

**FACTORS THAT INFLUENCE ICT ADOPTION BY  
SMALL AND MEDIUM ENTERPRISES:  
A CASE STUDY OF SMEs IN THIKA MUNICIPALITY**

**BY**

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*Factors that  
influence ICT*



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## DECLARATION

I declare that this Research Project Report is my original work and has not been presented in any other Institution of learning for the award of a degree.

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## **DEDICATION**

I dedicate this Research project Report to my family, my husband Prof. Douglas Shitanda, my children Staice, Zayali and Zanelle. Thanks for your Support, encouragement, prayers and the sacrifices you have had to make to enable me finish my Masters and project successfully. To my parents, thank you for laying a good foundation in my life.

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## **ABBREVIATIONS AND ACRONYMS**

<b>SMEs</b>	- Small and Medium Enterprises
<b>ICT</b>	- Information and Communication Technology
<b>KIPPRA</b>	- Kenya Institute for Public Policy Research and Analysis
<b>GDP</b>	- Gross Domestic Product
<b>ILO</b>	- International Labour Organization
<b>GOK</b>	- Government of Kenya
<b>ZEF</b>	- Zentrum fur Entwicklungschung (Center for Development Research)
<b>IFPRI</b>	- International Food Policy Research Institute
<b>ADPIP</b>	- Asia Pacific Development Information Programme
<b>ITC</b>	- Intermediate Technology Consultants
<b>UNCTAD</b>	- United Nations Conference on Trade and Development
<b>ESCAP</b>	- Economic and Social Commission for Asia and the Pacific
<b>ITU</b>	- International Telecommunication Union
<b>UNU- MERIT</b>	- United Nations University-Maastricht Economic and social Research and training Centre on Innovation and Technology

## ABSTRACT

*The SME sector is important in the social economic development of Kenya and is perceived as an engine for growth. However, SMEs seem ill equipped to confront the challenges of globalization, whose hallmark is ICT and information a major determinant of competitiveness. Whereas large enterprises have embraced ICT to gain a competitive edge, evidence relating to ICT adoption and use by SMEs has suggested a slow response and limited progression. The research was therefore carried out to find out the level of ICT adoption and factors influencing the adoption and use by SMEs in order to enhance adoption.*

*A cross-sectional survey of 75 SMEs in Thika Municipality was carried out; Stratified random sampling was used to draw the sample out the total population of 240 SMEs. Structured questionnaires were used as the instrument of data collection and were administered to the owners/managers of the enterprises. Data was collected in two weeks and analyzed using descriptive statistics.*

*The findings of the survey indicated that ICT adoption measured by the adoption index was higher than expected with an average index of 68 %. The mobile phone was the most common ICT and most frequently used, followed by the computers, fixed phones and lastly the fax. Most enterprises used ICT for basic applications i.e. communication and office automation. Usage of more advanced ICT tools and applications was very low and only 28% of the enterprises had a web page. Such kind of ICT applications may not be sufficient to address the challenges faced by the sector. ICT adoption was to a great extent influenced by internal factors to the enterprises as compared to external factors. These factors are ICT knowledge and skills of the manager/owner and employees, Identified need for ICT/ perceived usefulness of ICT in the enterprise, Availability of funds, Type of market and customers, Type of business operations.*

*Efforts to enhance adoption should be focused on the internal factors and could include Stepping up ICT awareness and training among SMEs owners, employees and stakeholders, Formulating policies that support ICT adoption by the sector, Subsidizing the cost of ICT purchase and maintenance, ICT providers coming up with customized ICT products and applications for SMEs.*

# CHAPTER 1

## 1.0 INTRODUCTION

### 1.1 Definitions and Concepts

Enterprises are primarily classified by the number of employees engaged in the firm. On that basis, Small and Medium Enterprises (SMEs) can be defined as non-primary enterprises which employ 5-99 full-time employees. (KIPPPRA Report, 2002) Small-scale enterprises employ 5-49 employees while medium-scale enterprises employ 50-99 employees. SMEs are very heterogeneous in nature, cutting across all sectors of the economy. Majority are characterized by small activity, limited capital and equipment, limited access to information, limited markets and access to big markets and employ labour –intensive technologies.

Information Communication Technology refers to the range of technologies for gathering, storing, retrieving, processing, analyzing and transmitting information. This include advances in ICT that have reduced the cost of managing information, enabling organizations to undertake information-related tasks more efficiently, and to introduce innovations in products, processes and organizational structures. In our context, ICT comprise of telephone facilities, fax machines and computers.

### 1.2 Background Information

SMEs cut across all sectors of the economy playing a significant role in the socio-economic development of the country. They provide one of the most prolific sources of employment creation, income generation and poverty reduction. In addition to the provision of goods and services, the sector also acts as a driver in the promotion of competition, innovation and enhancement of enterprise culture, a prelinquisite for development and industrialization. As such the Government has widely acknowledged the role of the sector in development and has actively formulated policies to stimulate its development. The government has also hinged its economic recovery strategy on the SME sector. However the sector continues to face many binding constraints that make it hard for it to achieve its full potential. These constraints include; limited access to information and markets, inadequate access to skills and technology, limited access to finances among others. (GOK, Sessional Paper No.2 of 2005)

In addition, recent trade liberalization and globalization policies have opened new opportunities for the sector as well as creating new competitive pressures that it needs to deal with. Despite government intervention by putting in place measures geared towards the promotion and development of the sector, the measures have not yielded the expected impact. The productive sections of the sector have stagnated despite the incentive-based approaches entrenched in the liberal policies. (KIPPRA Report, 2002) Problems that inhibit the growth of the sector persist three decades after being recognized. The sector is threatened by stiff competition from the large enterprises, and quality goods from other markets due to globalization. Poor access to information on markets, production technology, customer trends, and new products continue to inhibit the sector's growth. Access to markets to sell their goods remains a major challenge especially because production is done mostly without market research. Limited production technology has resulted in low quality goods. This therefore calls for further intervention to ensure the growth and survival of the sector.

On the other hand, ICT provides many developmental opportunities for the growth and survival of the sector; however adoption remains low mostly limited to telephony. Great potential exists in e-commerce that the sector can harness to expand its markets. (Mansell & Wehn, 1998) The sector can also exploit computer based information systems and knowledge based systems to improve production and management of their enterprises. ICT can greatly improve communication channels for such enterprises especially with their customers, suppliers, and other stakeholders. ICT holds a lot of potential that can also be harnessed to address the challenges facing the sector that have persisted for long.

### **1.3 Statement of Research Problem.**

SMEs are perceived as the engine of growth in Kenya but face a difficult task of competing and surviving in the global market. As one of the driving forces of globalization, ICT may deliver unique opportunities by empowering SMEs to participate in the knowledge economy by means of facilitating access to information, connectivity and access to new markets. (IFPRI, 2006). The importance of ICT to the economic development has long been recognized and yet SMEs seem to be slow in its adoption and use as compared to other sectors. Whereas there has been growth in the Use of ICT by large enterprises to gain a competitive edge, there is little evidence of its adoption and use by SMEs which continue to

be hampered by limited access to information and markets which is critical for their development and survival. Few studies that have been done indicate a low ICT adoption and use by SMEs limited to telephony, while the use of computers and especially e-commerce remains low. (World Bank Report, 2001) ICTs are rarely used by small enterprises as business tools, yet they hold a lot of potential in improving access to information and markets. (Mansell & Wehn, 1998)

Ironically, SMEs are believed to be better positioned to respond to and adopt change and technology because of their perceived flexibility. (Ritchie, 2005) It is therefore surprising that evidence (Smallbone et al, 2001; Dawn et al, 2002; Houghton and Winklhofer, 2004) relating to ICT adoption by SMEs has suggested a slow response and limited progression. The expectation that SMEs might emulate large organizations in progressing through the stages of ICT adoption has proved not to be the case. (Preece, 2000)

Although several studies have been carried out on the significant role of SMEs in the Social-economic development, challenges facing the sector and possible intervention, and on ICT as a driver for economic development, little has been done on the factors influencing adoption and use of ICT by Kenyan SMEs. This study will therefore seek to investigate the factors influencing ICT adoption and use by SMEs in Kenya thereby filling in the knowledge gap. Knowledge of the factors influencing the adoption and use of ICT will provide information necessary to enhance adoption through policy intervention, awareness creation and other measures. The benefits of ICT to individual SMEs will translate into positive results in our country's economic development.

## **1.4 Objectives**

The overall objective of the study was to determine the degree of ICT adoption and to investigate the factors influencing its adoption by SMEs.

**The Specific Objectives were:**

- i. To determine the extent of awareness of the existence of ICT and its uses among SMEs
- ii. To determine the levels of ICT adoption and use by the SME sector.

- iii. To establish the types of ICTs in use by SMEs and the kind of applications for which they are used for.
- iv. To determine the factors that influence the adoption and use of ICT by Kenyan SMEs
- v. To determine factors that would enhance the harnessing of ICT potential to help SMEs realize their potential based on the findings of IV above.

## **1.5 Research Questions**

The Study was guided by the following Research Questions

- i. What is the potential of ICT in addressing the challenges facing the sector in Kenya?
- ii. What is the extent of awareness by SMEs of the various ICTs available for adoption and their potential in increasing competitiveness?
- iii. What is the degree of ICT adoption by various SMEs
- iv. What factors influence ICT adoption and use by SMEs?
- v. How can ICT adoption be enhanced in the SME sector?

## **1.6 Significance of the Study**

The study attempted to provide a valid body of knowledge on the following areas;

- ◆ The potential of ICT for the growth, performance and survival of SMEs. This will be valuable to the SME sector and other stakeholders. Recognizing the potential of ICT by the SME will encourage its adoption and use by SMEs to increase their competitiveness.
- ◆ Factors that determine the adoption and use of ICT by Kenyan SMEs and ways of enhancing ICT adoption by SMEs. This is important in policy formulation and government intervention. Awareness of these factors is the critical first step for policy makers who may be interested in promoting access to, and use of ICT by the SME sector.
- ◆ This knowledge is also important to donor agencies as it will help them channel their support to strategic areas that can impact on ICT adoption and consequently the growth of the sector.
- ◆ Policy recommendations to enhance ICT adoption and use. This is important for policy makers in the formulation of policies aimed at encouraging ICT use and in intervention policies that seek to address the constraints in ICT adoption and use. This knowledge is also important for the government to use in planning e.g. budgetary allocation, resource distribution, Infrastructure etc.

- ◆ The study was to hopefully provide some knowledge for potential researchers as well as spur up research interest in other areas that are not sufficiently covered in the study. Such potential areas of research may include the Impact of ICT use to the performance of SMEs in Kenya etc.

### **1.7 Justification of the study**

The SME sector makes up a large part of the Kenyan economy and has been identified by the government as one of the vehicles of economic development. The sector is a key contributor to job creation, diversification of economic activities, GDP contribution, stimulation of innovations and invention. Globalization whose hallmark is ICT has brought about opportunities as well as challenges for the sector. Since SMEs operate in a globalised economy, adoption of ICT is a must if they are to remain competitive and survive stiff competition. The trend in the world economies is bent towards the adoption and use of ICT for increased competitiveness and yet SMEs have lagged behind in ICT adoption. Research in the potential of ICT for the sector and factors influencing its adoption is therefore of paramount importance. The research was to provide a basis for enhancing ICT adoption by the Sector as a way of improving and empowering it to enable it realize its full potential and remain an effective vehicle for economic development.

### **1.8 Scope and Limitation of the Study**

Even though the study addressed SMEs in Kenya, a representative sample of SMEs was used due to limited time, funds and logistic constraints. The study covered selected SMEs in Thika municipality. The municipality is strategic and it provided a good representative sample for the study which could be used to generalize the findings.

# CHAPTER 2

## 2.0 LITERATURE REVIEW

### 2.1 Introduction

There is no universal definition of what constitutes Small and medium enterprises (SMEs). The scale of the enterprise according to established researchers and analysts can be measured in terms of total work force, turnover, investment and number of business units. (Kelly & Kariuki, 2006) This study categorized enterprises based on the size of the workforce.

### 2.2 Small and Medium Enterprises in Kenya

In Kenya, enterprises are classified by the number of employees engaged in the enterprise. Accordingly, Small and medium enterprises are defined as non – primary enterprises (excluding Agricultural production, animal husbandry, fishing, hunting, gathering and forestry) that employ 5- 99 fulltime employees. (KIPPRA, 2002; National Baseline survey, 1999; Sessional paper No. 1 of 1986) Small scale enterprises employ 5-49 employees while medium enterprises employ 50-99 fulltime employees.

#### 2.2.1 The Role and Importance of SMEs

Small and medium businesses play an important role in Kenya because majority of people conduct much of their personal economic activities with them. The sector plays a major role in the socio-economic development of the nation as it cuts across all sectors of the economy, providing one of the most prolific sources of employment, income generation and poverty reduction.

According to a World Bank report, SMEs provide the largest opportunity for employment and government revenue. The national baseline survey of 2003 shows that the sector employs more than 4.6 million people and accounts for 18.4 % of the country's GDP. The sector comprises of 98% of all businesses in the country and contributes 30% of the total employment. It provides 40% of all urban and wage employment in the country, today 75% of all new jobs are created in this sector. The total capital employed in the sector is 28 billion. The sector thus plays a very significant role in the economic development of Kenya. In addition to the provision of goods and services, the sector promotes competition, innovation

and enhances the enterprise culture that is necessary for development. (KIPPRA Report, 2002) The SMEs promote a strong work ethics and stimulate the emergence of a strong and stable middle class. (GOK, Economic Survey, 2002).

SMEs also contribute to economic development by developing a pool of skilled and semi-skilled workers who become a basis for future industrial expansion, provide a vehicle for introducing a more equitable income distribution, and improve forward and backward linkages between economically, socially and geographically diverse sectors of the economy. SMEs provide opportunities for developing and adopting appropriate technological and managerial competencies. Socially, SMEs are a vehicle for social mobility as they enable people to move from one social class to another. SMEs also provide a productive outlet for expressing the entrepreneurial spirit of the individual. (Oluoch, 2002)

Since SMEs dominate the business sector in Kenya, they are an important factor in the context of poverty reduction. The important role of SMEs as a source of income and employment for poor households in Kenya has been widely acknowledged since the early 1970's following the publication of the influential International Labour Organization (ILO) report of 1972. The growing global concern about persistent stagnation and even decline in economic growth accompanied by chronic unemployment, poverty and its resultant social problems has led to increased search for strategies which could stimulate economic activity in many economies. Small business development has been at the center of these efforts based on the notion that small businesses form the context within which entrepreneurial activity takes place. SMEs have been found to have a higher potential for job generation because of a lower cost per job created. (Oluoch, 2002)

### **2.2.2 Challenges Facing SMEs**

Yet despite the critical role played by the sector in the country's economy, it continues to be faced by many binding challenges that have prevented it from realizing its full potential. They include: Unfavorable policy environment and inhibitive legal and regulatory framework, limited access to information, limited access to markets, inadequate access to skills and technology, insecurity of land tenure, poor access to infrastructure and inadequate

know-how and linkages with large enterprises and gender inequalities. (GOK, Sessional Paper No.2 of 2005)

In spite of our country having an impressive number of SMEs which contribute enormously to the country's GDP and employment creation, they are ill equipped to confront the challenges of globalization to be able to survive. Globalization is producing a knowledge economy with intensified competition, advances in ICT and pressured government structures. (Schienstock, 2002) It is argued that globalization opens a window of opportunities for SMEs while networking capabilities of ICT suggest SMEs can augment their competitiveness in global markets. Yet globalization also opens up markets exposing SMEs to intense competition from bigger firms. (Kaushalesh & Peedoly, 2006)

SMEs are challenged by globalization of production and the shift in the importance of the various determinants of competitiveness. With liberalization of trade and commerce and the accompanying dismantling of trade preferences, SMEs are increasingly subject to severe competition from low-cost producing countries. On the other hand though, it is clear that the global economy continues to move towards increased integration as a result of advances in ICT and reduction in trade barriers. Some of the greatest opportunities for SMEs will be derived from their ability to participate in the regional and international markets. SMEs flexibility and adaptability are key determinants to take advantage of the potential of globalization.

Through the rapid spread of ICT and ever decreasing prices for communication, markets in different parts of the world are becoming more integrated. (ZEF, 2005) Growth in ICT has led to the creation of a new economy, an information economy in which Information is the critical resource and basis for competition. (Torero, 2002) Information plays a key role in helping SMEs to create, develop and grow in their businesses. To identify business opportunities and make appropriate and timely decisions, they need ready access to comprehensive relevant and up to date information. This is very important as SMEs operate in severe time and capacity constraints.

However, studies have shown that access to information is a major constraint to SME growth in many developing countries. (ITG, 2002) Market signals on business opportunities, customer trends, and methods of organization are not communicating themselves effectively to SMEs, who perform better in information rich environments (Daly, 98). Evidence also exists to suggest that SMEs are willing to pay significant sums for relevant information where available. (Masbayi, 98) Acquiring information is costly especially in developing countries. Difficulties associated with information acquisition have numerous implications; the high costs of acquiring information may lead to behavior that differs markedly from what it would have been if more information were available. Lack of information may reduce the extent of mutually beneficial exchanges and lead to economy-wide Pareto inefficiencies. These may also result in uncertainty concerning economic decisions in the enterprises which has implications for efficiency and productivity. Information asymmetries are one of the major causes of high transaction costs, uncertainty and therefore market failure. A reduction in information asymmetries creates new opportunities and enhances the efficiency of resource allocation. (ZEF, 2005)

Whereas advances in communications technology have made internet, fax and telephone facilities available in a growing number of towns in developing countries, these modern technologies are rarely used by small enterprises as business tools, yet they hold a lot of potential in improving access to information. (Mansell & Wehn, 98). It is thus acknowledged that Small enterprises have little or no access to many information sources. The major factors facing SMEs in relation to information are acquisition, capacity to interpret and effectively use the acquired information, and disseminate the same. Without access to timely, simplified, reliable and relevant information on market opportunities, production technology, the sector is unable to survive and grow in the fast changing, increasingly globalised and highly competitive market environment. (GOK, Sessional paper No.2 of 2005)

Access to markets and marketing information is also severe constraint to SMEs development and growth in Kenya. Prescribed policies for addressing this problem do not seem to have achieved much success because access to markets and marketing information on competitors continue plaque the sector. (National Baseline Survey, 1999) Overall aggregate demand is

low; markets are saturated due to dumping and overproduction, and in many cases markets do not function well due to lack of information and high transaction costs. Most of the SMEs are ill-prepared to compete in the globalised and liberalized markets. Very few of them are capable of venturing into the export markets and even fewer are able to tap the new market frontiers through electronic commerce. As a result, most of them are confined to very narrow local markets where intense competition drives prices down, resulting in very low profits. Small capital base and limited technology confine the enterprises to products and services which cannot compete effectively in a globalised and competitive market environment due to quality limitations.

### 2.2.2 Challenges facing ICT

Kenyan SMEs are also characterized by restricted levels of technology, inappropriate technology, and inadequate institutional capacity to support adaptation and absorption of modern technological skills. In addition they lack information on existing technologies and their potential for increased trade. (KIPPRA, 2002). Linkages between SMEs and large enterprises in Kenya are either weak or lacking. This leads to inadequate technological transfer and development, poor information flow, weak subcontracting arrangements and inadequate marketing opportunities. This is a hindrance to the goal of developing and mainstreaming SMEs into the national economic framework. (GOK, Sessional paper No.2 of 2005)

I believe the adoption and use of ICT as (a production technology, information processing technology or as information communication technology) can help the SME sector to cope with the new challenges and be able to compete effectively in the globalised information economy.

## 2.3 Information and Communication Technology (ICT)

Information and Communication Technology refers to the range of technologies for gathering, storing, retrieving, processing, analyzing and transmitting information. ICT may assist economies in accessing information and knowledge to accelerate growth and reduce transactions costs. It is also necessary for networking and empowerment. ICTs can serve as information channels because they are capable of supporting the decoupling of information from its physical repository, which can be argued to be the truly revolutionary aspect of the

technologies. (Evans and Wurster 1997, Pohjola 1998) This allows the immediate transmission of large volumes of information and permits communication. It also allows users access to a body of information and ideas. Application of ICT can be a catalyst for economic competitiveness; economic and social development by improving access to information, increasing trade in commodities and services, reducing costs and achieving efficiency gains. (Kenya ICT Strategy Paper, 2006) ICT can significantly impact the market-oriented dimensions of products and services as well as manufacturing processes, working practices and management practices. (Ritchie, 2005) ICT is viewed as a key driver of productivity, growth and economic progress and is an essential component in the pursuit of a high value, knowledge based economy. ICT can improve efficiency and increase productivity through; improving efficiency in resource allocation, reducing transaction costs and technical improvement, leading to the outward shift of the production function. (ZEF, 2005) In a developing country like Kenya where transaction costs are very high as a result of logistics, ICT can contribute to the working of markets as well as in the reduction of transaction and coordination costs within and across organizations.

ICT can transform traditional transactions and create new market places in three ways by;

- ◆ Altering the process by which transactions take place,
- ◆ Creating new products and services,
- ◆ Creating new markets in time, space and information that did not previously exist.

The power of ICT allows business networking within and between enterprises and geographical regions to grow. This provides a platform for the exchange of experiences, options and opportunities for mutual cooperation and technology transfer. (Kenya ICT Strategy Paper, 2006) Marketing networking also helps organizations to disseminate access and incorporate best practices.

The availability of ICT in the business sector has several economic and social implications. Investment in ICT contributes to economic growth by making firms more productive (OECD, 2001). ICT makes firms more competitive, network ready and able to exploit new trading opportunities such as E-commerce. Availability of ICT in business also has a social

dimension with many workers developing ICT skills and access to the internet through their workplaces. (Minges, 2003)

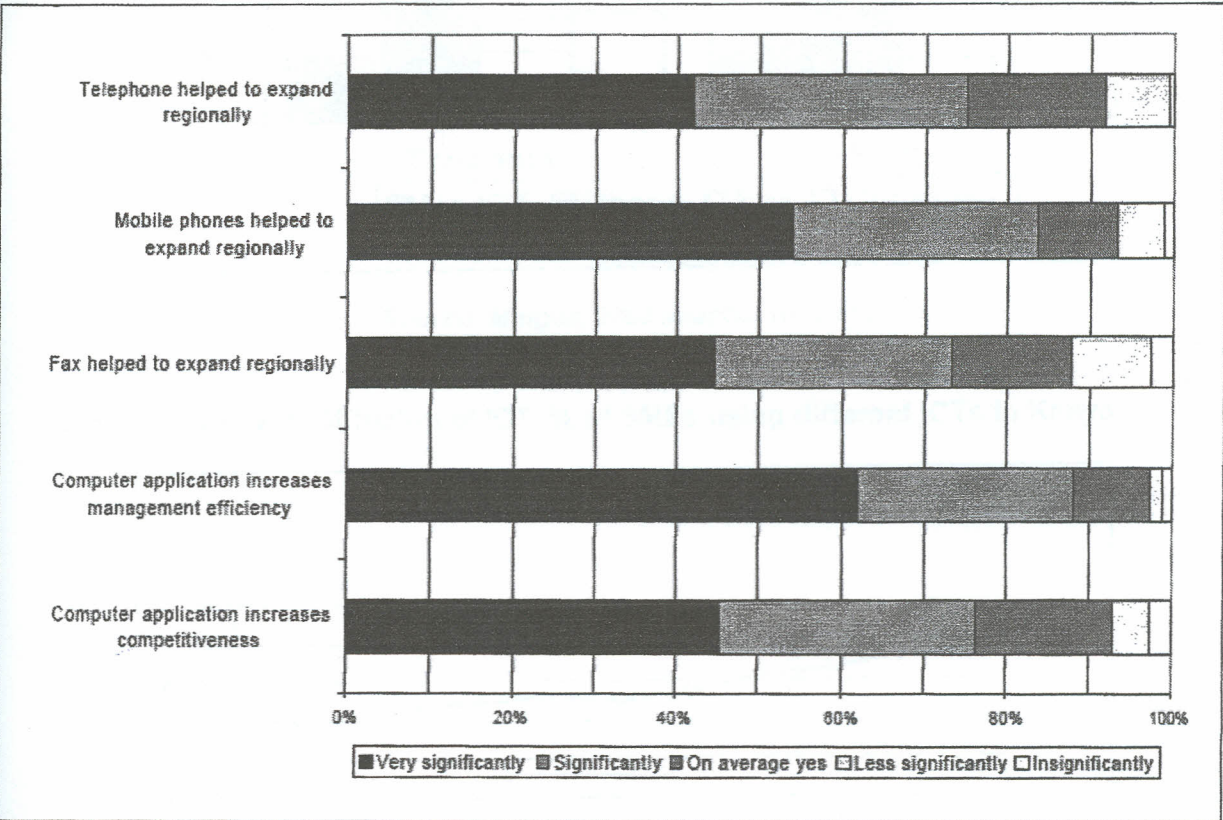
## **2.4 ICT and SME Competitiveness**

SMEs are perceived as an engine of growth in developing countries, but face a formidable task; surviving and competing in a global market. As one of the driving forces of globalization, ICT may deliver unprecedented opportunities (IFPRI, 2006). Promotion of access to and use of ICT by SMEs is very essential. The immense impact of SMEs on the economy makes it critical for the SMEs to be prepared for and to take full advantage of any benefits offered by ICTs (APDIP e-note, 2005). Since the SME sector plays a major role in our nation' economy, the benefits of ICT to individual SMEs will translate into positive results in form of job creation, revenue generation and the overall country's competitiveness. Contributions of SMEs to the national economy can further be enhanced and strengthened through the use of ICT that is increasingly transforming modern businesses by enabling the rapid, reliable and efficient exchange of large amounts of information. Flexibility is considered to be a major source of competitiveness for SMEs compared to large enterprises. The use of ICT could on one hand increase the competitiveness of SMEs as they facilitate the creation of more flexible links with trading partners because of faster and more reliable communication channels. On the other hand, ICT could help bigger enterprises to increase their flexibility through restructuring which will enable them to adapt quicker to changing conditions thereby decreasing the competitive advantage of SMEs. (Brynjolsson and Hitt, 2000)

Potential benefits of ICT to SMEs include enhancing efficiency, reducing costs and broadening the market both locally and globally. (APDIP e-note, 2007) It has the potential to increasingly empower SMEs to participate in the knowledge economy by facilitating connectivity; helping to create and deliver products and services on a global scale and providing access to new markets and new sources of competitive advantage to boost income growth. (Carol Chyau, 2005) From a Survey conducted in Kenya and Tanzania (Matambalya and Wolf, 2003) as in Figure 2.1, Enterprises that use different forms of ICT rate their effects

mostly positive. On top are computer applications that are assumed by 88% and 76% of users to considerably increase management efficiency and competitiveness respectively. Mobile phones are considered to contribute significantly to regional market expansion by most enterprises followed by fixed phones and faxes.

**Figure 2.1: Perceived Effects of ICT to SMEs in East Africa**

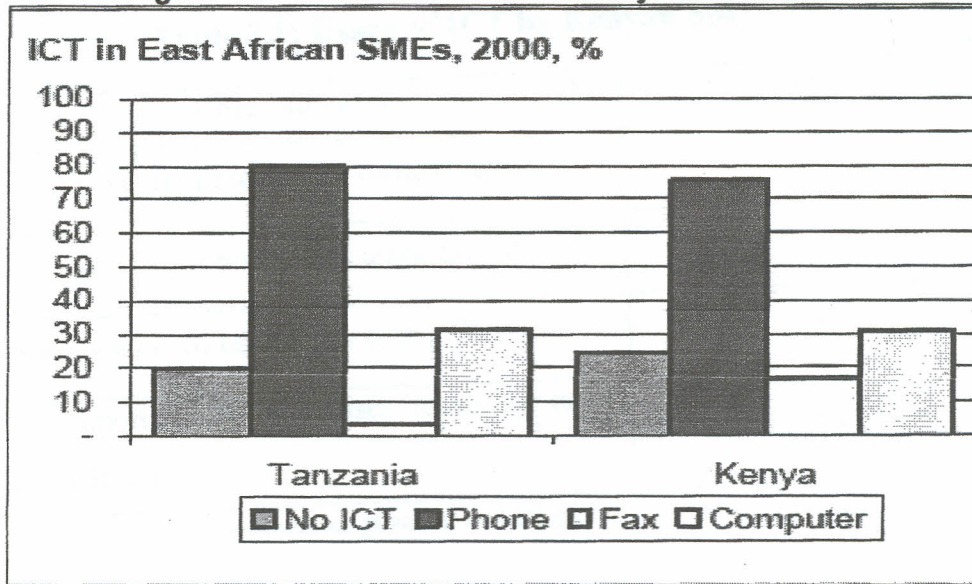


Source: East Africa SME survey, 2003

**2.5 Adoption and Use of ICT by SMEs**

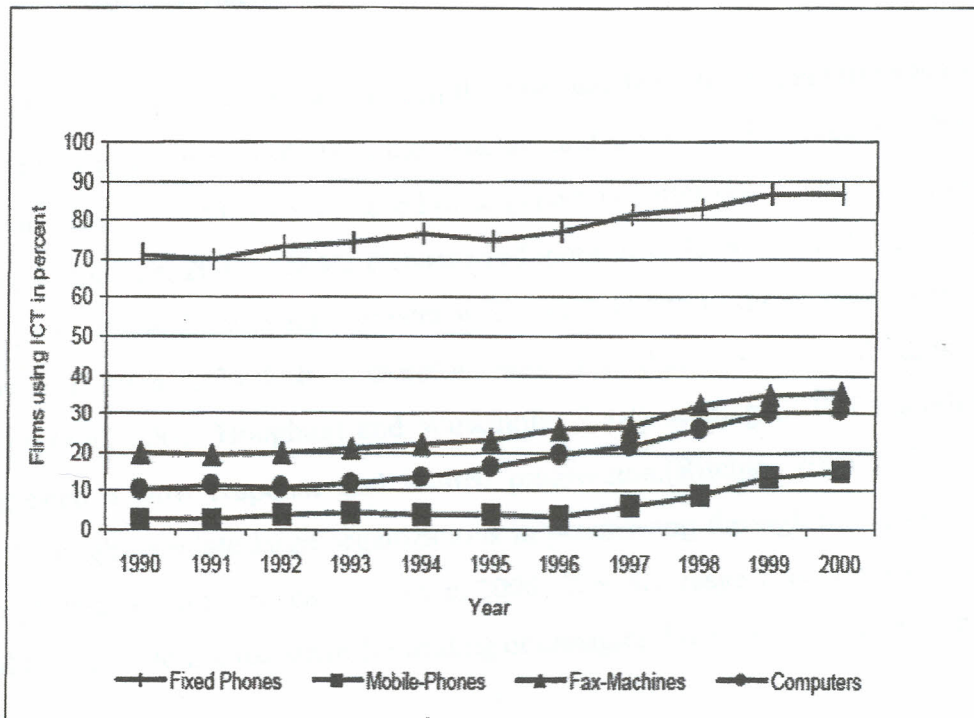
A sample of 300 SMEs in East Africa show that the use of ICT by SMEs in Kenya as well as in Tanzania is increasing over time. The usage of fixed phones nearly reaches saturation in Kenya. (ZEF, 2005) The percentage of firms that use mobile phones is increasing fast. However the usage of ICT is fairly low as shown in figures 2.2 and 2.3 below.

**Figure 2.2: Penetration of ICT in Kenya and Tanzania**



Source: Minges, 2003 adapted from ITU

**Figure 2.3: Diffusion of ICT, % of SMEs using different ICTs in Kenya**



Source: Chowdury and Wolf, 2003

**Table 2.1: Usage of ICT by Kenyan SMEs 2005**

<b>Core indicator</b>	<b>Percentage</b>
B-1 Proportion of businesses using computers	17%
B-3 Proportion of businesses using the Internet	6.7%
B-5 Proportion of businesses with a Web site	4.6%
B-7 Proportion of businesses receiving orders over the Internet	9.3%
B-8 Proportion of businesses placing orders over the Internet	7.4%
B-12 Proportion of employees with e-mail	35.6%

**Source: Kashorda, On ICT facilitated Trade and growth in Kenya (2005)**

Use of ICT by SMEs may vary as will their preparedness to respond to technological change. According to Ramsey et al 2004, the structure and size of SMEs make the obstacles they face unique. However SMEs are believed to be generally better positioned to respond and adopt to change. (Olouch, 2002) They are considered more flexible in terms of their structure, systems and processes and engender a greater willingness to rise to the challenges of innovation and change. (Ritchie, 2005). It is therefore surprising that evidence (Smallbone et al, 2001; Dawn et al, 2002; Houghton and Winklhofer 2004) relating to ICT adoption by SME has suggested a slow response and limited progression. (Ritchie, 2005). The expectation that SMEs might emulate large organizations in progressing through the stages of ICT adoption has proved not to be the case. (Preece, 2000) Website usage was primarily marketing related and the firms do not use them for trading or changing business processes as the larger firms.

## **2.6 Theories of ICT Adoption**

Different SME researchers have arrived at different results and factors considered to influence ICT adoption. As such several theories that influence ICT adoption by SMEs have

been put forward. According to Gibbs, 2006 the following factors summarized in the table below impact on ICT adoption.

**Table 2.2: Factors that Influence ICT Adoption by SMEs**

Key Attribute	Measures
Organizational/ Enterprise	Size, type, nature of business, IT expertise & knowledge, access to capital (financial)
Manager/ owner	Top Management knowledge, Support & Attitude
Adoption	Relative advantages, Compatibility, Trialability, Observability, Complexity
Competitive environment	Business environment, suppliers, competitors, customers
Governmental	National policies on taxes, labour, trade, regulation, prices

*Source: Adapted from Gibbs (2006, p. 7)*

Rogers, 1995 suggests that the adoption of innovations is positively correlated with business size, the owners' characteristics, and the competitive environment. Individual characteristics of the owner such as education, age, experience, and psychological traits have been found to strongly influence innovation adoption and to play an essential part in ICT adoption by SMEs.

Recent studies have also found that most SMEs lack technical expertise and adequate capital to undertake technical enhancements, suffer from inadequate organizational planning and differ from their larger counterparts in the extent of the product/service range available to customers (Migiro and Ocholla, 2005) Differences in management style between large businesses and SMEs have also been noted. Studies have shown that, among other characteristics, SMEs tend to have a small management team (often one or two individuals), are strongly influenced by the owner and the owner's personal idiosyncrasies, have little control over their environment (Mpopfu, 2007), and have a strong desire to remain

independent. These characteristics of SMEs strongly impact on their readiness and willingness to adopt technologies including ICTs.

While it is widely acknowledged that ICTs are beneficial to any Organization and more so to SMEs ,there seems to be a perception among many owners of SMEs that there is a lack of business benefit from the adoption of some ICTs. (Migiro and Ocholla, 2005)

### **Determinants of Technology Adoption:**

Most literature on technology adoption generally focuses on three sets of determinants: adopters' characteristics, features of the competitive environment, and attributes of the technology. Among adopters' characteristics, firm size, Research & Development expenditures, age, and capabilities are usually considered among the main determinants. The competitive environment can be described by the degree of firm concentration, competitors' strategies, the level of prices, and the existence of informational spillovers among potential users. Attributes of the innovation are usually related to technical features (i.e. compatibility with existing solutions) and may vary depending on the perception of potential adopters.

### **Barriers to ICT Adoption**

According to Andam, 2003 & Alampay, 2007, several barriers hinder adoption and use by SMEs:

- ◆ SMEs may not see the relevance or suitability of ICTs to their businesses. SMEs may find it more difficult as compared to larger firms to find an e-business case applicable to them because of lack of time, information and knowledge.
- ◆ SMEs often lack the human and financial resources needed for ICTs and e-commerce especially because in most cases they have to focus on day to day operations and lack the time and extra resources necessary to understand the benefits of new technologies.
- ◆ SMEs are generally concerned about the costs of establishment and maintaining e-commerce systems since they are faced with budget constraints and are not sure of expected returns to their investments in e-commerce.
- ◆ Availability of reliable internet connections and other communication services especially broadband at competitive prices affect ICT adoption by SMEs.

- ◆ Other barriers to ICT adoption by SMEs include; payment uncertainties and contract, delivery and guarantee uncertainties. Privacy and legal protection for internet purchases are also significant concerns, for businesses and customers alike.

**Table 2.3: Main Obstacles to ICT Adoption**

	<b>Informal</b>	<b>Semi-informal</b>	<b>Formal</b>	<b>Average</b>
Network Problems/ Unreliable Infrastructure	11.3	11.7	10.5	11.2
Lack of Financial Resources	10.6	4.5	7.3	8.0
Lack of awareness & Knowledge of ICTs	10.3	8.4	10.5	9.7
High Cost, Too Expensive	55.6	60.8	58.8	57.9
Lack of Skills & ICT illiteracy	2.8	7.4	6.9	5.1
No Need	9.5	7.2	6.1	8.0

*Source: Research ICT Africa in Alampay 2007*

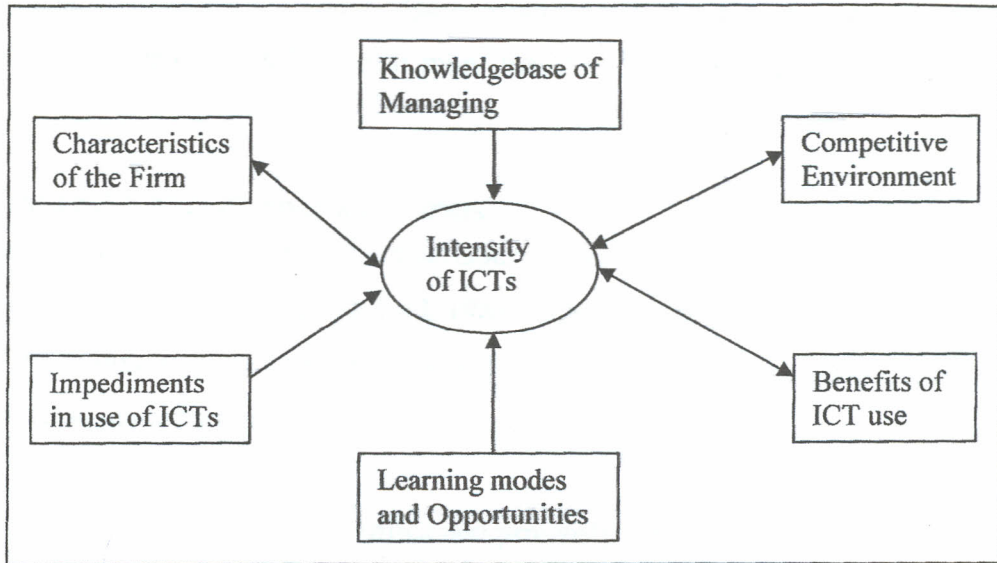
Awareness of the barriers is the critical first step for policymakers who may be interested in promoting access to and use of ICT by the SME sector.

## **2.7 Theoretical Framework**

This study will adapt a theoretical Framework by Lal and Peedoly (2006), to help explain ICT adoption and use by SMEs. This will provide a guide in data collection by providing a structure for the instrument of data collection.

According to the theoretical Framework by Lal& Peedoly (2006), adoption of new technologies could be influenced by several independent factors that are mutually reinforcing. These factors could be entrepreneurial abilities of owner, potential benefits of the new technology, learning opportunities for effective use, competitive environment, and affordability of new technologies. This is presented in Fig 2.4 below

**Figure 2.4: Theoretical Framework**



*Source: Lal & Peedoly, 2006*

The direction of arrows in Fig.2.4 shows the causality between the intensity of ICT adoption and a particular factor. For instance bi-directional arrow between degree of ICT use and competitive environment suggests that they mutually reinforce each other. Each factors depicted in Fig.4 encompasses several variables.

### **2.7.1 Knowledge base and Characteristics of Managers/ owners**

Decision-making in majority of SMEs is centered on the owner/manager. As a consequence, the personal characteristics and knowledge base of the owner/manager has a significant impact on technology adoption of the enterprise. Managing directors' (MDs)/ owner's academic qualification has been known to influence ICT adoption by a given enterprise. The higher the academic qualification the more likely the firm is to adopt and use ICT. Managers/owners who have ICT knowledge and skills are also more likely to adopt and use ICTs as compared to their counter-parts who lack ICT knowledge and skills.

The perception of the owner/manager of technology in this case ICT is also significant in determining adoption. Where the manager views ICT as not useful, complex and hard to use, the likelihood of adoption is very low as opposed to where the owner perceives ICT as useful, not complex and learnable. Age of the owner/manager also influences ICT adoption,

the younger the manager the more likely to adopt ICT as compared to older managers. Age also influence ICT skills and knowledge as younger people are more likely to have ICT skills compared to older ones and are also more ready to learn new skills as compared to older people.

### **2.7.2 General Characteristics of Firms**

There are factors related to the characteristics of the organization, which affect adoption of ICT. Existing literature (Lal, 2004; Lall, 1983) suggests that size has always played a critical role in the adoption of new technology and it is also hypothesized that older firms might adopt more advanced technologies.

Smaller SMEs operating from one office and primarily serving a local/regional market whose decision-making rests solely on the owner/manager have a less compelling need for ICT and less likely to adopt the technologies. On the other hand, larger SMEs that have several offices, serving many markets including international markets with decision- making resting on several directors have a more compelling need for ICT and are therefore more likely to adopt ICT.

Competence based theories suggest that a firm's ability to acquire, assimilate and exploit new technology (Absorptive capacity) is directly influenced by their portfolio of Human resources (Berranger and Pascale, 2003).The total number of employees, their education level and knowledge of ICT especially computer, greatly influences whether a firm adopts ICT. The business activity of the firm also influences ICT adoption. Firms offering services are more likely to adopt ICT as compared to Manufacturing /production firms.

Other firm factors that affect adoption include current level of technology usage within the organization, level of awareness; uncertainty about the benefits of ICT; firm's financial resources; and, concerns about security, level of ICT use by customers and suppliers, concerns about legal and liability aspects, costs of development and computer and networking technologies.

### 2.7.3 Impediments in ICT Use

SMEs are hindered from adopting ICTs due to impediments that arise as a result of many barriers within and without the firm. There are many significant factors, which may affect the adoption of ICT by SMEs which can be grouped to develop a framework for investigations. The barriers for SMEs in adopting ICT can be broadly categorized into Internal and External Barriers as follows.

#### **Internal Barriers:**

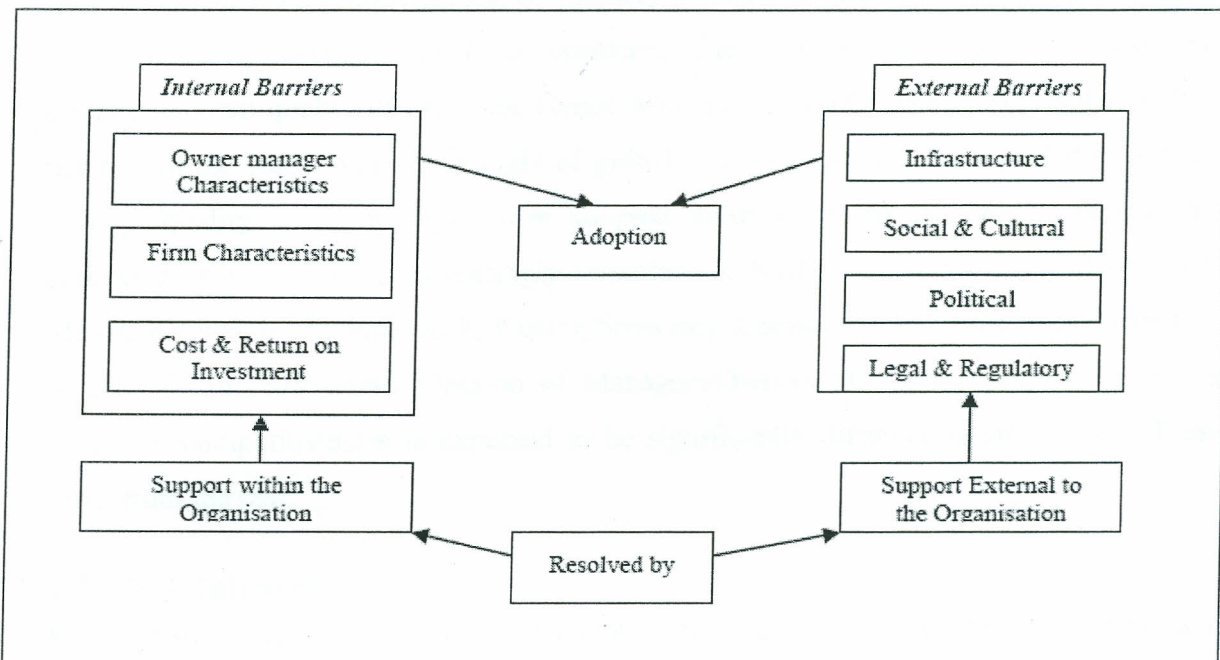
SME adoption of ICT is heavily influenced by factors within the organization. Internal barriers are within SMEs/firms and the firms have control over them and ability to change. Internal Barriers could be categorized into *Individual* owner/manager), *organizational* barriers and *cost and return on investment*. Lack of access to computers, software, other hardware, and telecommunications at a reasonable cost; low ICT use by customers and suppliers; concerns with security and legal issues; low knowledge level of management and employees; and lack of knowledge and awareness about the benefits of ICT, lack of exposure to IT products and services, language barriers and lack of staff with IT capability, were found to be the major organizational factors that inhibit adoption. (Lawson and Mahesha, 2006)

#### **External Barriers:**

These are barriers that can not be resolved by SMEs i.e. they have no control over them and are compelled to work within the constraints, for example inadequate telecommunication infrastructure. To understand the lack of, or slow uptake of ICT and e-commerce technologies, it is appropriate to look into the environment in which they operate. Due to the many constraints inherent to developing countries they are faced with many barriers within and also outside the organization. Organizations adopting ICT and e-commerce in developing countries face a number of challenges that are specific to them and are more pronounced than would be the case in developed countries. Some of these are the lack of telecommunications infrastructure, lack of qualified staff to develop and support e-commerce sites, lack of skills among consumers needed in order to use the Internet, lack of timely and reliable systems for the delivery of physical goods, low bank account and credit card penetration, low income, and low computer and Internet penetration, lack of telecommunications infrastructure

including poor Internet connectivity, lack of fixed telephone lines for end user dial-up access, and the underdeveloped state of Internet Service Providers. Lack of developed legal and regulatory systems also would inhibit the development of e-commerce in developing countries.

**Figure 2.5: Model – Barriers to ICT Adoption**



*Source: Lawson & Mahesha (2006)*

### 2.7.4 Mode of Learning

Literature on the learning processes suggests that there could be several modes of learning such as formal training, learning by doing, learning by searching, and learning from technical collaborators. Learning processes have been found to be a significant factor in knowledge acquisition in earlier studies (Lal and Peedoly, 2006). It is expected that MDs of advanced ICT using firms might attribute more importance to learning by doing mode of knowledge acquisition.

### 2.7.5 Perceived Benefits of ICT Use

Although the list of benefits from the use of ICTs is very long, two variables, namely: productivity gains and efficiency in business transactions are significant. Findings of earlier studies suggest that firms in developing and developed countries adopted ICTs for

productivity gains and efficiency. Kreamer and Dedrick (1994) found evidence of higher productivity of advanced ICT users. Lal (2002) study concludes that the use of advanced ICTs induced efficiency in business transactions. Perception of managers/ Owners about benefits of ICT use might also result in different levels of ICT adoption.

### **2.7.6 Sources of Competitiveness**

Three sources of competitiveness, namely; product quality, market network, and technological Collaboration has been considered. The Era of globalization is characterized by the international quality of products. Hence we expect that Managers/Owners who believed that one of the ways to face onslaught of global competitiveness is through the manufacture of high quality products might have adopted more advanced ICT tools. Technological collaboration is becoming increasingly important in SMEs also. Hence it is expected that Managers/Owners of advanced ICT using firms might have assigned more importance to this source of competitiveness. Opinion of Managers/Owners on market network as a major source of competitiveness is expected to be significantly different in advanced ICT using firms from the rest.

### **2.7.7 ICT Intensity**

ICT intensity refers to the level of ICT adoption and use by SMEs. On this basis firms can be categorized into 3; firms that were not using any kind ICTs, firms that were using ICT in processes other than production and firms that were using ICTs in production (NCMT) as well as non-production processes. It has been shown that all other variables except age of firm and product quality as source of competitiveness differ significantly among three categories of firms. Most important, variables that differ significantly in advanced ICT using firms from the other are cost of communication, augmentation in productivity, and technological collaboration.

## CHAPTER 3

### 3.0 RESEARCH METHODOLOGY

#### 3.1 Research Design

In order to attain the research objectives, across sectional survey of SMEs in Thika Municipality was carried out to collect data on the levels of ICT adoption and use and the factors influencing the adoption and use. Cross sectional survey was chosen because it has been successfully used to collect data on ICT use by SMEs in selected East Africa and East Asia countries (Matambalya and Sussana,2001) and in a case study on ICT adoption by SMEs in Mauritius (Lal and Peedoly,2006) .

#### 3.2 Definition of variables

The aim of the research was to collect data on ICT adoption as well as to investigate the factors that affected SMEs in their adoption. ICT adoption and use was indicated by the different types of ICTs that an enterprise had and the various application of the ICTs in their operations and management. (Pohjola, 2003) Factors influencing the adoption and use of ICT were obtained directly from the responses on that particular question by the enterprise and was also be deduced from the enterprise' information filled in the questionnaires.

Adoption and use of ICT by the SMEs was the dependent variable while factors influencing adoption and use were the independent variables.

#### 3.3 Target Population

The Target population consisted of Enterprises in Thika municipality that employ 5-99 full-time workers. This was derived from our definition of SMEs based on the number of full-time employees engaged in a firm. The sampling frame was drawn from a list of registered SMEs in Thika municipality from the Municipal Council of Thika. Thika municipality has approximately 240 registered SMEs (Municipal council of Thika, Business register, 2007). The SMEs cut across most sectors of the economy including; manufacturing and processing, the service industry, repair and maintenance and retail and wholesale. Thika municipality was selected because it is a cosmopolitan town, central to the surrounding agricultural areas that converge there to do their businesses and it also has most of the manufacturing industries

in the locality. The town's SME population can be said to be a representative of the SMEs in the country. The obvious short coming of the sampling frame is that it was very limited since many small businesses are informal and hence not registered. However the listing from the trading license register had the advantage of providing an up to date list of the addresses, location and contact details as well as sectoral distribution of the registered SMEs facilitating the data collection process.

### **3.4 Sample Size**

Because of limitations in resources, time and logistics, a sample that was fairly representative was selected using Stratified random sampling. The sample comprised 30% (75 enterprises) of the total population of 240. The sample size provided a good representation of the SMEs and had a low margin of error hence could be confidently used to generalize the research findings to the population. (Lohr, S., 1999)

### **3.5 Sampling Technique**

Stratified Random sampling technique was used whereby the population was divided into meaningful strata/sub population that had the same attributes. The strata were based on the size of the enterprises as well as the sub sector. Accordingly, the enterprises were considered to be either Small or medium and were in the manufacturing, processing, retail or service sectors.

Stratified random sampling technique was appropriate for the study because Small and Medium enterprises are heterogeneous and as such there was need for a representative sample of the different categories. This was achieved by categorizing the population in meaningful strata. Random sampling helped to reduce/eliminate sampling bias. This technique had been successfully used in various studies on the sector. (Matambalya & Sussana, 2001; Lal & Peedoly, 2006; Minges, 2003)

**Table 3.1: The Stratified Study Population**

<b>Sub-Sector</b>	<b>Small Enterprises</b>	<b>Medium Enterprises</b>	<b>Total</b>
<b>Manufacturing and processing</b>	10	5	15
<b>Retail and Wholesale</b>	160	3	163
<b>Service Industry</b>	56	6	62
<b>Total</b>	<b>226</b>	<b>14</b>	<b>240</b>

*Source: Municipal Council of Thika, 2007*

**Table 3.2: The Stratified Sample Population**

<b>Sub-Sector</b>	<b>Small Enterprises</b>	<b>Medium Enterprises</b>	<b>Total</b>
<b>Manufacturing and processing</b>	5	2	7
<b>Retail and Wholesale</b>	48	2	50
<b>Service Industry</b>	15	3	18
<b>Total</b>	<b>68</b>	<b>7</b>	<b>75</b>

*Source: Author, 2007*

### **3.6 Data Collection Methods**

Structured questionnaires were used as the tool for data collection. These were administered by the researcher with the assistance of a research assistant to the managers/owners of the enterprises who were the respondents. The questionnaires had both open and closed questions and were to collect data on ICT adoption and use and on the factors influencing adoption and use of ICT. Structured questionnaires were appropriate for the sample because it was fairly large and helped in coping with the limitations in time and resources. Care was taken in the design of the questionnaires to ensure that the questions are able to obtain accurate answers to the research questions and was able to address the research objectives. In some cases, face to face interviews with the owners/managers were necessary to complement the questionnaires, for clarity. Only enterprises that had been in operation for at least one year were covered in the study.

### **3.7 Data Analysis**

The questionnaires were edited to ensure completeness and consistency. Coding of data was done to convert responses into measurements that could be statistically analyzed. Descriptive statistics were used to describe the data collected from the research. These included the mean and standard deviation. Measures of central tendency were used to determine the mean score from a group of scores in the study. The mean was then used to draw conclusions. Measures of variability were also computed to show variance within the population and this will be done using the standard deviation. SPSS computer package as well as Microsoft excel were used aid in analysis. Frequencies and percentages were used to describe and summarize the data. Factors affecting ICT adoption were ranked based on the frequency by which they are perceived to influence ICT adoption and use. The results were meaningfully and systematically presented in tables, graphs and charts.

## CHAPTER 4

### 4.0 DATA ANALYSIS AND PRESENTATION OF RESULTS

#### 4.1 Introduction to Data Analysis

Data used in the study was obtained from a Cross-sectional survey of Small and Medium Enterprises carried out in Thika Municipality in November 2007. The SMEs were categorized into three subsectors namely: Retail and Wholesale, Service Industry and the Manufacturing Industry.

The objectives of the study were; to determine the extent of awareness of ICT and its uses and the levels of ICT adoption by SMEs, to establish the kind of ICT applications used by SMEs, to determine the factors that influence ICT adoption and to determine factors that would enhance ICT adoption by SMEs. ICTs present in an enterprise indicate the level of adoption and is essential as a precursor for analyzing the use of ICTs and factors that influence adoption. Characteristics of the enterprises and manager/owner that were found to influence adoption in other studies were investigated and included in data analysis.

The sampling frame consisted of 240 SMEs, from Trading License register of Thika Municipal council. A sample of 75 SMEs was drawn from the sampling frame using Stratified random sampling procedure. This was shown in table 3.2 in the previous chapter.

The instrument of data collection used in the survey was a structured questionnaire as in appendix 1B, structured into three sections. Section A dealt with the enterprise's profile, section B dealt with the Owner/ manager profile and section C on ICT adoption and use. Sections A and B were necessary because it is assumed from previous studies that the enterprise characteristics and owner/ manager determined ICT adoption and use. The questionnaires were personally delivered to the respondents who were either managers or owners of the Enterprises. Of the 75 questionnaires sent out, 73 of them were returned giving a response rate of 97.3%. This is shown in table 4.1 below;

**Table 4.1: Response Rate on Questionnaires Administered**

<b>Sub-Sector</b>	<b>Sample Size</b>	<b>Questionnaires sent out</b>	<b>Questionnaires received back</b>	<b>% Response</b>
<b>Manufacturing and processing</b>	7	7	6	86
<b>Retail and Wholesale</b>	50	50	49	98
<b>Service Industry</b>	18	18	18	100
<b>Total</b>	<b>75</b>	<b>75</b>	<b>73</b>	<b>97.3</b>

Source: Author, 2008

Data collected was analyzed with descriptive statistics using SPSS and Microsoft excel. The data was first edited to ensure it was accurate and as complete as possible. Coding was done to facilitate effective analysis. Frequencies of various variables were obtained. A measure of central tendency was used to determine the mean score from a group of scores and to derive conclusions. Weighted mean was also used where variables were consolidated to give us a more accurate picture of ICT adoption in relation to variables that influence adoption from previous studies. A measure of dispersion, standard deviation was also used to show variance within the sample variables. The Analyzed data is presented using tables, graphs and charts.

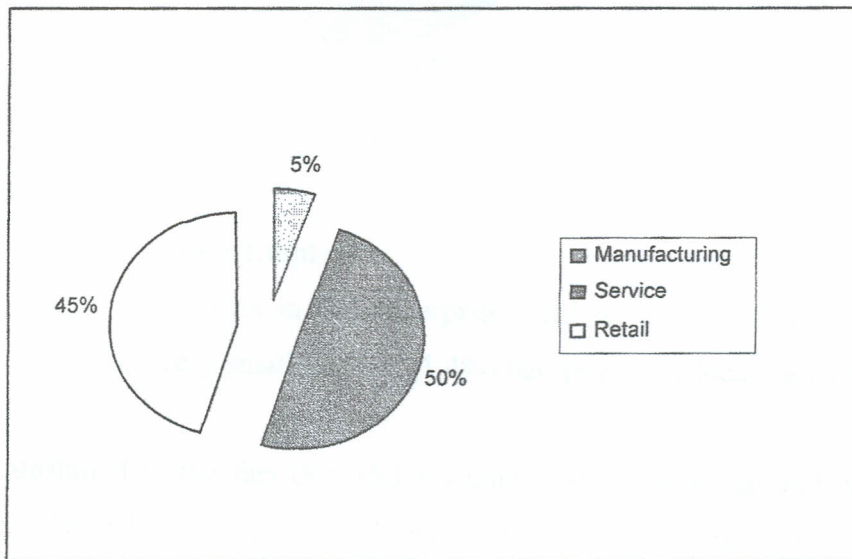
## **4.2 Quantitative Analysis**

### **4.2.1 Section A: Enterprise profile**

Three sub sectors of SMEs were identified and their frequencies converted to percentages. The service industry had majority of the respondent enterprises 49.5%, followed by retail and wholesale with 45.2 % and lastly the manufacturing subsector that had 4.55% of the respondents.

In any given population of SMEs, the Manufacturing subsector is bound to have very few enterprises compared to the Retail and Whole sale and Service subsectors. This can be attributed to the high initial capital required to set up a manufacturing enterprise which is prohibitive to many entrepreneurs. Distribution of enterprises in the different subsectors is shown in the chart below;

**Figure 4.1: SMEs in the Survey as distributed in Subsectors**

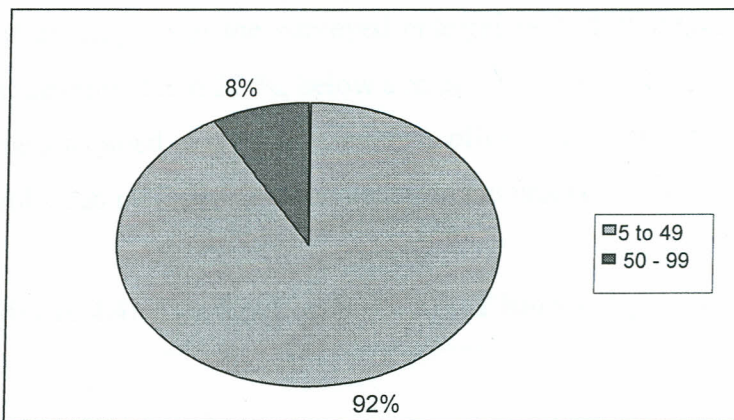


Source: Field data, 2007

### **Size of Enterprise**

Size of Enterprises in the survey is based on the number of permanent employees. Majority of SMEs in the survey were small with permanent employees ranging between 5 and 49 (90.8%) while a very small proportion; 8.2 % constituted medium enterprises those with 50 - 99 employees. This is in agreement with previous literature on SMEs indicating that there is a missing link between the small and medium enterprises where the former fail to graduate to the later due to the many challenges facing the sector and especially the small enterprises. Distribution of Enterprises based on the size of the enterprise is shown in the chart below;

**Figure 4.2: Distribution of Enterprises based on the size/ No. of employees**



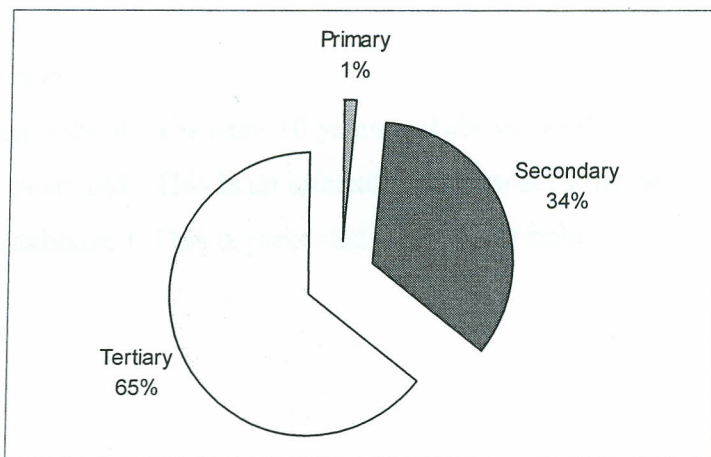
Source: Field data, 2007

### **Average level of Education for Employees**

Majority (64.4 %) of employees in the Enterprises had tertiary education, followed by secondary (34.2 %) and a very small number (1.4%) had primary education as shown in the chart below.

This could be attributed to the fact that Thika Municipality is an urban and cosmopolitan town with many schools hence a fairly high literacy level on average for the population.

**Figure 4.3: Average Level of Education for Employees**

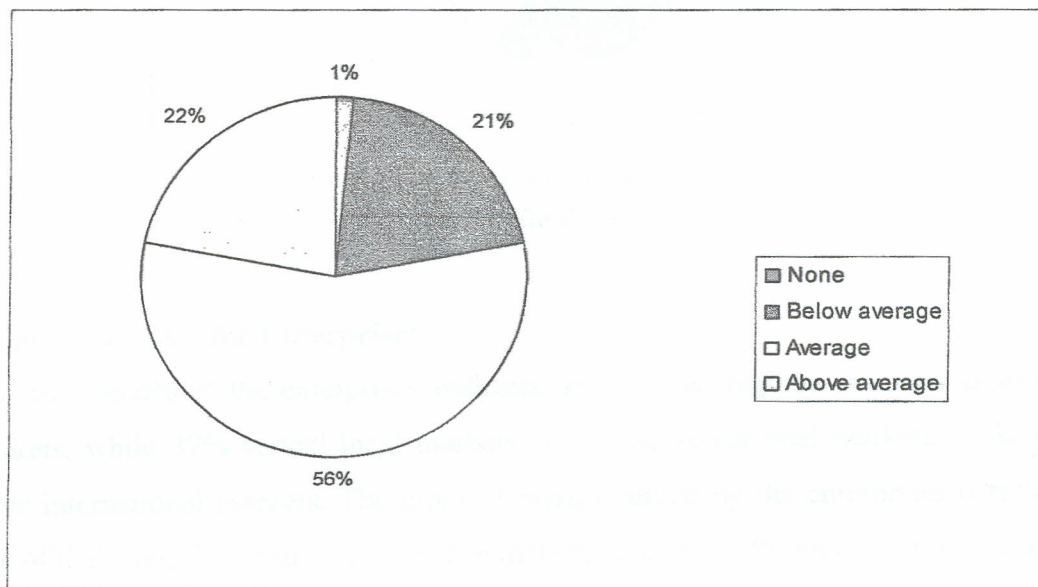


Source: Field Data, 2007

### Average Employee's ICT knowledge and Skills

Majority 56 % of employees in the surveyed enterprises had average ICT knowledge and skills, above average constituted 22 %, below average 21 % while those with none comprised 1 %. This could be attributed to the many colleges offering computer in the Municipality and the age of the employees majority who are young in the bracket of 30- 45 years.

**Figure 4.4: Average Employee's ICT knowledge and Skills**

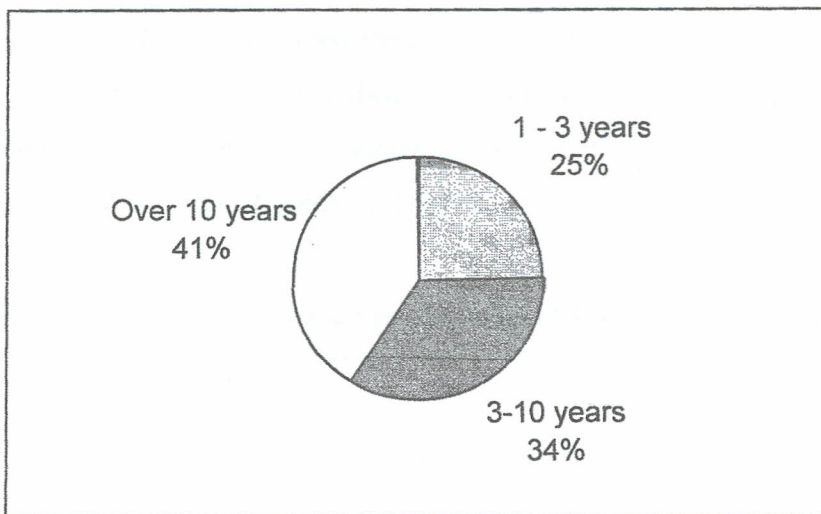


Source: Field Data, 2007

### Age of the Enterprise

Majority of Enterprises, 41.1% were 10 years and above, while 34.5% were 3- 10 years and 24.7% were 1-3 years old. This is an indication that most of the enterprises employing 5- 99 employees are established. This is presented in the chart below:

**Figure 4.5: Distribution of Enterprises based on Age**

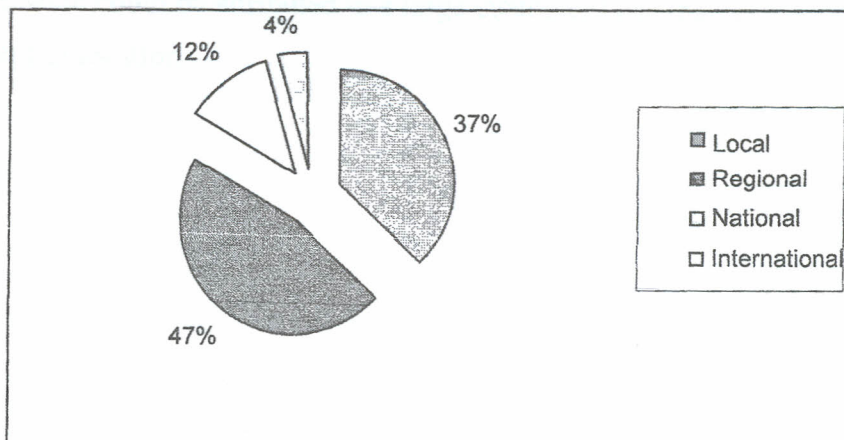


Source: Field Data, 2007

### Primary Markets for Enterprises

Majority, 46.6% of the enterprises indicated they served regional markets as their primary markets, while 37% served local markets, 12.3% serve national markets while only 4.1% serve international markets. The types of market served by the enterprises correlates to the size of the enterprises and as earlier seen majority are small. Previous literature also indicates that most SMEs have limited access to markets, and mostly concentrate on the local market as they have failed to penetrate other markets due to various limitations. This is presented in the Pie chart below:

**Figure 4.6: Distribution of Enterprises based on their Primary markets**

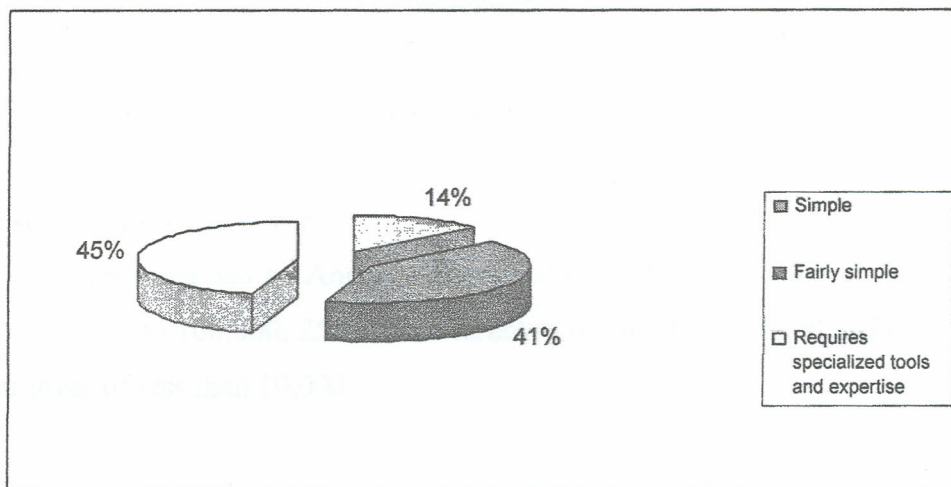


Source: Field Data 2007

## Description of Enterprise's business Operations

Majority 45.2%, of Enterprises described their business operations as requiring specialized tools and expertise, while 41.1 % described their operations as fairly simple and 13.7% described their operations as simple. This scenario could be due to the type of customers that the enterprises serve and the type of goods and services they offer to their customers.

**Figure 4.7: Distribution based on the kind of Business Operations**

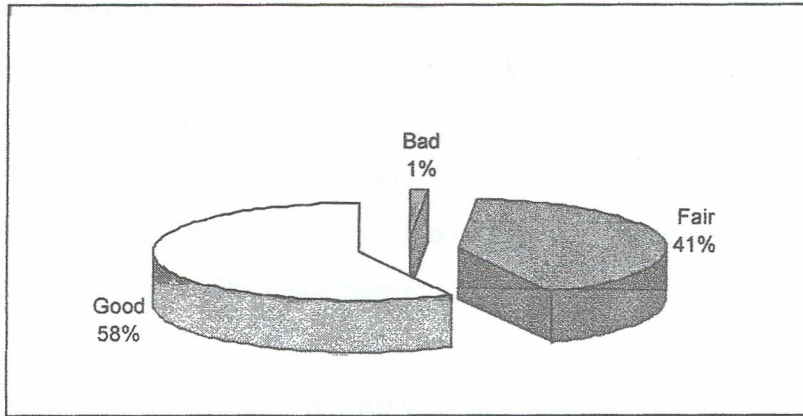


Source: Field Data, 2007

## Enterprise's Financial Status

57.5% of enterprises described their financial status as being good, while 41.1% as fair and only 1.4 as being bad. This can be explained by the fact that most of the enterprises were established and the same could be attributed to a large customer base that Thika municipality enjoys due to its central location.

**Figure 4.8 Distribution based on the enterprise' Financial status**

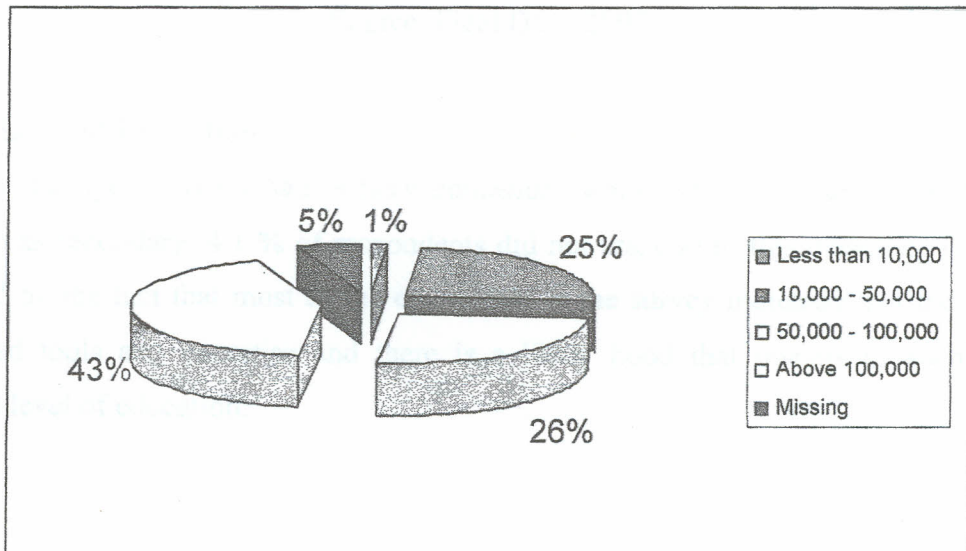


Source: Field Data, 2007

### Enterprise's Annual Turnover

43 % of the enterprises had an Annual turnover of over 100,000, while 26 % had an annual turnover of 50,000 to 100,000, 25 % had a turnover of 10,000 to 50,000 and only 5 % had an annual turnover of less than 10,000.

**Figure 4.9: Distribution based on Annual turnover**



Source: Field Data, 2007

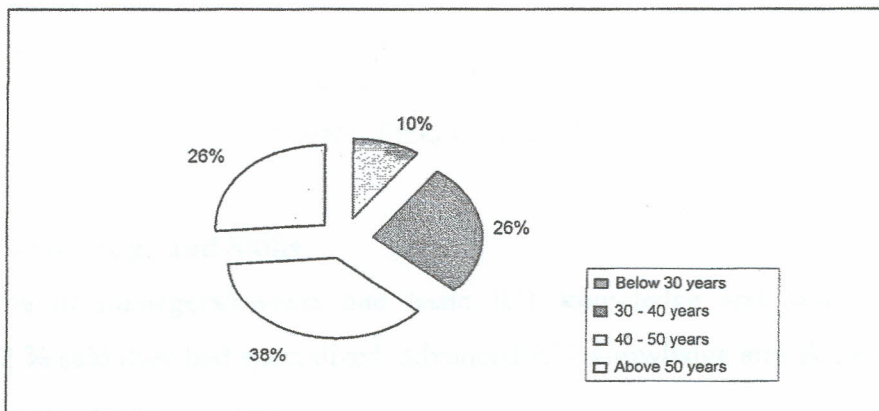
## 4.2.2 Section B: Manager/Owner Characteristics

### Average Age of Owner/s

38 % of owners were aged 40- 50 years, 26 % were between 30- 40 years and above 50years old and only 10 % were 30 years and below. Since majority of enterprises were well established with majority being over 10 years, it is also more likely that majority of owners are also somehow advanced in age as opposed to being very young i.e. 30 years and below.

This can be represented by the Pie chart below;

**Figure 4.10: Distribution based on the Average Age of Owners**

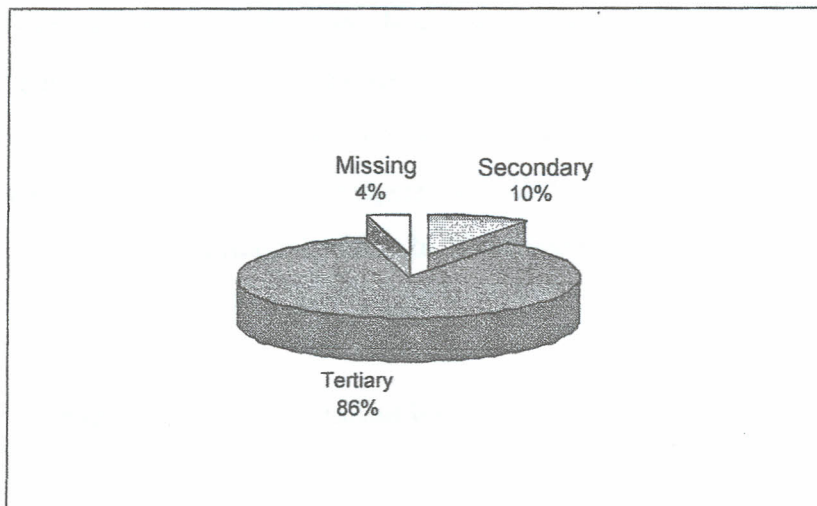


Source: Field Data, 2007

### Highest Level of Education

86.4% of managers/owners had tertiary education, while 9.6 % had the highest level of education as secondary. 4.1 % of respondents did not respond to this question. This can be explained by the fact that most of the enterprises in the survey indicated that they required specialized tools and expertise and there is a likely hood that owners of such have an advanced level of education.

**Figure 4.11: Distribution based on the owner's highest Level of Education**

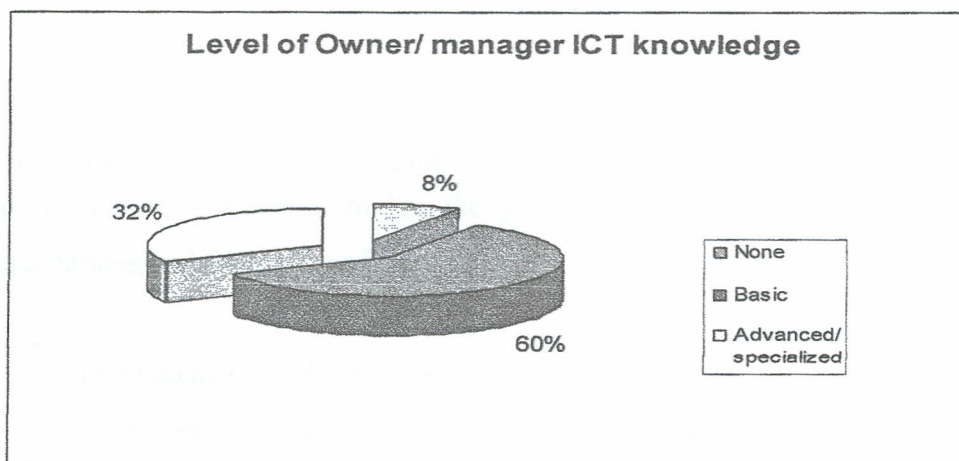


Source: Field Data, 2007

### Level of ICT knowledge and Skills

Majority 60 % of managers/owners had basic ICT knowledge and skill with average experience. 32 % said they had specialized/ advanced ICT knowledge and skills and 8 % had none.

**Figure 4.12: Distribution based on Owners' ICT knowledge and Skills**

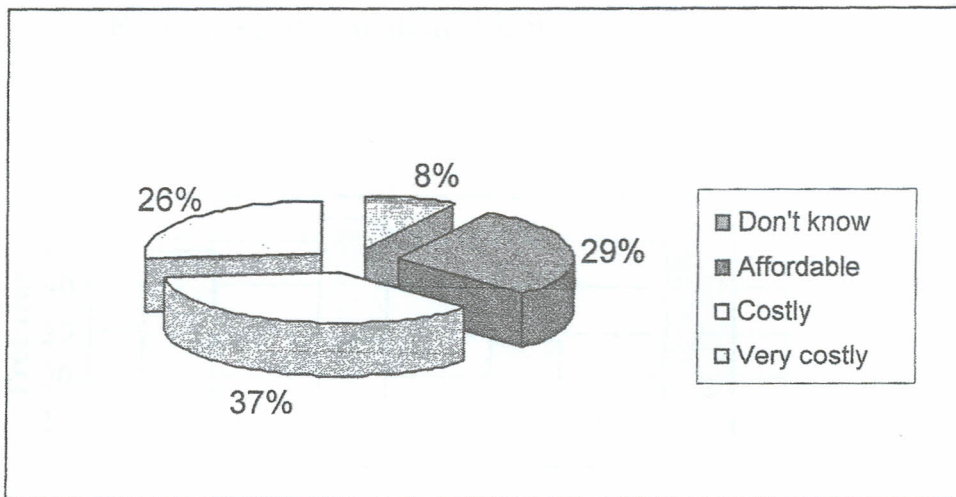


Source: Field Data, 2007

### Owner's / Manager's attitude to ICT

Managers/ Owners were asked about how they perceived ICT. 87.7 % of respondents perceived ICT as being very useful and 68.5 % felt it was fairly complex but could be learnt compared to 12.3% who felt it was complex and hard to use and 19.2 % who felt it was simple and easy to use. 37% of managers/owners perceived ICT as being costly, 29 % perceived ICT as being affordable, while 26 % perceived it to be very costly. 8 % did not know the cost of ICT.

**Figure 4.13: Distribution based on perceived Cost of ICT**



Source: Field Data, 2007

### 4.2.3 Section C: ICT Adoption and Use

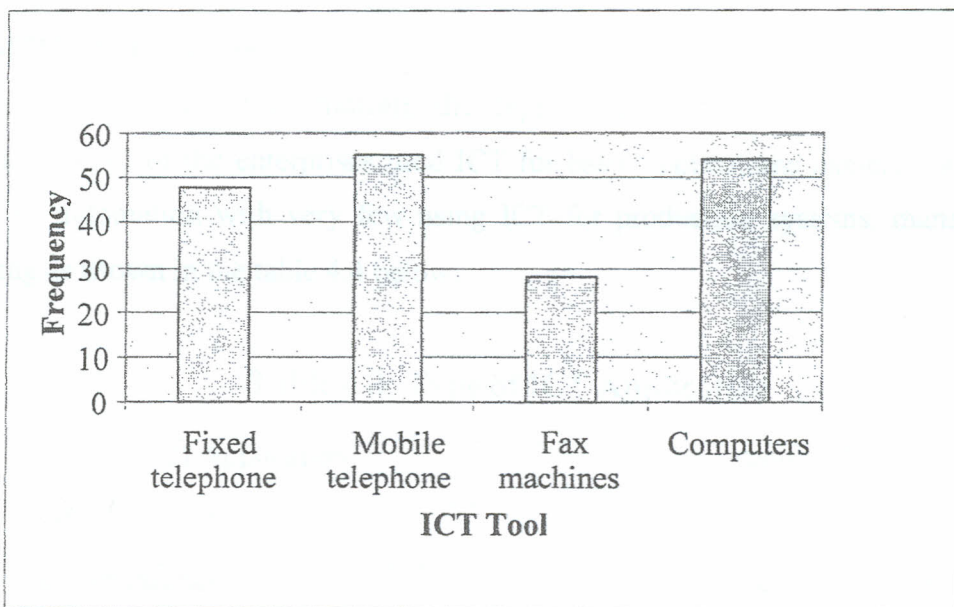
ICT adoption and use was measured by the type of ICTs an enterprise had and the type of ICT applications and frequency of use.

#### Type of ICTs present in an Enterprise

Respondents were asked the kind of ICTs they had in their enterprises and the frequency of the different types of ICTs was noted. Majority of enterprises i.e. 55 had mobile phones i.e. 78.6% and 54 enterprises i.e. 77.1 % had computers, 48 or 68.6 % had fixed telephones and only 28 enterprises or 40% had fax machines. High frequency of mobile phones can be attributed to the lower cost of the mobile phones and maintenance charges as compared to the

other types of ICTs. The high frequency of computer can be explained by the fact that computers can be used for many purposes which include automation of operations, communication, management, production etc. as compared to other ICT s, which have a single purpose. Many enterprises that could afford them could have adopted them because they perceived them as very useful to the enterprises. The low frequency of fax machines can be explained by the fact that many people perceive them as complicated and actually don't know how to use them. They are also more costly than the phones and not as efficient as the computer in communication.

**Figure 4.14: Distribution of Different types of ICT**



Source: Field Data, 2007

### Frequency of ICT Use

Enterprises were asked to rate their frequency of use of the ICTs they had as occasional, frequent and very frequent and the results obtained are as shown in the table below, table 4.3. The most frequently used ICT tool was the Mobile phone with 84.1 % rating their use as very frequent, followed by computers with 66.1% rating their use as very frequent, the fixed phone whose use was rated as very frequent by 62.5% and the least frequently used was the fax machine with only 27.1% rating its use as very frequent.

**Table 4.2: Frequency of ICT use**

	Occasional		Frequent		Very frequent	
	Count	%	Count	%	Count	%
Frequency of mobile telephone use	3	4.3	8	11.6	58	84.1
Frequency of fixed telephone use	8	12.5	16	25.0	40	62.5
Frequency of computers use	9	14.5	12	19.4	41	66.1
Frequency of fax machines use	20	41.7	15	31.3	13	27.1

Source: Field Data, 2007

### Type of ICT Applications

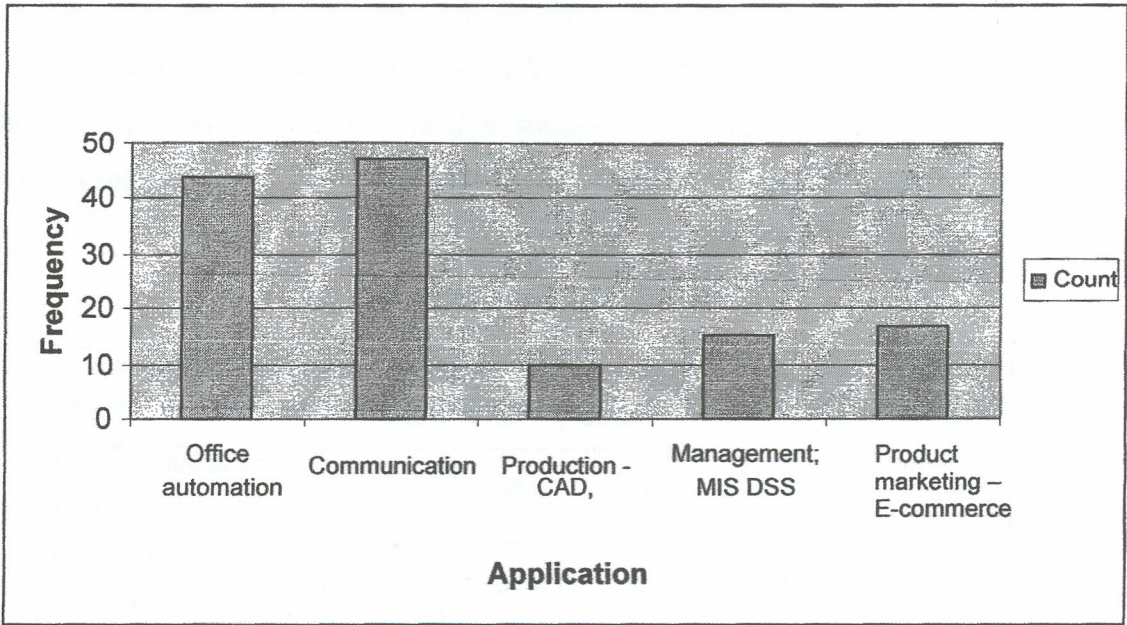
Respondents were asked to indicate the type of ICT applications they used in their enterprises. Most of the enterprises used ICT for basic applications namely communication and office automation with very few using ICT for production systems, management and marketing as shown in the table 4.4 below:

**Table 4.3: Type of ICT Application**

Type of ICT Application	Count	%
Office automation	44	63
Communication	47	67
Production e.g. knowledge systems, CAD, design	10	14
Management; Management Information Systems	15	21
Product marketing/E-commerce	17	24

Source: Field Data, 2007

**Figure 4.15: Type of ICT Applications in the Enterprises**

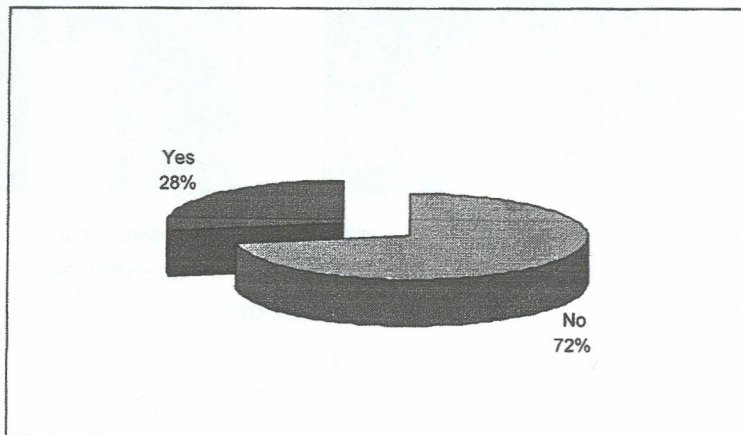


Source: Field Data, 2007

### **Enterprises with a web page**

Ownership of a web page can be considered as a sign of advanced application of ICT by the enterprises. Respondents were asked whether they had a web page or not. Responses as shown in the chart below indicated that only 20 enterprises i.e.28% had a web page while the rest, 72% did not have.

**Figure 4.16: Enterprises with a Web Page**



Source: Field Data, 2007

## Perceived Benefits of ICT

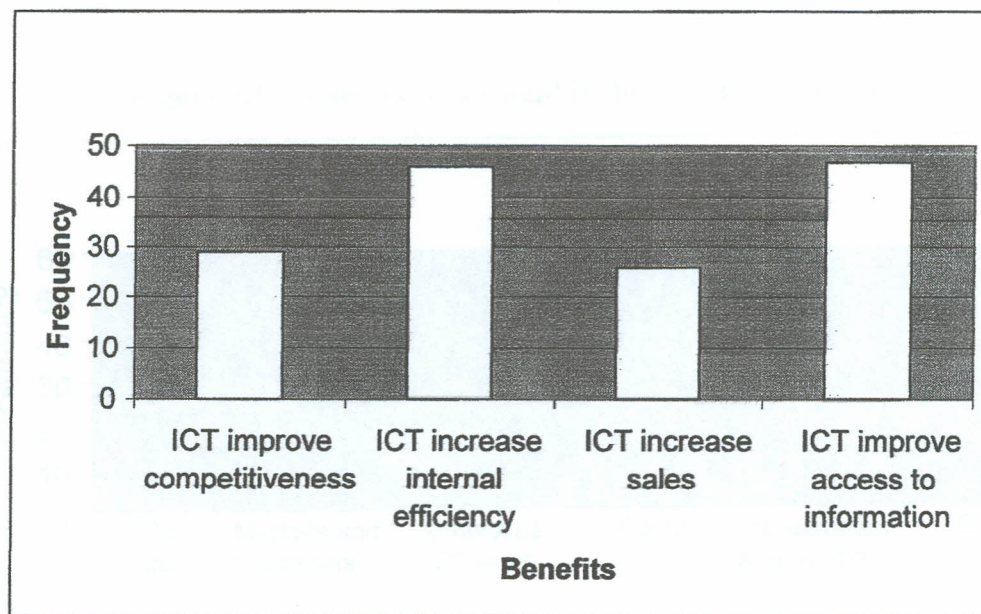
Respondents were asked to indicate whether they perceived some given factors as being benefits of ICTs to enterprises by answering Yes or No. Majority, 64.4% of the enterprises thought ICT improves access to information, followed by increasing internal efficiency 63%, improving competitiveness 39.7% and lastly 35.6% thought it increased sales.

**Table 4.4: Perceived benefits Of ICT**

Perceived Benefits of ICT	No		Yes		Total	
	Count	%	Count	%	Count	%
ICT improve access to information	26	35.6	47	64.4	73	100.0
ICT increase internal efficiency	27	37.0	46	63.0	73	100.0
ICT improve competitiveness	44	60.3	29	39.7	73	100.0
ICT increase sales	47	64.4	26	35.6	73	100.0

Source: Field Data, 2007

**Figure 4.17: Perceived benefits of ICT**



Source: Field Data, 2007

## Factors that would Influence ICT Adoption

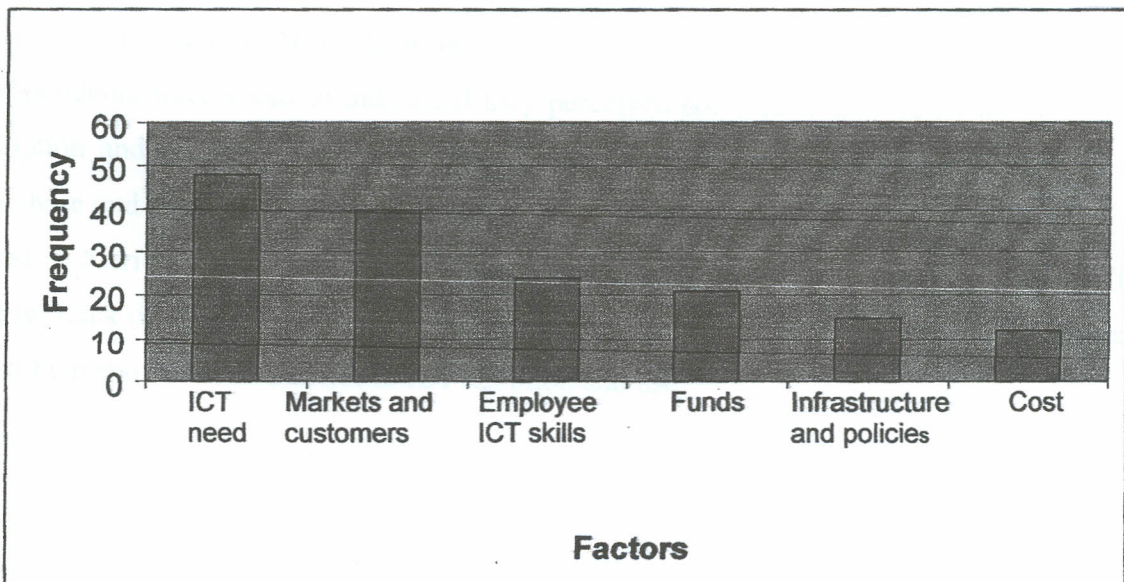
Respondents were asked whether some given factors could Influence ICT adoption in their enterprises to which they were to answer yes or No. Identified need was rated as factor number 1 with 65.8% of enterprises indicating that it would influence ICT adoption, followed by type of market and customers for goods and services with 54.8 %, level of employee ICT skills with 32.9%, availability of funds with 28.8%, state of supporting infrastructure and policies in that order with 20.5%. Cost of ICT acquisition and maintenance was rated last with 16.4%.

**Table 4.5: Factors that would Influence ICT Adoption**

Factors that would determine ICT adoption	No		Yes		Total	
	Count	%	Count	%	Count	%
Identified need for ICT	25	34.2	48	65.8	73	100.0
Type of market and customers	33	45.2	40	54.8	73	100.0
Level of employee ICT skills	49	67.1	24	32.9	73	100.0
Availability of funds	52	71.2	21	28.8	73	100.0
State of supporting infrastructure and policies	58	79.5	15	20.5	73	100.0
Cost of ICT acquisition and maintenance	61	83.6	12	16.4	73	100.0

Source: Field Data, 2007

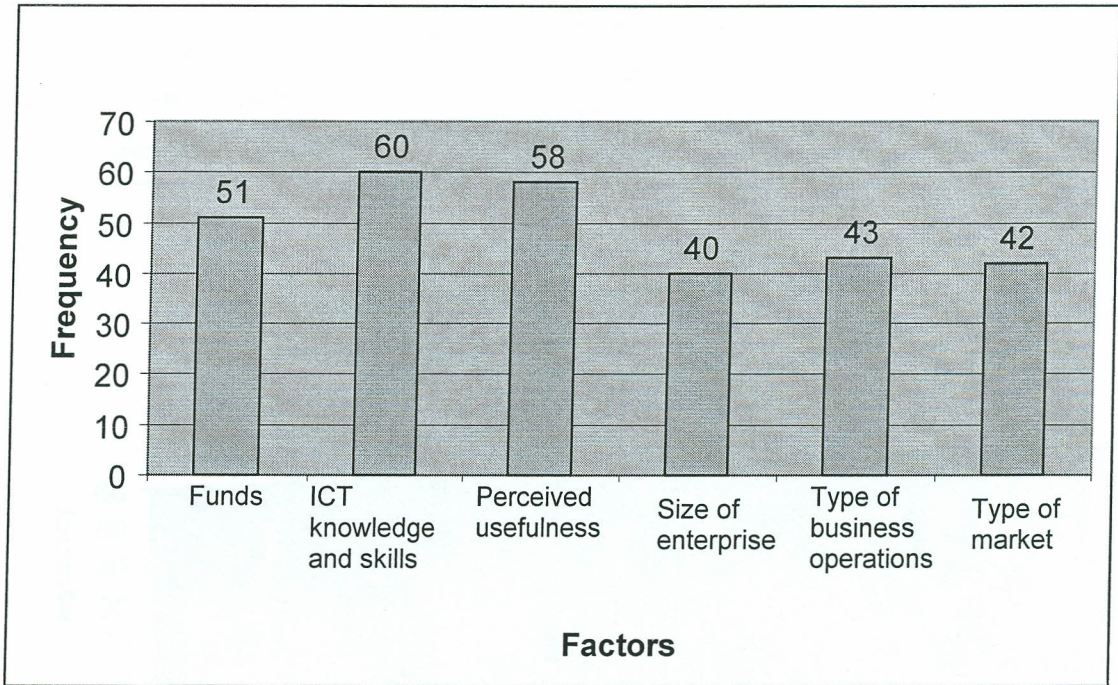
**Figure 4.18: Factors that would Influence ICT Adoption**



### Factors that will Influence ICT Plans and Strategies

Respondents were asked whether some factors would influence their ICT plans and strategies. Their response is as shown in the graph below. ICT knowledge and skills was rated highest followed by perceived usefulness while size of enterprise was rated last.

**Figure 4.19: Factors that would Influence ICT Plans and Strategies**



Source: Field Data, 2007

### Perceived Barriers to ICT adoption

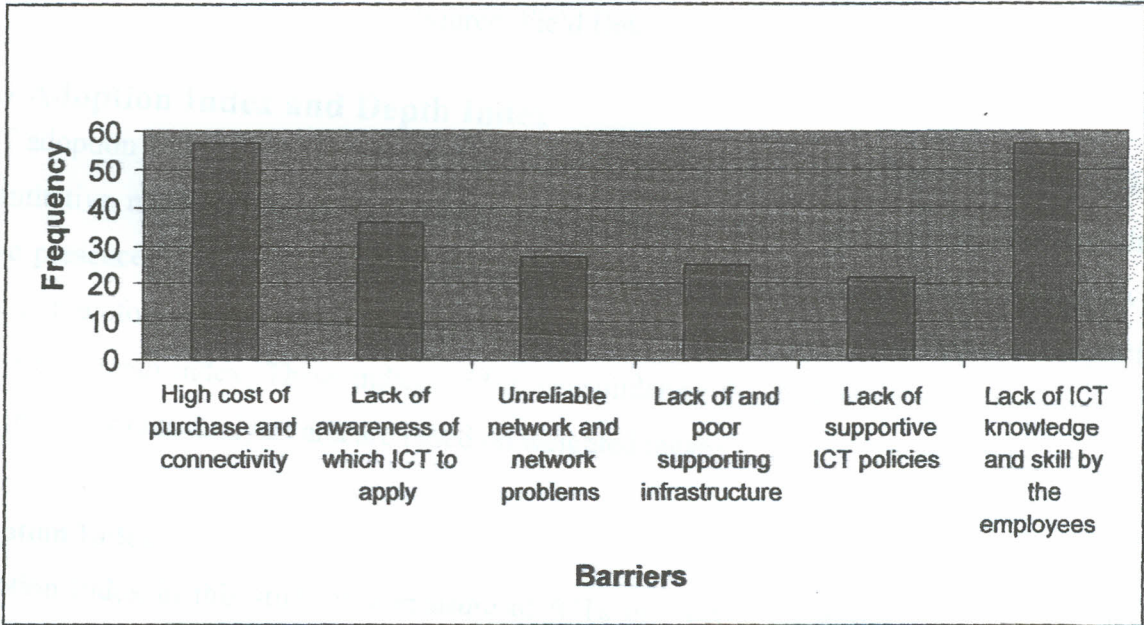
Respondents were asked to indicate if they perceived some factors as being barriers to ICT adoption and the table 4.6 and figure 4.20 below represent their responses. High cost of purchase and connectivity as well as lack of ICT knowledge and skills by the employees was rated as barriers by most of the enterprises followed by lack of awareness of which ICT to apply. Lack of and poor supporting Infrastructure and lack of supportive policies were rated least by respondents as barriers to ICT adoption and use.

**Table 4.6: Perceived Barriers to ICT Adoption**

Perceived Barrier	No		Yes		Total	
	Count	%	Count	%	Count	%
High cost of purchase and connectivity	16	22	57	78.0	73	100.0
Lack of awareness of which ICT to apply	37	50.6	36	49.4.0	73	100.0
Unreliable network and network problems	46	63.0	27	37.0	73	100.0
Lack of and poor supporting infrastructure	47	64.7	26	35.6	73	100.0
Lack of supportive ICT policies	50	68.4	23	31.6	73	100.0
Lack of ICT knowledge and skill by the employees	16	22.0	57	78.0	73	100.0

Source: Field Data, 2007

**Figure 4.20: Perceived Barriers to ICT Adoption**

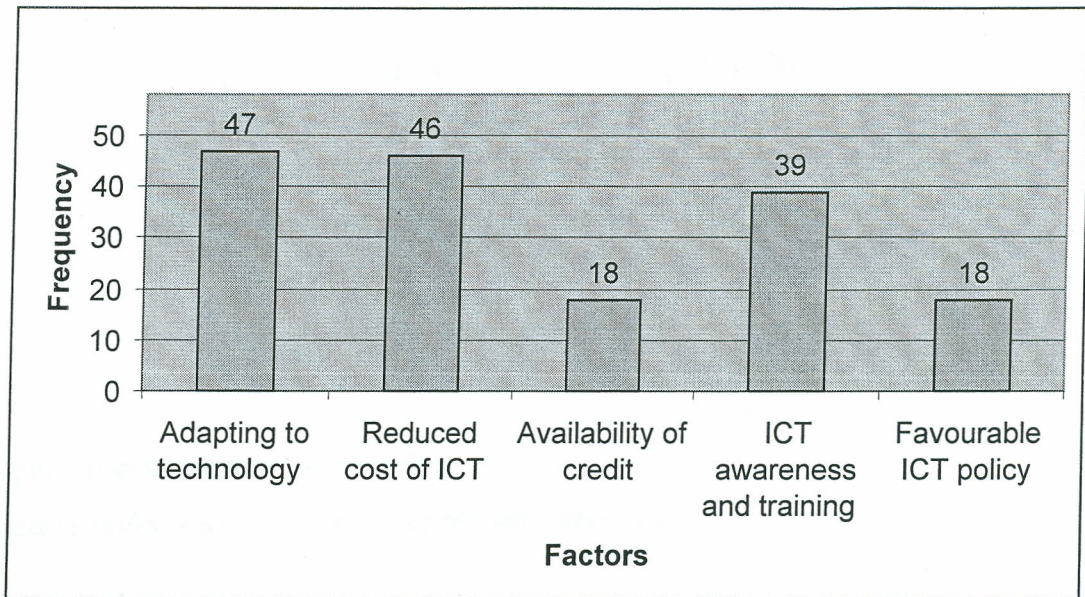


Source: Field Data, 2007

**Factors that would encourage ICT adoption**

Respondents were also asked about what factors they thought would encourage ICT adoption by SMEs. Adapting to technology was rated highest by 65.3% of the enterprises, followed by reduced cost of ICT with 63.9% of the enterprises, ICT training and awareness with 54.2 %, and availability of credit and favourable ICT policies with 25 %. This is presented in Figure 4.21 below;

**Figure 4.21: Factors that Would Encourage ICT Adoption**



Source: Field Data, 2007

### **4.3 Adoption Index and Depth Index**

ICT adoption and use can be measured using the adoption index and depth index. Despite the quantitative nature of the survey, quantitative analysis alone is not sufficient because the mere presence of ICTs in an enterprise doesn't guarantee its use and purpose. Quantitative data is therefore supplemented by data on degree of adoption and use, referred to adoption index and depth index. These indices aid in consolidating the different variables in a given enterprise for data analysis and are based on weighted means.

#### **Adoption Index**

Adoption Index in this study is a measure of ICTs in a given enterprise derived using the weighted mean. ICTs under consideration were given weights based on their perceived cost and ease of use. Those that I considered very costly and hard to use were given a higher weight as compared to those considered affordable and easy to use. The variables were rated on a scale of one to five with five being very costly and hard to use and one being affordable and easy to use as follows;

**Table 4.7: Weighted ICT**

ICT	Weight
ICT 1 - Mobile phone	1.0
ICT 2 - Fixed phone	1.0
ICT 3 - Fax Machine	2.0
ICT 4 - Computer	5.0
<b>Total</b>	<b>9.0</b>

Adoption Index was thus calculated;

*Adoption Index = weighted mean of the variables \*100*

$$\text{Adoption Index} = \frac{\text{sum ICT 1}(1) + \text{ICT 2}(1) + \text{ICT 3}(2) + \text{ICT 4}(5)}{9} * 100$$

### **Depth Index**

Depth Index is a measure of ICT applications in the enterprises. This index is based on the assumptions that some applications are simple and easy to use as compared to others. The Applications are therefore given values depending on perceived degree of simplicity in their applications and perceived cost. ICTs present in an enterprise are used for different applications and purposes ranging from communication, office automation, marketing, management and production. The applications were given values as follows;

**Table 4.8: Weighted ICT Applications**

ICT Application	Weight
Application 1 - Communication	1.0
Application 2 - Office Automation	4.0
Application 3 - Management	5.0
Application 4 - Production	5.0
Application 5 - Marketing	5.0
<b>Total</b>	<b>20.0</b>

Depth Index is thus calculated;

$$\text{Depth Index} = \text{weighted Mean of Variables} * 100$$

$$\text{Depth Index} = \frac{\text{sum (App.1 (1) + App.2 (4) + App.3 (5)5 + App.4 (5) + App.5 (5))}}{20} * 100$$

Generally, adoption index highly varied from enterprise to enterprise, from 11.11 as the minimum to 100 % for enterprises that had all the four types of ICTs. 23% of enterprises had an adoption Index of 100%, followed by 77.8 for 20.5%. The average adoption rate for the enterprises was 68 % which is above average.

The highest depth index for the enterprises was 70 with a frequency of 8, while the lowest was 5%. The average depth index was 31% which is well below average.

### Adoption Index

The adoption index was distributed as shown in the table below;

**Table 4.9: Distribution of Enterprises based on the Adoption Index**

	Adoption Index	Frequency	Percent	Valid (%)	Cumulative (%)
Valid	11.11	8	11.0	11.4	11.4
	22.22	7	9.6	10.0	21.4
	44.44	1	1.4	1.4	22.9
	55.56	11	15.1	15.7	38.6
	66.67	2	2.7	2.9	41.4
	77.78	15	20.5	21.4	62.9
	88.89	3	4.1	4.3	67.1
	100.00	23	31.5	32.9	100.0
	Total	70	95.9	100.0	
Missing	System	3	4.1		
	Total	73	100.0		

Source: Author, 2008

### Depth Index

The depth index for the enterprises was as shown in the table 4.10.

**Table 4.10: Distribution of Enterprises based on the Depth Index**

	Depth index	Frequency	Percent	Valid (%)	Cumulative (%)
Valid	0.00	3	4.1	4.1	4.1
	5.00	17	23.3	23.3	27.4
	20.00	7	9.6	9.6	37.0
	25.00	19	26.0	26.0	63.0
	30.00	2	2.7	2.7	65.8
	45.00	2	2.7	2.7	68.5
	50.00	14	19.2	19.2	87.7
	55.00	1	1.4	1.4	89.0
	70.00	8	11.0	11.0	100.0
	Total	73	100.0	100.0	

Source: Author, 2008

In the theoretical framework (Lal and Peedoly, 2006) and previous studies, several factors were considered to influence ICT adoption. These factors include the enterprise's characteristics e.g. size, personnel, type of sector type of markets served, age of firm, financial status etc, Owner/manager characteristics e.g. age, level of education and ICT skills, ICT attitude and external factors e.g. government policies, state of supporting infrastructure. I tried to establish the relationship between Adoption Index and Depth index which measures ICT adoption to these factors from the survey results and some relationships between the factors and the adoption index and depth index were noted as explained in the following section.

### Size of Enterprise

Size of enterprise is based on the number of permanent employees in an enterprise. From the survey, larger enterprises that are categorized as medium with 50-99 permanent employees had the highest adoption index of 76, followed by enterprises with 5-9 employees with an adoption index of 68 and lastly enterprises with 10 -49 employees with an adoption index of 66. This can be attributed to fact that larger enterprises have a higher capital base and turnover and are most likely to have business operations that require specialized tools and expertise that may call for ICT adoption for use. Depth Index was highest 44 for the larger, medium enterprises.

### Age of Enterprise

Adoption index increased with the age of the enterprise. Enterprises that had been in operation for over 10 years had the highest Index of 74 followed by those that were 3 -10 years with an index of 64 and lastly those that had been in operation for 1-3 years with an index of 62. Literature review indicated that older enterprises are better placed to adopt ICT as compared to younger enterprises since they are already established with a more stable capital base and markets. However, depth index was highest, 28 for enterprises that had been in operation for 1-3 years.

### Type of Enterprise

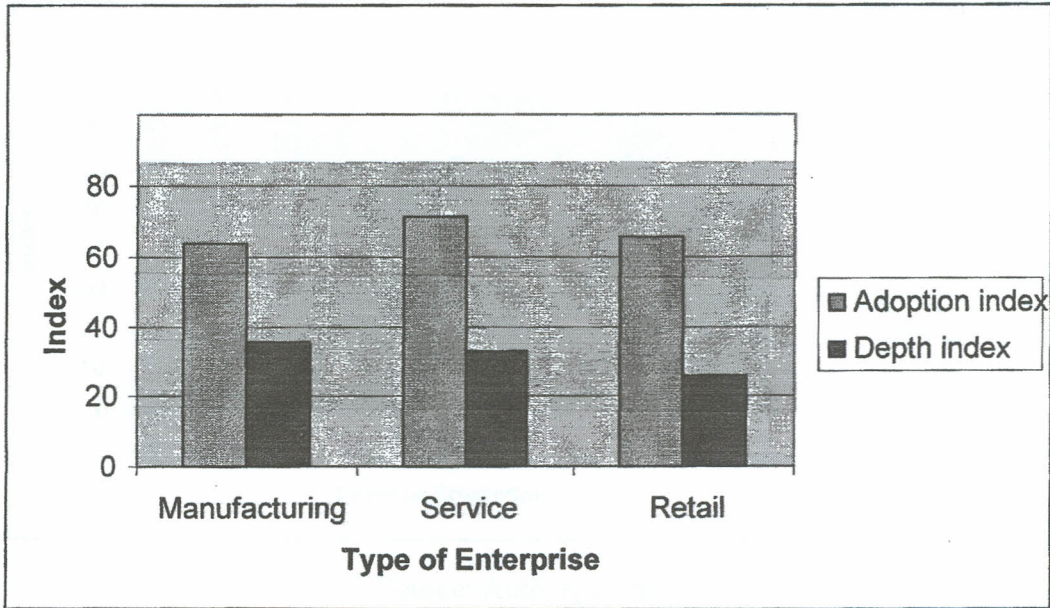
The service Industry had the highest adoption index of 71.2 followed by the retail subsector with an index of 65.27 and lastly manufacturing had the lowest index of 63.8. On the other hand, the manufacturing sub-sector had the highest depth index of 35 followed by the service subsector with a depth index of 32.7 and lastly the retail and wholesale subsector with an index of 25.6. This could be majorly attributed to their different type of business operations that influence their need and adoption of ICT. This is shown in the table below;

**Table 4.11: Adoption and Depth Indices for different types of Enterprises**

Type of Enterprise		Adoption. Index	Depth. Index
Manufacturing	Mean	63.8889	35.0000
	N	4	4
	Std. Deviation	39.93307	28.57738
Service	Mean	71.2418	32.7778
	N	34	36
	Std. Deviation	31.67805	21.02531
Retail	Mean	65.2778	25.6061
	N	32	33
	Std. Deviation	31.39527	21.67795
Total	Mean	68.0952	29.6575
	N	70	73
	Std. Deviation	31.64944	21.71995

Source: Author, 2008

**Figure 4.22: Adoption Index and Depth Index based on the type of enterprise**



Source: Author, 2008

### Average Level of Education for the Employees

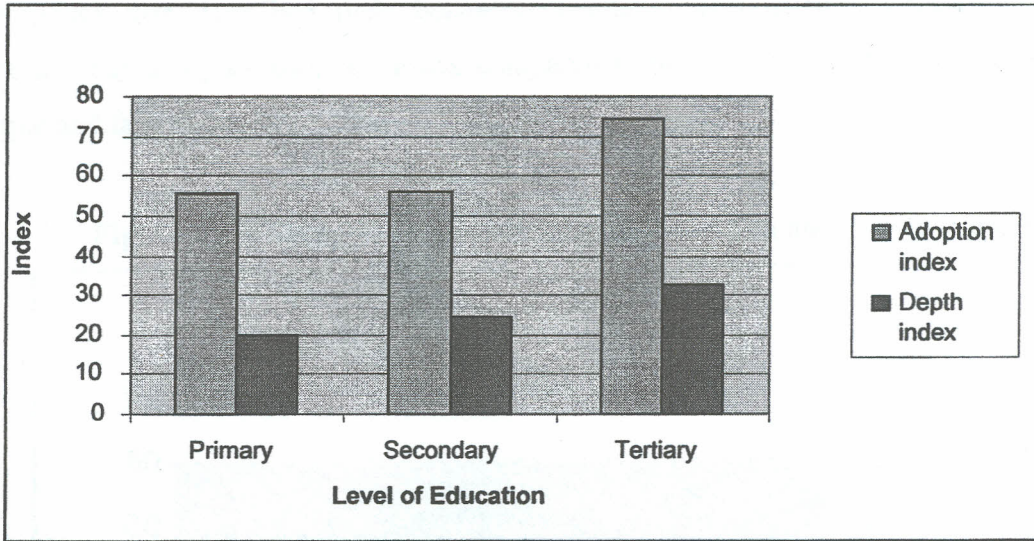
From the survey, adoption index was high for enterprises that had a higher average level of education. The Depth index was also higher for enterprises that had employees with a higher level of education as shown in table 4.12 below;

**Table 4.12: Average level of education versus Adoption and Depth Indices**

Average level of education for employees		Adoption index	Depth index
Primary	Mean	55.5556	20.0000
	N	1	1
	Std. Deviation	.	.
Secondary	Mean	56.0386	24.6000
	N	23	25
	Std. Deviation	36.15627	23.40406
Tertiary	Mean	74.3961	32.5532
	N	46	47
	Std. Deviation	27.90043	20.69111
Total	Mean	68.0952	29.6575
	N	70	73
	Std. Deviation	31.64944	21.71995

Source: Author, 2008

**Figure 4.23: Average level of education versus Adoption and Depth Indices**

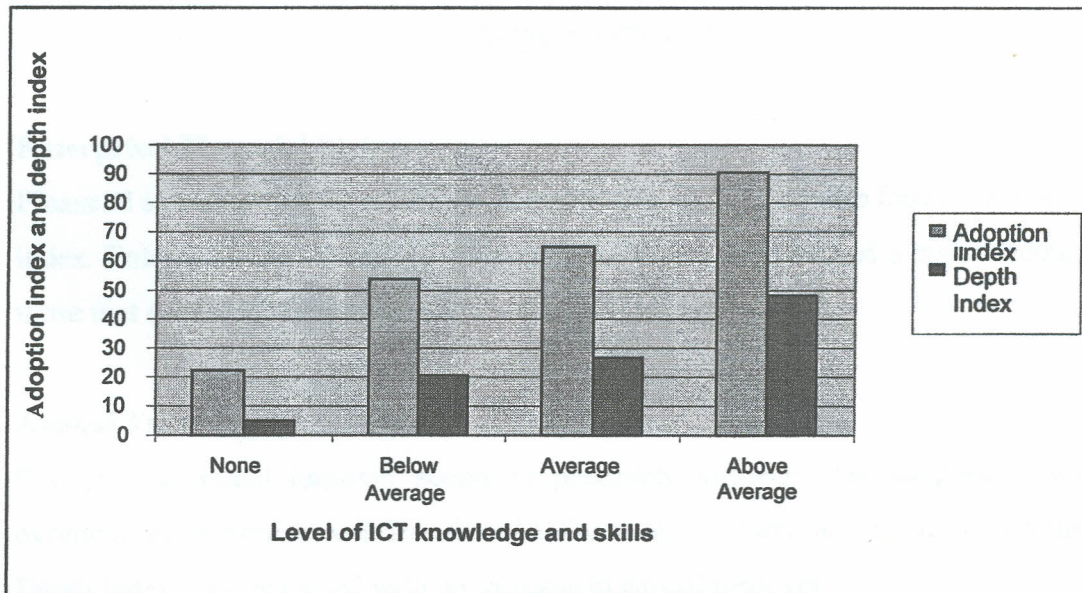


Source: Author, 2008

**Average Employee's ICT Knowledge and Skills**

From the survey it was found that the higher the average level of employee's ICT knowledge and skills, the higher the adoption index and depth index as shown in Fig.4.24

**Figure 4.24: Employee's ICT Knowledge and Skills versus Adoption and Depth Indices**

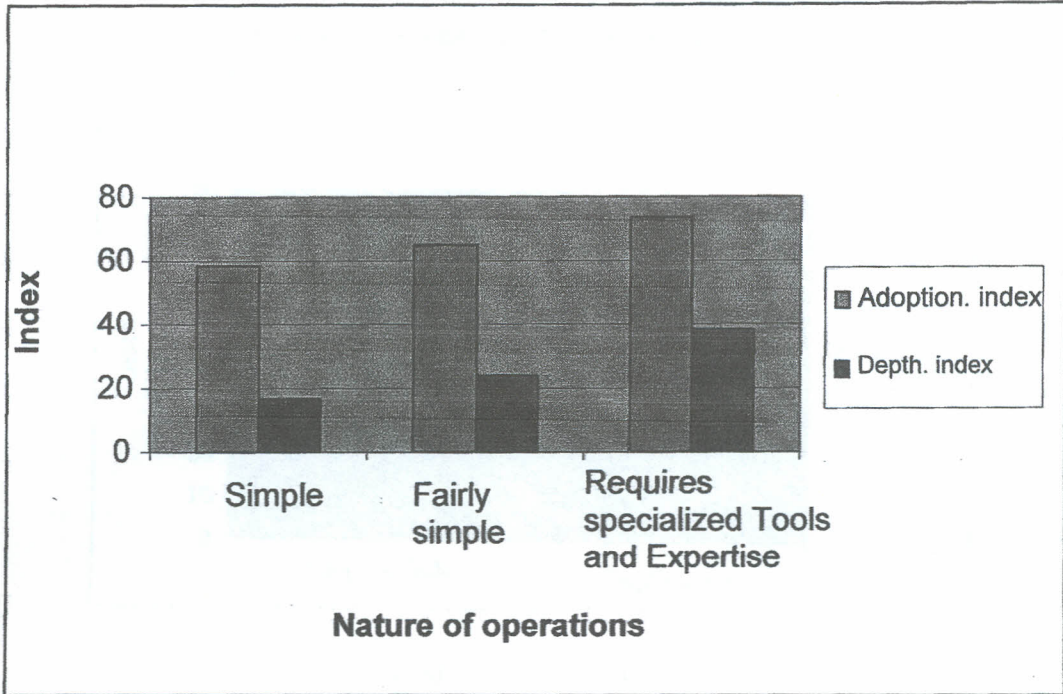


Source: Author, 2008

## Business Operations

Enterprises that described their business operations as requiring specialized tools and expertise had a higher adoption index compared to those that described their operations as simple and fairly simple.

**Figure 4.25: Business Operations versus Adoption and Depth Indices**



Source: Author, 2008

## Enterprise' Financial Status

Financial status seems not to have a direct bearing on the adoption index but affects the depth index. Enterprises that described their financial status as good had a higher depth index than those that described their financial status as bad or fair.

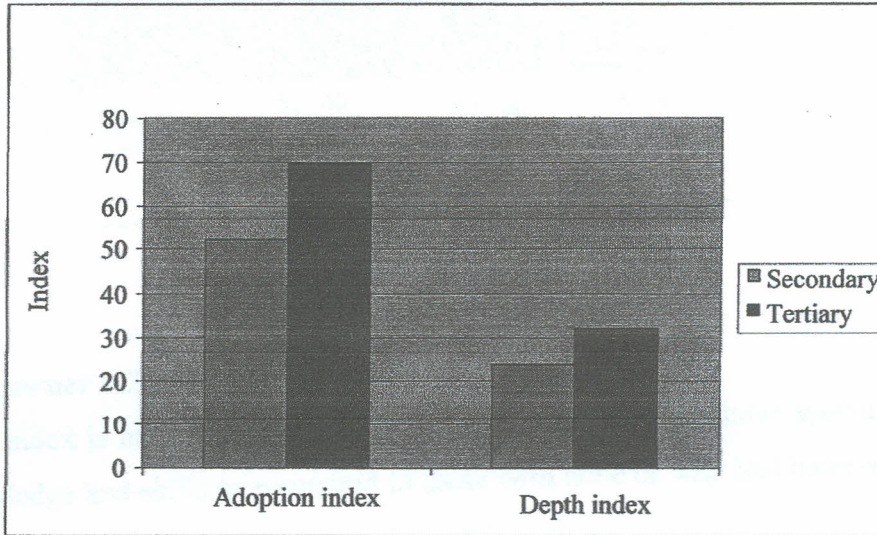
## Annual Turnover

Enterprise's annual turnover seems to positively influence the adoption index with the exception of enterprise with less than 10,000 as annual turnover which has a frequency of 1. Depth Index also increased with an increase in annual turnover.

### Manager/Owner level of Education

Adoption Index and Depth Index were higher for enterprises where the owner manager had a higher level of education. For managers with tertiary education, the adoption index was 69.8 and depth index 31.7 while those with secondary education had an adoption index of 52 and depth index of 23.6.

**Figure 4.26: Manager/Owner level of Education**

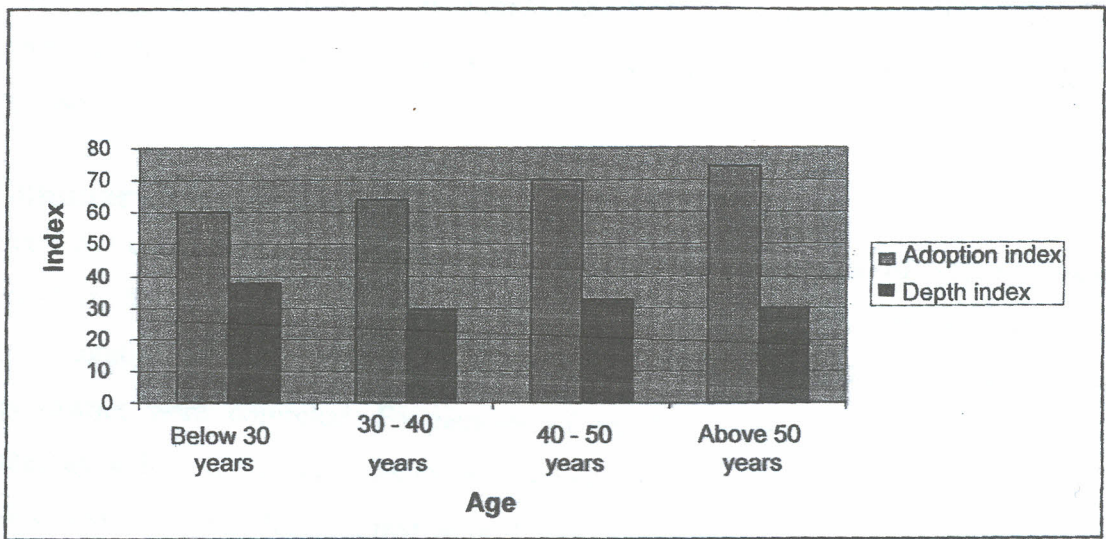


Source: Author, 2008

### Average Age of Owners

Adoption Index is higher for owners who are older, above 50 years as compared to younger ones below 50. However depth index seems higher for younger owners at 37 who are 30 years and below. Adoption index for owners aged above 50 years was 74, for those aged between 40 to 50 years was 70, those aged between 30 and 40 years was 63 and for owners aged below 30 years was 60.

**Figure 4.27: Average Age of Owners versus Adoption Index and Depth Index**

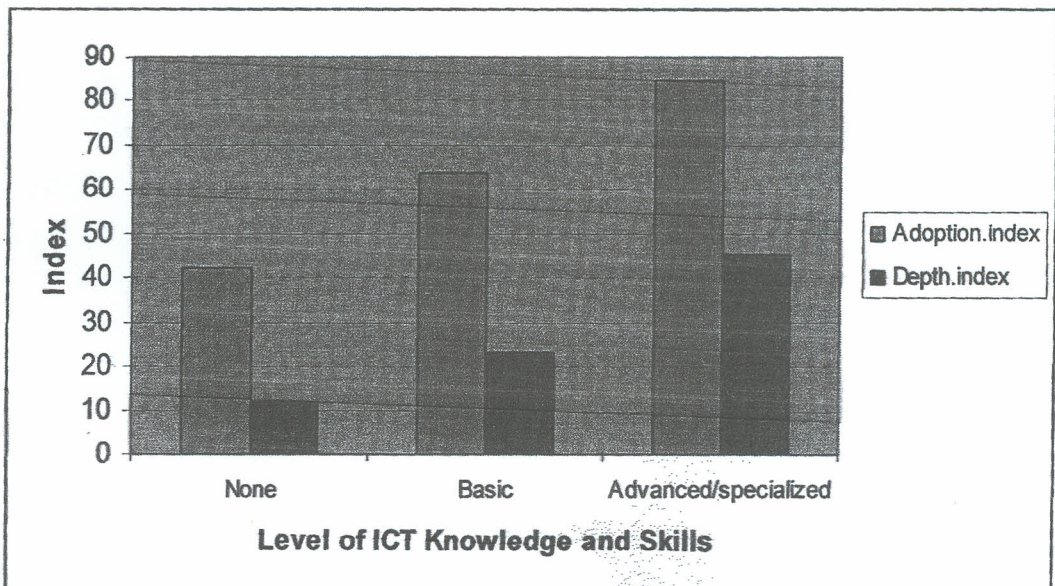


Source: Author, 2008

### Manager/owner ICT Knowledge and Skills

Adoption index is higher for enterprises whose manager/owners have specialized/ advanced ICT knowledge and skills as compared to those with none or who had basic skills. The depth index also corresponded to the manager/owner ICT skills.

**Figure 4.28: Manager/ owners ICT skills versus Adoption Index and Depth Index**



Source: Author, 2008

## **Owner/ Manager ICT Attitude**

Managers / Owners who felt ICT was complex and hard to use had a lower Adoption index and depth compared to those who felt it was simple and easy to use or it is fairly complex but can be learnt.

## **4.4 Summary of Data Analysis**

Chapter 4 has dealt with data analysis which involved the computation of certain measures and searching for patterns of relationships that exists between the data collected and various factors thought to influence adoption. Frequencies of characteristics for the enterprises and manager/owner were compiled. Frequencies of the ICTs used in the enterprises were computed as well as the frequencies on the factors that were thought to influence adoption, ICT plans and strategies, barriers that were thought to influence adoption as well as factors that were thought to encourage ICT adoption. Measures of dispersion, especially the mean were computed for various data or groups for comparison and inference. Standard deviation was also computed for groups to measure the degree of dispersion for given groups of data. Adoption index and depth index were also computed and used to measure the relationship between the adoption and factors thought to influence adoption. Results of data analysis were presented in tables, graphs and charts. Findings from the Data analysis are summarized in Chapter 5.

## CHAPTER 5

### 5.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary of Major Findings

##### Enterprise Profile

Majority, 90.8 % of enterprises in the survey were small with 5 – 49 permanent employees, majority, 64.4% of who had a tertiary education with average ICT knowledge and skills. The enterprises had been in operation for at least one year, majority 41.1 % were 10 years and above, 34.5 % were 3-10 years while 24.7% were 1-3years. Survey findings indicate most of the enterprises in the survey were established and this may have had an impact on ICT adoption and use.

Most of the enterprises, 45.2 % described their operations as requiring specialized tools and expertise and their operations as fairly simple. The enterprises mainly served regional and local markets with a small proportion 12.3% and 4.1 % serving national and international markets respectively.

Financial status for majority of the enterprises was described as good, most of the enterprises having an approximate annual turnover of over KSh. 100,000.

##### Manager/ Owner Profile

Majority of Owner/manager had tertiary education with basic ICT knowledge and skills and average experience. Survey findings indicate they had a positive ICT attitude with majority describing ICT as very useful, fairly complex but could be learnt and is affordable.

##### ICT Adoption and Use

All ICTs being considered in the study were present in the enterprises with some of them having all the four types. The mobile phone was the most adopted and frequently used ICT, followed by the computer, fixed phone and lastly the fax machine. It should however be noted that mobile phone use in many cases could have been private and not related to the business.

ICT applications in most cases were basic i.e. communication and office automation. Advanced applications like marketing, production systems and marketing were very low. Only 28% of the enterprises had a web page.

Majority of enterprises indicated that ICT improved access to information and increased internal efficiency. This could explain the high frequency of phones and the computer as ICT tools and their high frequency of use. Few enterprises said ICT could improve competitiveness and increase sales. This could explain the low frequency in application of ICT in marketing and management. Generally we can say that perceived benefits of ICT seems to influence the kind of ICTs and applications adopted by an enterprise.

### **Factors affecting ICT adoption and Use**

From the survey, it is clear that identified need for ICT, which is based on the enterprise' operations and the type of market they serve significantly influenced ICT adoption and use. This could be seen in the case of marketing applications that are not popular with the enterprises due to the fact that most of them serve regional and local markets where they transact physically with their customers.

Level of highest education and ICT knowledge and skills was found to be significant factors influencing ICT adoption and use. It was noted from the survey that ICT adoption and use was high for enterprises whose managers/owners and employees had a higher level of education as well as of ICT knowledge and skills. Lack of ICT knowledge and skills by employees was rated highly as a barrier to ICT adoption.

Availability of funds was also found to Influence ICT adoption, and high cost of purchase and connectivity was rated as a major barrier to ICT adoption. Size of enterprise as well as the type of operations was also found to influence ICT adoption and use and ICT plans and strategies.

State of supporting infrastructure and policies were not very significant in determining ICT adoption and use. Lack of and poor infrastructure together with lack of supporting ICT policies were also considered as not so significant barriers to ICT adoption.

The survey found out that factors that would encourage ICT adoption and use are mainly ICT awareness and training, reduced cost of ICT and adapting to technology. Availability of credit and favourable ICT policy were of less significant.

### **Adoption Index and Depth Index**

Adoption Index was on average high while the depth index was found to be low implying basic use of the ICTs present by the enterprises. The results show that the ICTs used are limited. Usage of more advanced ICT tools and applications such as management Information systems, CAD/CAM, flexible manufacturing systems, e-commerce is still very low.

### **Factors affecting Adoption index and depth index**

Adoption index directly corresponded with the size of the enterprise and was higher for larger SMEs and lower for smaller SMEs. This was the same case with the depth index. Adoption index was high for older firms that had been in operation for longer periods and decreased with a decrease in the age of the firm. This could be attributed to the assumption that older enterprises are more established and therefore in a better position to adopt new technology as compared to 'young' enterprises that are still trying to establish themselves or trying to survive. The depth index was however highest with young enterprises i.e. those in operation for 1-3 years.

The service industry had a higher adoption index as expected from earlier findings than the retail and manufacturing. This is in consistent with the notion in the theoretical frame work that the service industry is more inclined to adopt ICTs as compared to the other sectors due to the nature of their operations in the industry. On the other hand, the manufacturing industry that has the lowest adoption index surprisingly has the highest depth index. This can be attributed to the use of more advanced ICTs probably in manufacturing and marketing as their markets are broader. Level of education and level of ICT knowledge and skills for both the owner/manager and employees had a direct correlation to adoption index and depth index and therefore ICT adoption. From the survey results, a high level of education and ICT knowledge and skills corresponded with a high adoption index and depth index.

The age of the owner/s like the age of the enterprise was found to have a positive correlation with adoption index. Enterprises whose owners were older had a higher adoption index. This can be attributed to the assumption that older owners are more established in their businesses and have a stronger and sound financial base hence are more ready to adopt new technology including ICT. Younger enterprise owners are more likely still trying to establish themselves in the business, and still building their financial base. However younger owners had a higher depth index as compared to their older counterparts.

Manager/owner ICT attitude was found to be directly related to adoption. From the survey, it was noted that those who had a positive attitude; those who thought ICT was very useful, affordable and could be learnt had a higher adoption index and depth index.

## **5.2 Answers to Research Questions**

Research questions guided the survey and hence the research answers to the research questions are vital. I had five research questions that guided this study which the survey findings help to provide the answers.

### ***What is the potential of ICT in addressing the challenges facing the SMEs?***

From literature review, we noted that SMEs faced problems unique to them which include; limited access to information, limited access to markets, inadequate access to skills and technology, poor access to infrastructure, inadequate know-how and linkages to large enterprises among others. (GOK, Sessional Paper No.2 of 2005). Access to information and access to markets and marketing information were noted as very severe constraints that prevented the SMEs from realizing their potential and competing effectively in the global market.

Survey findings indicated that ICTs were seen as tools that would facilitate communication and improve access to information as well as increase internal efficiency and competitiveness. Information is very crucial for the SMEs if they are to compete effectively in the present globalised information society.

- ✓ ICT especially those employed in marketing like E-commerce can help the SMEs expand their markets and find markets for their goods and services.

- ✓ ICT s applied in production e.g. flexible manufacturing systems and CAD can help SMEs produce quality products that can compete effectively in the markets.
- ✓ ICT has the potential of improving internal efficiency of the enterprises which can be translated to more income, expansion and growth. This is true especially for management information systems and office automation.

Therefore ICT adoption and use among other factors provides a lot of potential that can be harnessed by the SMEs to address challenges facing them.

***What is the Extent of Awareness by SMEs of the various ICTs available for Adoption and their Potential in increasing competitiveness?***

From the survey, it is clear that most respondents are aware of the various ICTs available for adoption and their benefits to their enterprises. The survey results however implies that majority of the respondents may not be well aware of the various ICT applications save for the basics ones. The respondents indicated that ICT had the potential of increasing access to information and markets, increasing efficiency. Few thought ICT could help improve their competitiveness. I think the word competitiveness could have been unclear to many of them.

***What is the Degree of ICT adoption by Various SMEs?***

The survey revealed that ICT adoption by SMEs was generally high as indicated by the average adoption index of 68. This was higher than I expected based on earlier studies. The service sector had a higher adoption rate as compared to the retail and manufacturing. Larger and older SMEs were also found to have a higher adoption index as compared to smaller and younger SMEs. As earlier said, the adoption index just measures the presence of ICTs in the enterprises.

Depth Index which is an indicator of the various ICT applications /degree of application was low with an average of 31%. This implies most of the enterprises only applied basic ICT applications.

### ***What Factors Influence ICT adoption and use by SMEs?***

From the survey findings, the following factors were found to influence ICT adoption and use in that order;

1. ICT knowledge and skills of the manager/owner and employees
2. Identified need for ICT/ perceived usefulness of ICT in the enterprise
3. Availability of funds
4. Type of market and customers
5. Type of enterprise business operations.

Few, 20.5 % of the respondents indicated that the state of infrastructure and ICT policies influenced ICT adoption and use.

These are in consistent with the findings of earlier studies; however the order of significance is different.

### ***How can ICT adoption be enhanced in the SME sector?***

ICT adoption can be enhanced by focusing on the Factors that influence adoption which are indicated in the previous answer to research question.

- i. This can be mainly through ICT awareness creation and training. This can be done in our education institutions, seminars and workshops focusing on SMEs.
- ii. ICT adoption can also be enhanced through reducing the cost of ICT, through subsidies and tax reduction, liberalization
- iii. Formulating favourable policies for the sector
- iv. Improving the infrastructure needed for the installation and use of ICT e.g. electricity, internet connections etc.

## **5.3 Conclusion**

The findings from the survey help us to draw some conclusions about ICT adoption and use by small and medium enterprises.

The survey results based on the adoption index indicate ICT adoption by SMEs in Thika Municipality was above average. This is higher than the expectations based on literature

review that indicated that ICT adoption in SMEs was low. Even though the adoption index is high, the depth index is very low implying SMEs only applied basic ICTs. Such kind of ICT applications may not be sufficient to address the challenges faced by the sector, hence the need to enhance ICT adoption and application to a higher level. Even though the adoption index seems to be higher than expected, it should be noted that comparably to large enterprises, this index is probably much lower. The studies showed that even within the SMEs, the larger SMEs had a higher adoption index compared to the smaller SMEs. This therefore suggests a gap in ICT adoption across enterprises based on their size.

Literature review suggested that various factors could influence ICT adoption by SMEs and the factors could be grouped into external factors e.g. supporting policies and infrastructure, and internal factors which are basically the enterprise characteristics and owner/manager characteristics. Findings of this survey suggest the same. A significant finding from the survey showed that ICT adoption was to a great extent influenced by internal factors to the enterprises as compared to external factors. Internal factors influencing adoption were; the size and age of the enterprise, the level of education and ICT knowledge and skills for the employees and owner, type of business operations, owner's attitude to ICT and financial status of the enterprise. On the other hand external factors could also have had a big influence on ICT adoption and use by the enterprises but the respondents may not be familiar with ICT and other related policies that affected ICT adoption hence they dwelt on the internal factors that are very clear and familiar to them. Never the less, policies can still be used to address internal factors that limit ICT adoption by SMEs.

## **5.4 Recommendations**

It has been noted that ICT adoption and use by SMEs was largely influenced by factors internal to the enterprise, it follows that efforts to enhance adoption should be focused on the internal factors.

Top on the factors that the survey showed to influence adoption and use were; perceived need for the ICT, level of education and ICT knowledge and skills and cost of purchase and connectivity. The following are recommendations based on the findings;

- i. The government and various stakeholders should step up ICT awareness among SMEs.

- ii. ICT training should be emphasized in schools and other training institutions.
- iii. Training forums for SME owners, managers and employees should be encouraged.
- iv. ICT strategy should lay some emphasis on enhancement in the SME sector as it is a very important sector which contributes enormously to our country's economy.
- v. Government policies should encourage adoption as well as address other factors internal to the SMEs that limit them from adopting ICTs. Policy considerations should integrate and address both enterprise characteristics and owner characteristics notably perceptions
- vi. Since the cost of ICT is high for most of the SMEs the government should subsidize the cost to the SMEs especially for computer related ICTs and also reduce taxes that are a cost included in the purchase and use of various ICTs.
- vii. The government through its relevant arms should encourage and facilitate linkages between SMEs and large enterprises for knowledge and technology transfer.
- viii. There is need for ICT providers to come up with tailor-made ICT applications for SMEs considering their unique characteristics and challenges.
- ix. Where the cost of purchase is considered prohibitive especially for the small enterprises, they can link together and share some facilities or they can outsource the same from providers.

## **5.5 Suggestions for Further Study**

The following areas are suggested for further research;

- ✓ Further Study on SME characteristics and practices with regard to their effects on ICT adoption.
- ✓ Further research may be necessary to shed some light on the real influence or impact of ICT adoption and use on enterprise competitiveness.
- ✓ Research on ICT and related policies and their implications to ICT adoption and use by SMEs.

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## 7.0 APPENDICES

### Appendix 1: Questionnaires

#### Appendix 1 A: Covering Letter for the Questionnaire

**Mary N. Kiveu,  
Kenyatta University  
P.O Box 43844 – 00100,  
GPO, Nairobi.  
28<sup>th</sup> November, 2007.**

#### RE: Completion of Questionnaire

I'm an MBA student (Entrepreneurship option) at Kenyatta University carrying out research on ICT adoption by Small and Medium enterprises as part of my project which is a requirement for the award of a degree.

The purpose of the Survey is to investigate the degree of ICT adoption by Small and medium enterprises and the factors influencing the adoption by the various enterprises. This information is important for use by various stakeholders to enhance adoption in order to improve the competitiveness of the sector.

Please complete the attached questionnaire as honest as possible to the best of your knowledge. Try and answer all the questions even if you feel some may not apply directly to your enterprise. Your answers are essential in providing a true picture of the status of ICT adoption and use by Small and Medium enterprises.

## Appendix 1B: Questionnaire

### A: Enterprise Profile

1. Name of Enterprise.....

2. Address of Enterprise

.....

3. Type of Enterprise (Tick as appropriate)

- Manufacturing
- Service (Specify kind of service)
- Retail

4. Type of Ownership

- Sole proprietorship
- Partnership

5. No. of Permanent Employees (Tick as appropriate)

- 5 -9
- 10 -49
- 50-99

6. Average level of Education of the Employees (Tick as appropriate)

- Primary
- Secondary
- Tertiary

7. Average employee ICT knowledge and skills is.....

- None
- Below average
- Average
- Above Average

8. What is the Average age of employees?

- 20 – 30 yrs
- 30 - 45 yrs
- Above 45

9. How many years has your Enterprise been in operation?

- 1-3 years
- 3-10 years
- Over 10 years

10. Which of the following best describes the primary markets that your business serves?

- Local
- Regional
- National
- International

11. Which of the following best describes your business operations?

- Simple
- Fairly simple
- Requires specialized tools and expertise

12. Which of the following in your opinion best describe your enterprise's financial status?

- Good
- Fair
- Bad

13. What is your enterprise' approximate Annual turnover?

- Less than 10,000
- 10,000 – 50,000
- 50,000 – 100,000
- Above 100,000

## B. Owner/ Manager Profile & Characteristics

14. What do you understand by the term ICT?

---

15. What is your level of ICT Knowledge and skills?

- None
- Basic
- Advanced/Specialized

16. What is your experience with ICT applications?

- None
- Minimal
- Average
- A lot of Experience

17. What do you feel about ICT? It is.....

- Complex and hard to use
- Fairly complex but can be learned
- Simple and easy to use

18. In your opinion ICT is.....

- Not useful
- Limited usefulness
- Very useful

19. What do you think about the cost of ICT? It is.....

- Affordable
- Costly
- Very costly

20. What is your highest level of education?

- Primary
- Secondary
- Tertiary

21. What is the average age of owner (s)?

- Below 30
- 30 – 40
- 40 - 50
- Above 50

### C. ICT Adoption and Use

22. What kind of ICT tools does your Enterprise have? (Tick as appropriate)

- Fixed Telephone
- Mobile telephone
- Fax Machines
- Computers
- Others (specify)

23. What type of applications do you use ICT for?

- Office automation e.g. MS word, Spreadsheets, databases, Accounting packages
- Communication
- Production e.g. Knowledge systems, CAD, CAM
- Management; Management Information Systems, Decision Support systems
- Product Marketing/ E-Commerce

24. Does your enterprise have a web page?

- Yes
- No

25. What is the frequency of ICT use? (Tick as appropriate)

Type of ICT	Occasional	Frequent	Very Frequent
Fixed Telephone			
Mobile Telephone			
Fax machine			
Computers			
Others (specify)			

26. What are the reasons for your enterprise adopting the ICTs that you have?

- To improve business efficiency
- To expand our markets
- To improve Communication
- Others (Specify)

27. What purposes does ICT serve in your enterprise?

Purpose	Not Applicable	Applicable	Very Applicable
Communication			
Automation			
Marketing			
Information management			
Market research			

28. What are the Benefits of using ICT in your enterprise?

- Improved competitiveness
- Increased internal efficiency
- Expanded market and customers
- Increased sales
- Improved access to quality Information
- Other Specify

29. What factors have determined adoption of ICT in your Enterprise?

- Availability of funds
- Identified need for ICT
- The level of Employee ICT skills
- The state of supporting infrastructure and policies
- Cost of ICT acquisition and Maintenance
- Type of market and customers

30. Does your enterprise plan to expand ICT adoption and use in future?

- Yes
- No

Explain:

.....

.....

31. Which of the following factors would influence your ICT plans and strategies?

Factor	Not Applicable	Applicable	Very Applicable
Availability of Funds			
ICT knowledge and skills			
Perceived usefulness			
Type of Enterprise operations			
Size of Enterprise			
Type of market for goods and services			

32. Which of the following factors could encourage ICT adoption and use by firms like yours?

- Reduced costs of ICT
- Improved Infrastructure and connectivity
- Availability of Credit
- ICT awareness and training
- Favorable ICT policy
- Other (Specify)

33. What are the perceived barriers to ICT adoption and use by SMEs?

- High costs of purchase and connectivity
- Lack of awareness of which ICT to apply
- Unreliable network and network problems
- Lack of and poor supporting infrastructure
- Lack of Supportive ICT policies
- Enterprise does not require ICT
- Lack of ICT knowledge and skills by the employees

***Thank you for taking time to complete this questionnaire. If you have any queries please do not hesitate to contact Mary on 0722-508553.***