136	1											
	Sig. (2-	0.678	0.349	0.893	0.882	0.396	0.827	0.78	0.356	0.279	0.116	.											
Resources	Pearson	-0.044	-0.11	0.039	0.048	-0.019	0.023	-0.028	.191(*)	-0.013	0.151	0.061	1										
	Sig. (2-	0.614	0.202	0.65	0.582	0.827	0.791	0.746	0.027	0.88	0.081	0.481	.										
Relative advantage	Pearson	-0.046	-0.045	-0.141	.259(**)	-0.124	0.063	.250(**)	.194(*)	.338(**)	.359(**)	0.093	.319(**)	1									
	Sig. (2-	0.6	0.604	0.102	0.002	0.152	0.469	0.003	0.024	0.01	0.01	0.281	0.01	.									
Complexity	Pearson	0.02	0.02	0.038	0.055	0.164	-0.037	0.128	-0.085	.172(*)	0.071	0.051	-.201(*)	0.143	1								
	Sig. (2-	0.82	0.816	0.658	0.525	0.057	0.673	0.138	0.325	0.046	0.414	0.555	0.019	0.099	.								
Compatibility	Pearson	-0.048	0.019	0.047	0.058	-0.083	0.053	0.042	0.128	0.141	0.052	0.048	-0.105	0.137	.431(**)	1							
	Sig. (2-	0.578	0.828	0.586	0.5	0.336	0.538	0.626	0.138	0.102	0.551	0.584	0.226	0.114	0.01	.							
Image	Pearson	.236(**)	0.071	0.013	0.061	0.047	0.04	0.08	-0.1	0.074	-0.128	-0.032	0.115	0.043	.197(*)	.375(**)	1						
	Sig. (2-	0.006	0.414	0.883	0.485	0.589	0.642	0.357	0.25	0.393	0.14	0.716	0.184	0.622	0.022	0.01	.						
Cost	Pearson	0.002	0.032	0.121	-0.015	0.022	-0.018	-0.11	-.169(*)	0.028	-.197(*)	0.014	0.083	0.007	0.153	.365(**)	.542(**)	1					
	Sig. (2-	0.985	0.715	0.162	0.866	0.803	0.831	0.205	0.05	0.744	0.022	0.874	0.338	0.932	0.076	0.01	0.01	.					
Trust	Pearson	-0.028	0.013	0.166	0.057	0.096	0.102	-0.052	-0.044	0.101	0.073	0.11	-0.017	0.073	.348(**)	.415(**)	.255(**)	.425(**)	1				
	Sig. (2-	0.745	0.882	0.054	0.512	0.269	0.24	0.546	0.609	0.243	0.399	0.205	0.846	0.403	0.01	0.01	0.003	0.01	.				
Competitve pressure	Pearson	-0.042	-0.014	-0.089	.264(**)	-0.142	0.11	.289(**)	.229(**)	.453(**)	.218(*)	0.108	0.168	.603(**)	0.164	.194(*)	0.105	0.082	.201(*)	1			
	Sig. (2-	0.628	0.871	0.302	0.002	0.1	0.205	0.01	0.008	0.01	0.011	0.212	0.052	0.01	0.057	0.024	0.227	0.345	0.019	.			
Government policies	Pearson	-0.069	-0.079	-0.103	.175(*)	-0.091	0.091	0.019	0.051	0.14	0.095	.228(**)	0.072	0.065	-0.108	0.03	0.038	-0.007	-0.042	0.083	1		
	Sig. (2-	0.424	0.363	0.234	0.042	0.293	0.295	0.829	0.554	0.106	0.272	0.008	0.407	0.451	0.211	0.733	0.665	0.934	0.626	0.337	.		
ICT infrastructure	Pearson	0.051	0.117	0.152	0.137	-0.087	-0.036	0.149	0.058	0.108	0.033	0.157	0.091	0.091	-0.028	0.065	0.135	0.451	-0.081	0.12	.344(**)	1	
	Sig. (2-	0.559	0.176	0.078	0.112	0.315	0.678	0.084	0.502	0.213	0.702	0.069	0.292	0.291	0.743	0.452	0.119	0.091	0.351	0.164	0.01	.	
Culture	Pearson	-0.078	-0.129	-0.11	.197(*)	-.247(**)	-0.117	.231(**)	.311(**)	.255(**)	0.125	0.079	0.02	0.053	0.1	-0.011	-0.061	-0.034	-0.149	.253(**)	.253(**)	.173(*)	1
	Sig. (2-	0.371	0.137	0.204	0.022	0.004	0.177	0.007	0.01	0.003	0.148	0.362	0.819	0.544	0.248	0.901	0.485	0.692	0.085	0.003	0.003	0.045	.
Supplier	Pearson	-0.048	-0.149	0.017	.197(*)	-.199(*)	-0.057	.294(**)	.311(**)	.175(*)	0.125	-0.013	0.058	.187(*)	0.052	-0.067	-0.107	-0.077	-0.129	.304(**)	.186(*)	.204(*)	.612(**)
	Sig. (2-	0.582	0.085	0.84	0.022	0.02	0.515	0.01	0.01	0.042	0.148	0.882	0.503	0.03	0.546	0.439	0.216	0.376	0.136	0.01	0.031	0.018	0.01

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table A16: Classification Table on the overall success rate of prediction

Observed			Predicted		
			Has adopted and uses ICT		Percentage Correct
			Do not adopt	Adopt	
Step 1	Has adopted and uses ICT	Do not adopt	19	6	76.0
		Adopt	1	110	99.1
	Overall Percentage				**94.9**

a The cut value is .500

Source of data: Survey (2008)

Appendix 2: Sample determination

Table A17: Sample determination table

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Table 11.3
Sample Size for a Given Population Size

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Source: Sekaran (2003)

Figure A1: Graphical sample determination

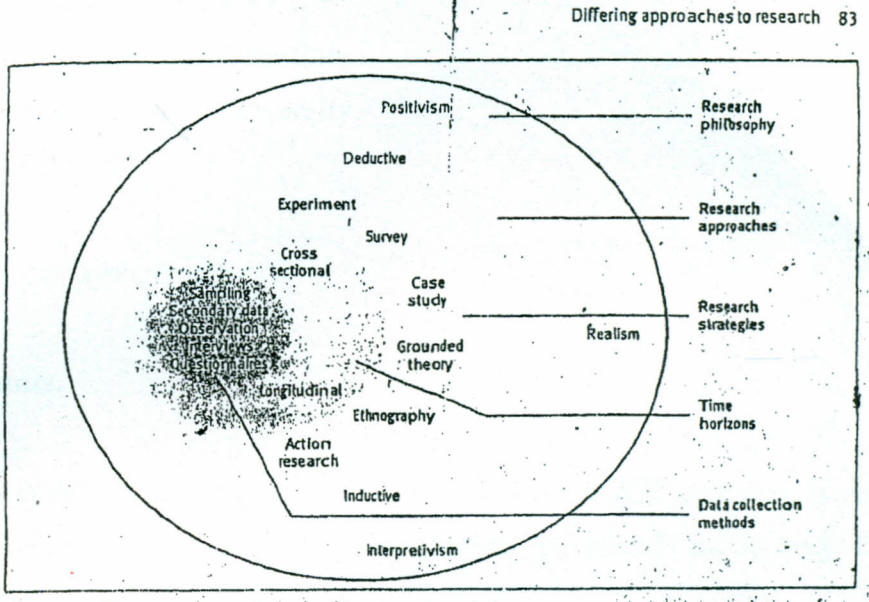

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Figure 4.1 The research process 'onion'

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Table 6.1 Sample sizes for different sizes of population at a 95 per cent level of certainty (assuming data are collected from all cases in the sample)

	Margin of error			
Population	5%	3%	2%	1%
50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	434	384
500	217	340	414	475
750	254	440	571	696
1000	278	516	706	906
2000	322	696	1091	1655
5000	357	879	1622	3288
10000	370	964	1936	4899
100000	383	1056	2345	8762
1 000000	384	1066	2395	9513
10 000000	384	1067	2400	9595

Source: Saunders *et al.*, (2003)

Appendix 3: Data collection Instruments

a) Cover Letter

Stephen M.A Muathe; MBA, AMKIM
Department of Business Administration
School of Business, Kenyatta University
P.O Box 43844-00100
Nairobi-Kenya
Email : muathesm@yahoo.com

Dear Informants,

I am currently conducting a study on *"The determinants of ICT adoption by SMEs within the health sector in Kenya"*. This information is useful concerning future ICT implementation plans in the sector.

Participating in this survey is voluntary, and your job would not be affected in any way by whether you participate in the survey or not. This survey will take approximately 20 minutes to complete. Please be free to complete the questionnaire and make additional notes on the instrument where necessary. All information will be treated confidentially and the responses will only be treated as group data in the final report.

Your time in completing this survey is greatly appreciated and if you would like to get a copy of the final report of this study please fell free to indicate on the top of the questionnaire.

Yours faithfully

Muathe SMA (Adm. No. D86/15750/05)

b) Questionnaire

{Would you like to share the findings of the survey? (a) Yes [] (b) No []}

General Instructions: The purpose of this questionnaire is to collect data on *"The determinants of ICT adoption by SMEs within the health sector in Kenya"*. The questionnaire consists of four sections. Make sure to respond to every statement.

(*Note: In this study the ICT facilities will be limited to: personal computer, word processing, Excel, Access, accounting payment system, Intranet, LAN, file sharing, mobile phone, email, Internet and website*)

Section A: Individual factors

1. Informant's name (optional)_____
2. Organization name_____
3. Date of establishment_____
4. Has your enterprise adopted ICT (1) Yes [ ] (0) No [ ]. If yes how many departments are linked (1) 0-2 departments [ ] (2) above 2 departments [ ]
5. What is your sex? (1) Male [ ] (2) Female [ ]
6. Do you think sex influences the level of ICT adoption? (1) Yes[ ] (2)No [ ]
7. What is your age? (1) Less than 20 [ ] (2) 21-30 [ ] (3) 31-40 [ ] (4) 41-50 [ ] (5) Over 50 [ ]
8. Do you think age influences the level of ICT adoption? (1) Yes[ ] (2)No [ ]
9. In your opinion, which age category of employees is likely to adopt ICT faster?

_____

10. Indicate the department/section you work for. 1) Purchasing [ ] (2) Operations [ ] (3) IT/IS [ ] (4) Marketing [ ] (5) Admissions [ ](6) Discharge [ ] (7) Any other (specify)_____

11. How many years have you been in this organization?

(1) 1-5 [ ] (2) 6-10 [ ] (3)11-15 [ ] (4)16-20 [ ] (5) over 20 [ ]

12. What is your highest completed academic level? (1) High school Certificate [ ] (2) Diploma [ ] (3) Bachelors [ ] (4) Master's [ ] (5) PhD [ ]

13. Does the level of education influence ICT adoption in your enterprise? (1) Yes [ ] (2) No []

14. Do you think your CEO is innovative in terms of bringing new changes in the organization? (1) Yes [ ] (2) No [ ]

15. If yes, do you think his/her innovation influences ICT adoption in the enterprise? (1) Yes [ ] (2) No [ ]

16. The CEO of your enterprise is ICT literate (1) Yes [ ] (2) No [ ]

17. Do you think the CEO's ICT knowledge influences your enterprise in adopting ICT (1) Yes [ ] (2) No [ ]

18. ICT applications are mainly used for (tick appropriately): (1) Administrative purposes [ ] (2) Strategic planning purposes [ ] (3) Related to purchasing and supplies [ ] (4) Inventory tracking [ ] (5) Marketing developments [ ] (6) Internal communication [ ] (7) External communication [ ] (8) admission [ ]

(9) Discharge [ ]

19. How do you assess your ICT adoption achievements (1 being very negative and 5 Very positive)? (1) Very unsatisfactory [ ] (2) unsatisfactory [ ] (3) Neutral [ ] (4) satisfactory [ ] (5)Very satisfactory [ ]

Section B: Organizational factors and ICT adoption by SMEs

20. Please indicate the number of employees in the organization:

    (1) Less than 20 [ ] (2) 21 to 30 [ ] (3) 31 to 40 [ ] (4) 41-50 [ ] (5) Above 50 [ ]

21. Do you think the number of employees in your enterprise has influenced your decision to adopt ICT?(1) Yes[ ] (2) No [ ]

22. If yes, which enterprise are likely to adopt ICT (1) Small enterprises [ ] (2) Large enterprises [ ] Any other(specify)_____

23. Which of the following mode of communication is used by your organization? (tick appropriately) (1) Telephony [ ] (2) e-mail [ ] (3) Mobile [ ] (4) Intranet [] (5) Memo [ ] (6) Any other (Please specify_____

24. Are you happy with the quality of the ICT systems in your enterprise? (1)Yes [ ] (2) No [ ]

25. On a scale of 1-5 (1 being very negative and 5 Very positive) indicate your level of satisfaction with the quality of the ICT systems (1) Very unsatisfactory [ ] (2) unsatisfactory [ ] (3) Neutral [ ] (4) satisfactory [ ] (5)Very satisfactory [ ]

26. Do you think the quality of the systems influence your ICT adoption? (1)Yes [ ] (2) No [ ]

27. What rate is the level of information intensity in your organization? (1) Weak [ ] (2) Intense [ ]

28. Do you think the level of information intensity contributes to the level of ICT adoption by your organization? (1)Disagree [ ] (2) Agree [ ]

29. On a scale of 1-5 (1 been very negative and 5 Very positive) rate the level at which information intensity contributes to ICT adoption (1) Very little [ ] (2) Little [ ] (3)Moderate [ ] (4) Much [ ] (5) very much [ ]

30. Do you find your ICT facilities adequately specialized/ aligned with your current work practices? (1)Yes[ ] (2) No [ ]

31. Do you think ICT specialization/ alignment with current work practices contributes to your ICT adoption? (1) Yes [ ] (2) No [ ]

32. On a scale of 1-5 (1 been very negative and 5 Very positive) rate the level of agreement at which you think ICT specialization/ alignment has contributed to the ICT adoption (1) Strongly disagree [ ] (2) Disagree [ ] (3) Neutral [ ] (4) Agree [] (5) Strongly agree [ ]

33. Is management in your enterprise supportive of new innovations?
(1) Yes [ ] (2) No [ ]

34. If yes, does the management support affect your willingness to adopt ICT?
(1) Yes [ ] (2) No [ ]

35. In your organization do you use ICT facilities voluntarily (1) Yes[ ] (2)No [ ]

36. On a scale of 1-5 (1 been very negative and 5 Very positive) rate the level at which use of ICT facilities is voluntary (1) Strongly disagree [ ] (2) Disagree [ ] (3) Neutral [ ] (4) Agree [ ] (5) Strongly agree [ ]

37. Do you think voluntary use of ICT facilities contributes to adoption? (1) Yes [ ] (2) No [ ] Explain your answer_____

38. Do you think your organization has adequate resources like financial and technological resources for taking on new technology?

(a) Financial resources (1) Yes [ ] (2) No [ ]

(b) Technological resources (1) Yes [ ] (2) No [ ]

39. On a scale of 1-5 (1 been very negative and 5 Very positive) rate the level of agreement with the statement that adequate resources in an organization facilitate ICT adoption (1) Strongly disagree [ ] (2) Disagree [ ] (3) Neutral [ ] (4) Agree [ ] (5) Strongly agree [ ]

Section C: Technological factors and ICT adoption by SMEs

40. Do you think by adopting ICT your organization will have some relative advantage over the competitors (1) Yes[ ] (2) No [ ]

41. If yes, does the relative advantage influence an enterprise in adopting ICT?

(1) Yes [ ] (2) No [ ]

42. Rank the extent to which the following factors enhance adoption of ICT in your organization. (Rank 1-5; 1 Weakest and 5 Strongest) 1. Very weak extent 2. Weak extent, 3. N=Neutral 4 Strong extent, 5. Very strongly extent

i. Complexity of the ICT facilities 1 2 3 4 5

ii. Lack of compatibility of the ICT facilities 1 2 3 4 5

iii. Lack of improvement in the image of organization 1 2 3 4 5

iv. ICT not been affordable 1 2 3 4 5

v. Threats of information security /trust 1 2 3 4 5

43. Tick the benefits likely to be observed/ perceived if your organization adopts ICT.

i. Improvement in information storage and retrieval [ ]

ii. Improvement in communication [ ]

iii. Reduction of business costs [ ]

iv. Improvement in business efficiency [ ]

v. Improvement in contact with patients [ ]

vi. Improvement in stocks control [ ]

vii. Reduction of administrative burden [ ]

viii. Improved customer service [ ]

ix. Reduction in manpower [ ]

44. What are the factors limiting the use of ICT facilities in your organization?_____

_____

Section D: External environment and ICT adoption by SMEs

45. Please rank the competitive strengths of your organization (rank 1-5) 1.Very weak [ ], 2. Weak [ ] 3. Neutral [ ] 4 Strong [ ] 5. Very strongly [ ]

46. Do you think adoption of ICT can enable the enterprise deal with the competitive pressure? (1) Not true [ ] (2) True [ ]

47. In your opinion does ICT adoption by your competitors influence your organization to adopt ICT? (1) Yes [ ] (2) No [ ]. Explain your answer.

_____

_____

48. In terms of ICT adoption, how does your organization compare with the competitor? (1) Lagging behind [ ] (2) At par with the leading[ ] (3) Any other_____

49. Do you think government has legislated adequate policies to influence ICT adoption by your enterprise? (1) Yes [ ] (2) No [ ]

50. To what extent do you think government policies have affected ICT adoption by your enterprise? (1) Not to a great extent [ ] (2) To a great extent [ ]

51. On a scale of 1-5 (1 being very negative and 5 Very positive) rate the level of agreement with the statement that there are adequate government policies supporting ICT adoption by SMEs. (1) Strongly disagree [ ] (2) Disagree [ ] (3) Neutral [ ] (4) Agree [ ] (5) Strongly agree [ ]

52. Has the government developed adequate national ICT infrastructure? (1) Yes [ ] (2) No [ ]

53. If yes, do you find the national ICT infrastructure adequate to support ICT adoption? (1) Yes [ ] (2) No [ ]

54. Are there shared values in Kenya (national culture) concerning technology? (1) Yes [ ] (2) No [ ]

55. If yes do you think the shared values in Kenya concerning technology contribute to your ICT adoption? (1) Yes [ ] (2) No [ ]

56. In your opinion indicate the rate (1 being very little and 5 Very much) at which national culture (shared values) affects ICT adoption (1) very little [ ] (2) Little [] (3) Moderate [ ] (4) Much [ ] (5) Very much [ ]

57. Your enterprise has a lot of pressure from the patients' in need of services? (1) Yes [ ] (2) No [ ]

58. Has the pressure from patients influenced the adoption of ICT (1) Yes [ ] (2) No []

59. What suggestions can you give to promote the adoption of ICT by organizations in the health sector?

_____

_____

_____

c) Interview Schedule

(For Hospital CEOs/Administrators)

General Instructions: The purpose of this questionnaire is to collect data on *"The determinants of ICT adoption by SMEs within the health sector in Kenya"*. The interview schedule consists of four sections.

(*Note: **In this study the ICT facilities will be limited to:** personal computer, word processing, Excel, Access, accounting payment system, Intranet, LAN, file sharing, email, mobile phone, Internet, and website.*)

Section A: General Questions

1. Informant's name (optional) _____
2. Organization name_____
3. Date of establishment_____
4. Please indicate the number of employees in your organization

   (1) Less than 20 [ ] (2) 21 to 30 [ ] (3) 31 to 40 [ ] (4) 41-50 [ ] (5) above 50 [ ]
5. What is your sex? (1) Male[ ] (2) Female [ ]
6. Has your enterprise adopted ICT (1) Yes [ ] (0) No [ ]. If yes how many departments are linked (1) 0-2 departments [ ] (2) above 2 departments [ ]
7. If yes, do you think this has been as a result of your innovation? (1) Yes [] (2) No []
8. What is your age? (1) Less than 20[ ] (2) 21-30 [ ] (3) 31-40 [ ] (4) 41-50 [ ] (5) over 50[ ]
9. How many years have you been in the organization?

(1) 1-5 [ ] (2) 6-10 [ ] (3)11-15 [ ] (4)16-20 [ ] (5) over 20 [ ]

10. What is your highest completed academic level? (1) High school Certificate [ ] (2) Diploma [ ] (3) Bachelors [ ] (4) Master's[ ] (5) PhD[ ]
11. Which of the following (tick appropriately) mode of correspondence is used by your organization internally and with other organization. (1) Telephony (2) e-mail [ ] (3) Mobile [ ] (4) Intranet [ ] (5) Any other (Please specify)_____
12. What is the level of your ICT knowledge _____
13. How do you assist those employees who are unable to use ICT in your organization?

Section B: Organizational factors and ICT adoption by SMEs

14. What factors do you think affect ICT (both positive and negative) adoption within your organization?

15. How do you encourage your employees to use ICT in executing their duties?

16. How do you find the quality of the ICT systems in your organization?

17. What is the level of information intensity in your organization?

18. How do you find the specialization of the ICT facilities in relation to the specific tasks of your organization?

Section C: Technological factors and ICT adoption by SMEs

19. What barriers are experienced in ICT adoption in your organization?

20. Are there benefits which accrue as a result of ICT-enabled organization?

21. How expensive are ICT (Internet) connection charges?

Section D: External environment factors and ICT adoption by SMEs

22. How does competitive pressure influence ICT adoption by your organization?

23. In terms of ICT adoption, how does your organization compare with the competition?

24. How do the government policies on ICT affect the ability of your organization to adopt it?

25. How do you find the national ICT infrastructure in support of ICT adoption?

26. How does patients' pressure affect ICT adoption by your organization?

27. How does Kenya's national culture concerning ICT contribute to ICT adoption by your organization?

28. How do you assess your ICT adoption achievements? (1) Very unsatisfactory[ ] (2) unsatisfactory [ ] (3) Neutral [ ] (4) satisfactory[ ] (5)Very satisfactory

29. What suggestions can you give to enable organizations enhance ICT adoption in the health sector?

_____

_____

_____

Appendix 4: Research Authorization

a) Clearance Letter

REPUBLIC OF KENYA

MINISTRY OF HIGHER EDUCATION SCIENCE & TECHNOLOGY

Telegrams: "SCIENCE TEC", Nairobi
Telephone: 02-318581
E-Mail:ps@scienceandtechnology.go.ke

JOGOO HOUSE "B"
HARAMBEE AVENUE,
P.O. Box 9583-00200
NAIROBI

When Replying please quote

Ref. MOHEST 13/001/38C 601/2 **Date:** 29th September, 2008

Muathe Stephen M. A
Kenyatta University
P. O. Box 4344
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to conduct research on ***'Determinants of Adoption of information and Communication Technology by small and medium enterprises within the Health Sector in Kenya,***

I am pleased to inform you that you have been authorized to conduct research in Nairobi for a period ending 30th October, 2009.

You are advised to report to the Provincial Commissioner and the Provincial before commencing on your research.

On completion of your research, you are expected to submit two copies of your research report to this office.

MERCY GATOBU
FOR: PERMANENT SECRETARY

Copy to:

The Provincial Commissioner
NAIROBI

The Provincial Director of Education
NAIROBI

b) Research Permit

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss. MUATHE STEPHEN

M. A

of (Address) KENYATTA UNIVERSITY
P. O. BOX43844 NAIROBI

has been permitted to conduct research in

Location,

NAIROBI District,

NAIROBI Province,

on the topic THE DETERMINANTS OF ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY BY SMALL AND MEDIUM ENTERPRISES WITHIN THE HEALTH SECTOR IN KENYA

for a period ending 30TH OCTOBER, 2008

PAGE 3

Research Permit No. MOHEST13/001/38C 601

Date of issue 29.09.08

Fee received KSH. 1000

M. GATORU

Applicant's Signature

FOR Permanent Secretary
Ministry of
Science and Technology