FACTORS INFLUENCING ACCESS AND UTILIZATION OF INFORMATION COMMUNICATION TECHNOLOGY FOR DEVELOPMENT, AMONG RURAL COMMUNITIES IN KENYA: THE CASE OF THARAKA DISTRICT

BY

BENEDICT M NGANGA

A RESEARCH PROJECT REPORT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF MASTERS OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI

November, 2012

DECLARATION

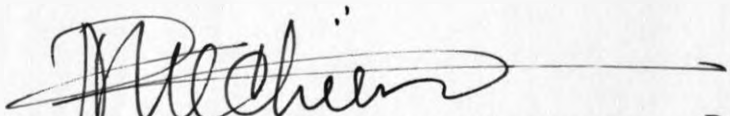
I declare that this research project is my original work and has not been presented for award of any other degree in any other university.

Date 30/11/12

NGANGA BENEDICT MUSAU

L50/76006/2009

A research Project submitted for examination with my approval as the Supervisor.



Date 30/11/12

Dr. Patricia Muchiri

Lecturer Department of Extra Mural Studies, University of Nairobi

DEDICATION

To my late Father, Simon Nganga Mulwa, my brothers Leonard Mativo and Martin Wambua for offering unswerving support materially and emotionally in my education up to university level.

And

My daughters: Fridah Musau, Diana Musau and Sheila Musau,

My wife: Ruth Mukonyo and My Mother Veronica Ndindi

For their patience, encouragement and sacrifice.

ACKNOWLEDGEMENT

This demanding Research work would have not been possible and accomplished without the great support I received from my lecturers, supervisor, colleagues and friends who devoted their precious time, resources, technical and incredible creative advice.

My special gratitude to my supervisor Dr Patricia Muchiri who continuously provided counsel on how to draft and organize the project proposal, for her patience, humble and professional critique, guidance and assistance given to me throughout the process of developing the project proposal paper and in accomplishing this Research Paper Report

I feel highly indebted to my lecturers Dr. Gakuu, Dr. Kidombo, Prof. Pokhariyal, Prof. Macharia, Dr. Agaya among others who professionally guided in completion of my class course work and laid a firm and solid foundation for career in project management.
Special gratitude to my wife Ruth Mukonyo and my children Frida Mutheu, Diana Nduku and Sheillah Mutindi, my parents, my brothers and sisters for their unswerving support, encouragement and understanding throughout my study period.

Finally, I wish to extend my broader and special thanks to Mr. Peter Muthini, Mr. Nicholas Kitua, Mr. Clement Tongi, Dr. Kioko, for being there as comrades and close friends for their unbelievable support both morally and materially during my study period.

TABLE OF CONTENT

Title **Page**

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ICT4D	Information Communication for Development
ICT	Information Communication Technology
IEA	International Energy Agency
DSG	District Steering Group
DDP	District Development Plan
ECOSOC	United Nations Economic and Social Council
ECP	Embu Community Program
SIDA	Swedish International Development Agency
NECTEC	(Thailand's) National Electronics and Computer Technology Center
PC	Personal Computer
UN	United Nations
UND-PAPID	United Nations Development Programme for Asia and Pacific Information for Development
UN-IER	United Nations Information Economy Report
UNESC	United Nations Economic and Social Council
ITU	International Telecommunication Union
SLM	Living standard measure
CCK	Communication Commission of Kenya
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
KARF	Kenya Association for Researchers Foundation
F G M	Female Genital Mutilation
UN ICT	United Nations Task Force on Information Communication Technology
UNESCAP	United Nations Economic and Social Survey of Asia and Pacific
KCA	Kenya Communication Amendment Act
VoiP	Voice over internet Protocol
UNECA	United Nations Economic Commission for Africa
DOT	United Nations Task force in understudying use of information

	communication technology for development
GKP	Global Knowledge Partnership
ISP	Internet Service Providers
EJISDC	Electronic Journal on Information Systems in Developing Countries
WTISD	World Telecommunication and Information Society

ABSTRACT

The purpose of this study was to establish the factors influencing access and utilization of information communication technologies for development in rural areas of Kenya and specifically in Tharaka District. The study adopted descriptive survey design within a target population of 139,058 people in Tharaka district. The research instruments used were combination of questionnaire and interview schedules as the main instruments while observation and transect walk was employed to capture data on the observable/countable variables. The questionnaire was structured and semi structured, open ended and closed. To test the validity of the instruments, a pilot study was undertaken prior to the main study while split half method was used to determine the reliability (internal consistency of the instrument) during the pre-test. The data collection procedure entailed personally visiting heads of the government and other stakeholders' institutions to seek permission to collect data from the target respondents. Descriptive and inferential statistical tools were used to analyse the data. Microsoft excel and SPSS were used for analysis of frequencies while Pearson correlation coefficient was used to find the influence of one variable other the other. The data was presented using tables and frequencies along the descriptive presentation. The study revealed that level of education influenced access and utilization of Information and Communication Technology for development in Tharaka, the technological application factors influenced access and utilization of Information Communication Technology for Development in Tharaka District in that many respondents indicated they had challenges on how to apply the technology in their work. The socioeconomic factors were also found to have influenced access and utilization of Information Communication Technology for Development in Tharaka District for that majority of CBO members indicated they did not have a monthly income and majority of schools lacked power connectivity due to inability to pay for the monthly. The study also revealed that legal framework influenced that utilization of Information Communication Technology for Development in Tharaka District as majority of the members were not aware of government policies and regulations in relations to ICT access and utilization. Per the study findings, infrastructural development influenced the utilization of Information Communication Technology for development in Tharaka District as majority of the respondents indicated lack of power source, telecommunications masts and inaccessibility most of the district due to poor road network. The conclusion of the study was that the five variables namely level of education, technological application, infrastructural development, socioeconomic and government legal framework greatly influenced access and utilization of information communication for development in Tharaka district. The researcher recommended that government and other stakeholders to do the following, find alternative source of power for the community, disseminate and create awareness to the community and learning institutions on the existing ICT policies and application of ICT in development. That school boards, management and district education office to create awareness on value of ICT in learning in order for the committees to prioritize the same during resource allocations and that learning institutions should take lead in introduction of ICT in their operation to spur its rollout in the community. Recommendations were made for further study on factors hindering effective dissemination of government policies, how to community can be supported to effectively apply various ICT tools in development and further detailed study on how individual categories of learning institutions were using ICT in their business.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Information Technology for Development (ICT4D) is concerned with applying information and communication technologies to development goals and poverty reduction. The Information Communication Technology (ICTs) is the means that facilitate the production, storage, processing, communication and transmission of information electronically. The ICT tools include computers, Internet, satellites, wireless technology (mobile phones), radios, videos and televisions and their accessories. The tools for ICT are varied set of goods, applications and services. According to United Nations Development Programme-Asia Pacific Development Information Programme (UND-APDI, 2004), ICT tools are used to store, process, distribute and exchange information.

The international development sector has become focused in recent years on the need to share knowledge more effectively in support of poverty reduction efforts. Multi and bi-lateral agencies and Non Governmental Organizations are increasingly putting knowledge sharing at the centre of their organizational strategies.

The Dot Force (2001) defines context of a perceived 'knowledge divide', as the widening gap in ICT access and usage between the developed and developing countries. They noted the increasing need in addressing the challenge of how to respond to the knowledge needs of people living in poverty in developing countries, and of which Kenya is part of and in deed Tharaka District is not exceptional.

The challenge for information providers in development is how to share information with people who have little access to ICTs, low levels of literacy, little time or money, and highly contextualized knowledge and language requirements. According to Paisley & Richardson (1998), for many years reaching people living in poverty was characterized as the 'last mile' problem; a terminology which seemed to carry negative connotations hence they refocused the same as connecting the 'first mile'.

Sachs (1992) sees the concept of 'development' as having been evolving since its origins after the Second World War. He dates the 'age of development' as beginning after the Second World War, when President Truman at his inauguration described regions in the South as 'underdeveloped'. International organizations such as the World Bank and the United Nations were established to support international relations and their agenda have influenced the discourse on development ever since.

The priorities of the international development community have shifted over the years from a focus on economic development and growth; international bodies have begun to focus on poverty as a multidimensional phenomenon and to acknowledge the various contributory factors to poverty such as a lack of access to markets and services or vulnerability to shocks. In his paper, Heeks (2009) says communication has consistently been central to the work of development agencies, but in recent years the recognition of information and knowledge as contributing to growth, as well as the vogue for knowledge management and the massive expansion of ICTs have highlighted the importance of knowledge for development.

World Bank (1998) published a report on "Knowledge for Development" which noted that many international initiatives have been established to harness ICTs for development on a global scale. These include the Global Knowledge Partnership (1997), the DOT-Force (2000) and the UN ICT Task Force (2001). There is a consensus that ICTs can play a huge role in development, by connecting people to more accurate and up to date information, equipping them with new skills, connecting them to an international market and more. However, there is concern that the 'digital divide' is increasing the gap between the 'information haves and have nots' and this is the preoccupation of many of the initiatives established to address ICTs for development.

It is important to appreciate that in recent times Information Communication Technology has become key focus as a tool for development both in developed and developing world. Many Governments, private companies, public institutions, non governmental organizations, cooperative movements and organized groups have come to appreciate the role Information technology can play in enhancing socioeconomic development.

In his paper, Brown (2001) concluded that although Information Communication Tools are not a magic bullet, they can provide "powerful ammunition in the fight against poverty". The G8 (July 2000), underlined the growing gap in access and utilization of ICTs and the importance of harnessing the same in the service of equitable development, by declaring that "everyone, everywhere should be enabled to participate in...the benefits of that global information society." This statement was captured in The Okinawa Charter on Global, Information Society, which signaled a new global focus on ICT4D. The hope of Okinawa is that given the right enabling environment, ICTs can be leveraged by poor countries, communities and individuals to "leapfrog" into a more empowered, equitable and prosperous future.

The United Nations Information Economy Report (2010) indicates that, in recent times, ICTs are creating millions of new jobs and micro-enterprises in developing countries. Kleine (2010) concurs with this report by concluding that ICTs' have great value in enabling choice and capabilities of individuals while Chambers (2010) notes that ICTs and web 2.0 are rapidly expanding range of possibility for engaging in participatory methodologies. The social and economic networks created through ICTs have widely contributed to rapid development in the developed world. "The novel information networks are beginning to change how international development is conducted" (Quaggiotto and Wieleznski, 2007, Thompson, 2000, Heeks, 2010)

The Government of Kenya through various line Ministries has developed and adopted several policy documents in the use and support of Information Communication Technology for Development. This is crucial for the attainment of the Country's vision of becoming highly industrialized nation where all citizens will enjoy high quality of life by the year 2030, as reflected in the Kenya's blue print of Kenya Vision 2030 document. The Kenya government zero rated tax on computer and their accessories to incentivize access and utilization. In addition, the government through Kenya Communication Amendment Act - KCA (2009) introduced the universal access fund contributed by the locally registered Telecommunication Service Providers to ensure additional support in accessing the services to the hard to reach areas.

The issue of Point of Presence and Public Access Point or Collective Access Centers and universal access fund were also introduced under the same act. However, this has not guaranteed the access and utilization and perhaps more need to be done through awareness creation to the public on how the ICT tools may be of use especially in opening access to e-government services and other benefits accruing from the application of the tools.

In order to invigorate and enhance access to information and pass skills and knowledge both in rural and urban areas, ICT is among the core pillars on which the Kenyan vision 2030 is anchored. The Government of Kenya through the parent Ministry of Communication established Information Communication Board (ICT Board) in 2007 to help the government to achieve information based society as a government priority. It also has a mandate of contributing in the process of improving government operations as outlined in the e-government strategy. The government had previously established Communication Commission of Kenya (CCK,1999) with a mandate to license and regulate telecommunications, radio communication and postal/courier services in Kenya.

It also issues licenses to Internet Service Providers (ISPs) as well as other communication devices that go beyond unlicensed frequencies. The commission is responsible for developing and co-coordinating the policies and strategies with respect to development and operation of telecommunications services in Kenya. The net benefits for this initiative is efficient service delivery in the public sector leading to improved economic growth and hence reduction of poverty and sufferings of the more than 80% of Kenyans who live in the rural areas. Key among the proposed success projects are the digital villages in every part of the country to enhance information sharing for development. This is in addition to gathering and disseminating information on various development spheres such as health, education, commodity market surveys, e-commerce, banking and e- learning. It will also create employment opportunities for the Youth who are core to development of any country. Through trainings on use of ICTs, the capacities of the communities will be definitely enhanced, (CCK 1999).

1.2 Statement of the Problem

There is very limited access and low utilization if any of information communication technology tools as means of alleviating poverty, advancing development, information access and accountability in Kenya, (CCK 1999). This is despite the great potential of these tools and the same having been assessed and found to invigorate socioeconomic, cultural, political and technological development in both developed and developing countries. The Electronic Journal on Information Systems in Developing Countries (EJISDC) (2011), cites International Telecommunication Union (ITU) report which indicate that only 26 per cent of the world's population were using the Internet which is a slightly significant rise of 13.2% (up from 13.2 per cent in 2004), with four out of five people in the developing world still being excluded from the benefits of being online.

Tharaka District the proposed area of study is among the most marginalized Districts in Kenya with high poverty levels of over 58.6% according to Kenya Economic Household Survey (2007).

Fig 1: Map of Kenya indicating Tharaka district

The area has low education standards, high illiteracy levels among the Youth and Adults as per Tharaka District Education Survey (2008) and The District Development Plan (2008-2012). The area has very limited electricity network, poor road infrastructure and network. No supply chain for newspapers or Magazines as only few reach the area a day or two after publication and mostly to NGOs and Government offices only- no vendors

for the same in the district. Tharaka is among the hard to reach geographical areas of Kenya and among those categorized as having most of its area not receiving or receiving very weak mobile signals as per Communication Commission of Kenya Study (2007). This therefore qualifies the district to be among the most excluded in Telecommunication Network among others.

The Tharaka Community has remained among those still clinging to old traditions and cultural practices such as Female Genital Mutilation (FGM), and "Kirimo" (a traditional rite of passage for boys). School drop out rate is among the highest in the Eastern Province with most schools assigned less than the prescribed Ministry of Education number of teachers according to Tharaka District Education Survey (2008). This signifies low literacy level in the Community and possible limited exposure to factors of development as education is widely seen as a key driver in development within an area.

Tharaka District is prone to natural disasters such as drought, famine, forest fires and livestock diseases which have a highly negative impact on the socioeconomic development of the Community according to the District development Plan (2008 -2012) and District Disaster Steering Group report (February 2011).

In Kenya and in most African countries, most academics/scholars are being left behind in the rush to research how communication technologies can help in development. This is according to reports shared in a London Conference on Information and Communication Technology and development (September 2010) where only 9% of the contributions on ICT4D came from Africa. This clearly indicates the area of information communication technology in general and specifically for development is receiving little attention from scholars and development workers despite its critical role in facilitating development in areas of governance, health, Micro enterprises, education and research in Africa. A review on impact of ICT4D by Heeks (2009) reveals that most of existing researches on ICT4D have focused more on policy issues, technological advancement and of late the impact. This shift in focus assumes that access and utilization factors are no longer as issue yet individuals, communities and governments in most developing countries are still struggling to deal with the factors affecting availability and usage of ICTs in

development. While some of the access factors may have been addressed, the utilization of the ICTs in development is still a challenge hence need for continuous research to reveal the more hidden and underlying factors if the benefits of ICTs in invigorating development are to be realized in the developing countries.

It is on basis of the above aforesaid factors that the proposed study aimed at establishing factors that affect access and utilization of communication technology for development in Tharaka District and the same will be generalized as applicable to similar rural areas of Kenya. This was necessary as the country prepares to implement the devolved government system which aim at empowering communities to participate in planning and making of critical decisions of the day today activities and participate more in own development. The effective use of ICTs will lead to easy access to e-government information such as various policies, allocation of funds, e-learning; improve on disaster risk reduction and inclusion of the marginalized and excluded groups and individuals within the community. Therefore, ICT4D is not a choice but a requirement for all.

1.3 Purpose of the Study

The purpose of the study was to establish the factors influencing access and utilization of information communication technologies for development in rural areas of Kenya and specifically in Tharaka District.

1.4 Objectives of the Study

To achieve the purpose of the study, the following research objectives were developed

1. To examine how the level of education influences access and utilization of Information and Communication Technology for development in Tharaka District
2. To determine the influence of socioeconomic factors in access and utilization of Information Communication Technology for Development in Tharaka District
3. To find the influence of technological application factors in access and utilization of Information Communication Technology for Development in Tharaka District

4. To establish the influence of the legal framework in utilization of Information Communication Technology for Development in Tharaka District

5. To determine the influence of infrastructural development in utilization of Information Communication Technology for development in Tharaka District

1.5 Research Questions

Below were the research questions developed based on the above research objectives

1. How does the level of education influence access and utilization of information communication technology for development in Tharaka District?
2. How do the socioeconomic factors influence access and utilization of information communication technology for development in Tharaka District?
3. What is the influence of the technological application factors in access and utilization of information communication technology for development in Tharaka District?
4. How does the legal framework influence access and utilization of information communication technology for development in Tharaka District?
5. What is the influence of infrastructural development to the access and utilization of information communication for development in Tharaka District?

1.6 Significance of the Study

The study may be of significance to Community Members who may appreciate the value of the information communication technology as tools for development and how to apply them within the various dimensions of development. They may be able to share information for socioeconomic development purposes among the various groups and individuals as well as for the general development in the district small & Micro Enterprises may also gain deeper understanding on how to take advantage of the ICT tools to improve on their business performance through linkages and social networks. This may help them optimize on their profits hence their enterprise growth.

The findings may help institutions in shaping policies which may foster usage of ICTs for development within their operations. The institutions which are involved in supporting ICT4D and other related projects may gain deeper understanding of current factors that may be barriers to the success of the same and possible solutions based of the study recommendations. The study may also help to enhance coordination of the activities of the institutions.

The study may help the government in provision of guidance on revision and enactment of policies that may invigorate and guide the integration of ICT4D within its departments and private sectors. This report may be used by other researchers to provide insight on issues touching on Information Communication Technology for Development especially the gaps that may be identified. It may also assist in validating the existing theories and findings on factors influencing access and utilization of ICT4D as well as adding to the wealth of knowledge in the field.

1.7 Scope of the Study

This study dealt only with issues concerning factors influencing access and utilization of information communication technology for development in Tharaka District. Other districts were not covered in this study although they may have similar conditions like the district under study.

1.8 Basic Assumptions of the Study

In this study the following assumptions were made.

The members of CBOs had an understanding of the concept of access and utilization of information communication technology. The members of the CBOs and other respondents would willingly participate in the interviews and that the information they gave on access and utilization of ICT4D was honest.

1.9 Limitations of the Study.

At the District level the Information and Communication Technology sector was not very well structured and established. This created a challenge in collecting ICT4D data from

the Government Departments and the researcher had to rely on a respondent from Meru District who also doubles as the Information Officer for Tharaka District. This may have compromised some of the information/data given by the department. The Teachers strike which took place interrupted the data collection from learning institutions hence affected the set time frame for the data analysis and report presentation. Some of the areas were hard to reach as there were no means of transport to some of the places were some of the target CBO Committee Members live.

1.10 Definition of Significant Terms

Access: Availability and affordability in terms of cost, time and space

Influence: Either positive or negative effect on a situation.

Communities: Individuals or group of people of the same or diverse cultures living within the same geographical area

Development: Positive social and economic progression

Diffusion: Flow or spread of the technology within a given area.

Information Communication Technology for Development: The use of computers, televisions, radios, mobile phone handsets, landlines and satellite phones, internet as well as use of video for disseminating, conveying and exchanging information.

Utilization: Use of the ICT tools and or the way in which an individual, group(s) or institution(s) make use of the ICT tools in their businesses or daily undertaking

Rural Communities: People settled and living in rural areas of the country

Level of Education: Primary Certificate of Education or dropout before completing class 7/8, Secondary Certificate of Education or dropout before completing form 4/6, University or Higher Degree

Level of Institution: Primary School, Secondary School, Tertiary/ Colleges or University

Socioeconomic factors: Events/occasions/values/norms/practices within a given community and how they interplay in defining individual or group behaviors, conduct and actions while economic are issues of wealth, property, asset ownership, income control and use of the same.

Technological Application: How individuals, groups and institutions apply information communication technology daily operations and management of their businesses or daily

undertaking.

Legal Framework: Set rules and regulations which governor acquisition and use of ICT tools in Kenya

Infrastructural development: Physical Infrastructures inform of Roads, Telecommunication masts, Power lines, and Government and Service Providers offices

1.11 Organization of the Study

The study was organized in five chapters. Chapter one dealt with the background of the study, statement of the problem, purpose of the study, objectives and subsequent research questions. In this chapter the significance of the study and the limitations of the study were provided. Finally significance terms are defined as used in the study. Chapter two dealt with literature review, conceptual framework and summery of the literature reviewed. Chapter three dealt with research methodology used in carrying out the study which included research design, target population, sampling procedure and sample size, research instruments, validity and reliability of the instruments ,data collection procedures, data analysis tools, ethical issues and presentation of the operationalization table. Chapter four dealt with data analysis presentation and interpretations based on the research objectives and questions while chapter five dealt with summery of the study findings, discussions, conclusions, recommendations and suggestions for further research.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The literature review covers the factors influencing access and utilization of information communication technology for development based on the selected variables as contained in works of previous researchers on the same. It covers variables on education, socioeconomic, technological application, policy and other government regulations as well as infrastructural development.

2.1. Theory Supporting the Study

2.2. Diffusion of Innovations Theory/Model

This theory stipulates that diffusion of innovations is the how, why, and at what rate new ideas and technology spread through cultures. Everett Rogers (1962), a professor of rural sociology, in his book "Diffusion of Innovations" observed that "diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" Under this theory, Rogers came up with four main elements that influence the spread of a new idea: he named them as the innovation, communication channels, time, and a social system. The diffusion of innovations many a times manifests through various ways in different cultures, environments and can be subjective at times especially in relation to those adopting the same and the decisions involved in the innovation processes. The above aforesaid elements of diffusion imply that innovation is communicated through certain channels over time among the members of a social system. Rogers indicated that those benefiting from the innovations would therefore progress through the following main phases: Viz: knowledge, persuasion, decision, implementation, and confirmation. When an innovation is adopted, it spreads vide various communication channels. During communication, the idea is rarely evaluated from a scientific standpoint; rather, subjective perceptions of the innovation influence diffusion. The process occurs over time. Finally, social systems determine diffusion, norms on diffusion, roles of opinion leaders and change agents, types of innovation decisions, and innovation consequences

Information and Communication Technologies for Development (ICT4D) refers to the use of Information and Communication Technologies (ICTs) in the fields of socioeconomic development, international development, human rights and poverty eradication. This presupposes that when there is more and better information and communication in a given locality, the same will invigorate development in that given community.

The diffusion theory relate to this research on factors influencing access and utilization of information communication technology among rural communities in Kenya, in that, for the ICTs to invigorate development, they need to be applied/used within the context and understanding of other factors affecting community development, poverty, agriculture, healthcare, and basic education. Heeks (2010), gave a breakdown of the association of ICT4D where the I, is related with "library and information sciences", the C is associated with "communication studies", the T is linked with "information systems", and the D for "development studies". The use of ICTs in development is seen to as a bridge of the "digital divide" and can aid economic development by fostering equitable access to modern communications technologies.

Based on this diffusion of innovation theory, the researcher will focus on establishing the how, why and what influences adoption of information communication technology and application of the same in development among rural communities in Kenya and specifically in Tharaka district. At the end of the study, the researcher will link the findings to the theory

2.3 Level of Education in Access and Utilization of Information Communication Technology for Development

According to United Nations Development Programme (2001), language is a key factor in the utilization of information communication tools in development and alleviation of poverty. The agency says that language is important when it comes to utilization of ICTs especially in the operation and application in development since one needs to

understand the required skills and the operational language. This implies that literacy is a key determinant of the level of access and use of ICT tools at ones disposal.

According to Eagle, (2009), the issue of ICT4D use has been associated with access where the latter is seen in terms of ability to manipulate ICT tools for the intended purpose along with availability and affordability. In a sessional paper on mobile phones and development, mobile divides; gender, socio-economic status and mobile use in Rwanda, Blumestock and Eagle, (2009), found out there was high disparity in access where those who had mobile phones were seen to be different from the "normal" people as mobiles were associated with the "better off" members of society who were better educated and wealthy.

While studying pattern of food utilization in Iranian households, Lashgarara, Mirdamadi and Hussein, (2010) acknowledged the usefulness of ICT tools in disseminating the required knowledge and information in terms of research findings, extension services, social development amongst others an approach which would help to improve food security among the rural Iranians. However, they identified high illiteracy levels among rural communities as barrier to their ability to utilize ICT tools in development. In conclusion of their study, among their key recommendation was eradication of illiteracy of rural people and promoting technical information infrastructure among others.

A survey conducted by Kenya Advertising Research Foundation (KARF, 2008) for media houses revealed that the main languages spoken at home were vernacular (81%) ,Kiswahili (18%) and English at (1%).The study also showed that for vernacular speakers, the favorite radio stations were for vernacular at (48%), for Kiswahili stations(29%) and English at (23%). The study also showed that the incidence of listening to vernacular was (68%) of the total incidence. This occurred at (73%) in rural areas and (62%) in urban areas. The implication is that ICT tools whose operational language was in vernacular would attract majority users in Kenya. In relation to the area of the proposed, only (45%) of the Tharaka community had access to Muga FM which broadcast in Tharaka language (KARF 2007).

In addition to the above, many researches conducted world over indicate that distribution

of ICT users to be highly influenced by repeated demographic patterns that affect the common profile of users with the same being skewed to young educated adults with access to a disposable income (Guida and Crow, 2009). The above has a significant effect in ICT access though it cannot be considered as inherent factor in people's ability to learn how to make use of the tools, Mitra (2009). On the other hand, Hellstrom (2010) in his presentation of SIDA review on the Innovative Use of Mobile Applications in East Africa observed that, Nokia had identified language issues and poverty as among the profound challenges in developing mobile hand sets and that the company was focusing on designing a cell phone that will sell to essentially the "only people left on earth who don't yet have one, making $4 per day or less and have no easy access to electricity, the challenges are considerable.

Heeks (2010) pinpoints that the people with low level of education can use intermediaries to make calls or access internet if available or within reach thus downplaying the critical role of education in utilization of ICTs. Lekoko and Morolong, (2006), have the same view as they also argue that the poor and lowly educated people tend to use their creativity and ingenuity instincts to manipulate the tools for their own good provided the design is appropriate for their elementary level of education. This is based on an experiment they conducted among young children in India on use of computers baptized "hole in the wall" a five year project (1999 to 2004) in 22 villages. The findings revealed that despite limited access to computers, over 40,000 children from poor families developed capabilities to use a computer and surf the web without any support from tutors. They progressively learned on their own and supported each other to understand how to use the computers with discovery of different application at a time and to use the same each new day.

Within this dimension of education as a factor in utilization of ICT for development, Best (2010) is of the view that, it is not the level of education that matter but the ability of the users to interact that determine the access and utilization of ICT4D.He indicates that, public cyber cafes exert great influence in utilization of ICTs such as computers and internet services as they provide opportunity for learning and knowledge acquisition. This happens through what he refers as co-present interactions in public cyber cafés. Best

argues that even those with skill deficit are able to be influenced by peers and social networks to utilize and learn computer skills.

In the above referenced studies, education as factor of access and utilization was not studied alone but along other factors hence one can argue that an in-depth study my be desirable before fully making a judgment of the level of influence of education in the access and utilization of the ICT tools in development.

2.4 Socioeconomic factors in Access and Utilization of ICTD

Socio-economic factors are critical in development of any sector as they determine the level of the commodity acceptance by the public thus creating demand as well as whether the public in a given area is able to afford a given commodity or service and sustain the usage. The United Nations Information Economy Report (UN-IER, 2010), observes that many decision-makers in some developing countries as well as in the international development community still remain skeptical or unaware of the contribution that ICT can make to development. The above will point to the likely aspect of resource allocation and prioritization especially when top decision makers both locally and internationally cannot appreciate the role of ICTs in invigorating development. Heeks (2010) says that creating digital opportunities is not something that happens after addressing the "core" development challenges; it is a key component of addressing those challenges in the 21st century. For ICTs to play a key role in development, they need to be factored the as part of the whole development process and assigned respect budgets just like any other component of a project.

Heeks (2010) in his presentation on ICT4D observed that the issue of scalability of Telecenters has proved untenable in many developing countries where they have been rolled out mostly due to sustainability factor. Telecenters were established in most of the Asia pacific countries with aim of accessing ICT4D to the rural communities in these countries. They were initially fully funded by government and provided free or highly subsidized internet and computer services. Most governments had hope that the telecenters would sustain themselves with time. The sustainability factor hinged on the user ability pay for maintenance cost, browsing, learning and even printing and faxing

service which were being offered in the centers. This argument by Heeks 2010 implies that those who had not accessed the ICTS before and had hope of accessing the same in the centers may not do so today, while those who had the opportunity before and cannot afford to pay, are no longer accessing and utilizing the ICTs for development.

Harris et al, (2003), who had indicated that the non sustainability of the telecenters was due to the fact that most of the governments and non governmental organizations who supported the initiatives even within poor communities expected that after investing the seed capital, the telecenters would be viable enterprises which would be able to cover their operational costs and sustain profitably to the advantage of local business people.

A United Nations Economic Commission for Africa (UNECA, 2005) review report indicated that there was clear absence of ICT in poverty reduction papers. The report notes that the existing world "digital divide" is in effect, a reflection of existing broader socio-economic inequalities that is characterized by insufficient infrastructure, high cost of access, inappropriate or weak policy regimes, inefficiencies in the provision of telecommunication networks and services, lack of locally created content, and uneven ability to derive economic and social benefits from information-intensive activities.

In the developed world, half of their populace is online while only 15% of population in the developing world is online. The access is also geographically and socially biased especially in Africa where 90% of the subscriptions are in Algeria, Morocco, Egypt Tunisia and South Africa. Worldwide, there is also a gap of broadband speed and cost which is most expensive in Africa (ITU, 2010).

The developed countries managed to have deeper penetration and diffusion of ICT4D through introduction of a Personal Computers (PC) connected to internet through a landline. The approach which was affordable and considered viable by the developed countries in 1980 and early 1990s enabled them to rollout ICT4D in most parts of their countries especially rural areas. However, this kind of rollout has proved a hard nut to crack in the developing countries due the high costs involved vis a vi other priorities like the provision of basic requirements to citizens as well as the end user ability in the poor

south to afford the service.

During the above said period, only few private institutions and mostly multi nationals with a few government departments in the developing countries could afford the technology whose cost was very prohibitive. This made the rollout very slow and in most times impossible. This brought about the so called digital divide which an ICT4D source book for parliamentarians of Asia -Pacific noted as the existence of an environment that sustains 'unequal and unaffordable access to digital and network resources; enormous disparities in the ICT endowment/infrastructure...'. The digital divide was seen to cut across international borders and to go beyond the gap between developed and developing nations to include the unequal participation of women, youth and marginalized communities ...,. The concept is also said to have been applied to reflect the disparity in access to information that is growing within nations, namely, between the rich and poor and between urban and rural communities (UNDP-APID, 2004). The above referred ICT4D source book for parliamentarians further indicates that the disparity within countries was as a result of faster pace of infrastructural development in urban centers and the comparatively slower growth in rural areas. The aforesaid is evident in that even by 2008; only 0.5% of African villages had access to PC based route of internet connectivity (Heeks, 2008).

The access and utilization of information communication technology in development can also be associated with level of research work on the same in a given country. Where there is much emphasis on research in an area, there is tendency to have easy acceptability and usage as the consumers make informed decisions on acquisition of tools and use of the technology. This partly explains the continuous gap in access and utilization between the developed and developing countries which tend to happen every day.

The developed countries have continued to support research in advancement of ICTs and internet in almost all spheres of life hence their focus has shifted from access and usage to impact of ICT4D. The contrary is happening in developing countries and more specifically in Africa where there has been little contribution by researchers and academicians. In a London Conference on Information Communication Technology for

Development (2010), it was revealed that only 9% of ICT4D articles in world conferences come from Africa. In a related finding, an internet market study by Communication Commission of Kenya Study (CCK 2007), revealed that only 1% of learning institutions including the Universities had access to internet. The revelation is an indicator as to why there is continued low availability and utilization of ICT4D in the rural areas and so among the marginalized. I argue in this manner for the educated members of any given society influence a great deal in technological transfer more so to the rural areas. If students in higher institutions of learning do not have access and may not make use of the ICT technology by the time they graduate, diffusion of the same become limited as graduates should be champions of the same.

The Communication Commission of Kenya Study (2007) also revealed that the ICT tools are generally not accessible; hence not everyone benefits equally; in particular, women, girls and the marginalized poor groups in the rural areas of Kenya. Where the communities may be aware, the access and utilization is also limited by other factors which hinder the ICT application in development. This is a clear indicator of the role played by socioeconomic factors in access and utilization of information communication technology in both developing and developed countries.

The socioeconomic factors will also affect the level of access and utilization whether tools are computers or mobile phones as they tend to add costs to individual and household bringing about competition for limited resources coupled with other issues of their acceptability. "it is important to conduct indigenous research to know what pertains to our peculiar environments and not just swallow all what we are told since that pertains to other areas and may not apply to us" (Plan International ICT Managers workshop in Ghana 2010). In this workshop, the participants shared their field experience based on plan supported ICT4D programs within the communities the organization works in worldwide. They observed that ICT use was not necessary determined by the basic skills and knowledge required to use the technology like sending text messages or uploading a video .It is a social media which goes beyond internet and presents culture different from face to face or printed word due the virtual interaction

The effect of socioeconomic factors in access and utilization of ICT for development is also seen through effort by Ericson to open three African application development hubs in Kenya, Nigeria and South Africa in 2008.According to Hellstrom (2010) in a SIDA review report on the innovative use of mobile applications in East Africa, the aim of the Ericsson Innovation Centre was to better meet the needs of poor and rural populations by focusing on developing affordable, sustainable applications and solutions in health, education, agriculture and small business development. According to the review report, the centers would further "develop business cases that enable network operators to introduce and expand mobile broadband services" (Ericsson 2008- report by Leandi Kolver, 2008:).It would also provide tools for local developers and entrepreneurs, and in that way "foster a good environment for the creation of new small businesses throughout Africa" (Ericsson 2008) as reported Kolver. After its launch in 2008 it has been extremely quite from Ericsson Innovation Centre. The possible implication is that despite the well intentioned move, the socioeconomic environment may have been non conducive for the company to operate.

Evidently, issues of ICT infrastructure will come into mind of many researchers who are familiar within the conditions in the developing countries where governments are struggling to provide basic needs to their citizens. The issue of ICT4D usage has been associated with access where the latter is seen in terms of availability, affordability and ability to manipulate the tools for the intended purpose. In their session paper, titled mobile phones and development, mobile divides; gender, socio-economic status and mobile use in Rwanda, Blumestock and Eagle, (2009), found out there was high disparity in access where those who had mobile phones were seen to be different from the "normal" people as mobiles were associated with the "better off" members of society who were well educated, wealthy, and from larger households. The same group was found to use their phones twice longer than the poor and was perceived to be more central to the networks. While this may be the case, one can argue that it is not the level of education and wealth that determines use of mobile phones as it depends on time spend, whether text message or voice call and purpose of which the facility is being used for. The cost of mobile phones handsets has gone down in most parts of the world so it's likely that one of

family members in each given household will have a handset which may be shared

In considering the affordability of the services provision and the potential targets, one would like to take cognizance of some tools that can disseminate the same information in much convenient and affordable way. Thinking about the areas which are marginalized in terms of access due to lack of the infrastructures and remoteness, the convenience of availing the ICTs through videotapes and DVDs/CDs to learners in schools and to women groups would not escape ones mind. This could be through mobile videos just like the concept of mobile radios in India, Pakistan and China as discussed by Shaheen (2010), and Zhao, (2007) in their studies on the same. Through the video watching, the environment create high level of interaction among the audience watching presentation in a video clip and helps participants to gain life skills and additional knowledge. A case study in Ghana by David and Asomaoh (2011) on use of video as tool for agricultural extension in Africa found out that video viewing clubs/groups presented an effective ICT channel for training cocoa farmers on integrated crop and pest management. The cost of undertaking the same was low and the training methodology proved to be effective and interactive way of providing low literacy populations with skills, information and knowledge on complex topics. " Farmers, perception of changes in their practices provided further evidence of the positive impact of the training, as did their high rate of knowledge"(David and Asomaoh , 2011). This finding raises fundamental questions on why despite the availability of this alternatives and opportunities for ICT4D, in most developing countries like Kenya, there is very insignificant or none utilization of the same in rural areas as the portability of the tools and say power source like a battery or generator can offer such wonderful opportunities in educating rural entrepreneurs and farmers on how to develop their businesses.

It would also be worthy to then argue that technology becomes means of facilitating development process hence it does not count unless put into use. The issue socioeconomic and political factors would then rekindle again as among the key drivers of access and utilization of ICTs based on the above perspectives. The above view is inline with views of Bezanson and Chen (2003), who in their outline thought papers based on dialogue on ICTs and poverty, presented in Harvard University; highlighted

that today technology as influenced by politics, economic, bureaucrats, aid agencies and their ability to avail knowledge which is relevant to the needs of the consumers respectively. The entire above scenario beckons the question of why access and utilization has continued to be an issue both in developed and developing countries despite many studies done on the same and various recommendations, strategies and strides put in place by states.

Infrastructural development whose attainment is determined by economic ability of a country has been identified as a challenge and barrier of access and utilization of ICTs. The success in access and utilization of ICT4D is based in a county ability to built successful ICT infrastructure, develop human resources, and institutional capacity to provide appropriate response to these needs mostly in sub- Saharan region (UNDP – ICT4D-(Yves Hamel)- Rezanian, 2006:p 51). While this is important in enhancement of access and utilization of ICT4D, there are other scholars who have argued that developing countries need to focus more on provision of basic life needs but not on ICT development which they are skeptical on their ability to reduce poverty and spur development in the poor countries. They even argue that the ICT4D agenda was based on Washington consensus aimed at addressing American security through E-governments as Avgerou (2010), has pointed as among arguments brought forth by some scholars in his review of various studies on ICT4D.

While the above said arguments make sense to some extend especially for the most under developed countries of the world, my view is that ICT have great potential of leading to development break through in the developing world. Today, ICTs have been widely used albeit among the well educated to make advancement in treatment and management of human health in the developing world. Take example of CT-scanners, X-rays and endoscopes which use computers to identify problems in human body and help in analyzing the cause and how the same is shared through email among doctors for different interpretation and opinion on what kind of treatment to provide. This is happening even in the poor countries and the technology is reported to have reduced mortality rates by 40 to 50% within the period of 1960 to 1990 as reported by Wang et al (1999) in a World Bank

study.

I would therefore maintain that even the very poor man in the hard to reach rural area need information communication technology far much to receive their pay through the mobile phone money transfer for their daily casual piece work from their employer who may be miles away yet they need the money the same day to buy food or buy drugs for their sick child and or to get an update of latest news as televisions and radios leave alone newspapers are hard to come by in these inaccessible areas.

Poverty has been seen to greatly influence the access and usage of ICT4D in developing countries. The issue of poverty raises big concern especially in the developing world where people live on less than two dollars per day and naturally one would guess what would be a priority for a poor person. Buying a mobile phone handset costing say Kes 1000 and spending another Kes 100 to load credit for communication purpose or buy a kilo of maize flour to feed his family of eight. Poverty levels and exposure levels but one cannot fail to think of other aspect mentioned above. Though Jyotsna (2010) noted that poor villagers were willing to pay for telecommunication services, the length of service usage was determined by their purchasing power and the usefulness of the service to the individual consumer. The study recommends need to improve infrastructures such as roads and electricity as they determine operation and maintenance of costs incurred by the service provider which is then transferred to the service consumer. This would only be realized where a country GDP is well developed.

Many countries commemorated World Telecommunication and Information Society Day (WTISD) on May 17, 2011. The theme for the year 2011 is "Better life in rural communities with ICTs." Kenya was among the countries that commemorated the day and the Minister for Information and the Permanent secretary in the ministry made the following high lights in their respective speeches.

Access to ICTs is now recognized as a basic human right and the Government of Kenya has made requisite policy, legal and other interventions including enactment of the ICT sector Policy guidelines and the Kenya Information and Communications Act, CAP 411A

(including the subsidiary legislation).

The transformative power of ICTs is now acknowledged globally. ICTs have capacity to free the poor from the fetters of want, disease and ignorance. They support trade, communication, entertainment, information and other basic facets of life. Information Communication Technologies s have opened markets to small scale traders and peasants, and created new opportunities in health care, education and political participation.

While the penetration of mobile services in Kenya has surpassed the 60% mark, distribution of service subscription is skewed in favour of urban areas whilst most remote rural areas remain uncovered. To address this challenge, Government of Kenya is to strengthen the Universal Access Fund to support ICT services, access, capacity building and innovations.

The purpose of WTISD is to help raise awareness of the possibilities that the use of the Internet and other information and communication technologies (ICT) can bring to societies and economies, as well as of ways to bridge the digital divide

The above highlights emphasize the importance with which governments worldwide are taking the issue of access and utilization of ICTs as tools for development. There is wide acknowledgement that ICTs can be utilized to invigorate socio-economic, technological and political developments even within the very remote areas and among the marginalized communities. Acknowledging that ICTs access and utilization as human right issue is in itself a big step as citizens can demand for provision of the services from their government as primary duty bearer. In Kenya, the issue of penetration of mobile phones services is also noted to be skewed in favour of urban areas with 40% of the most remote rural areas and urban slums not covered. The same applies to access to other tools like televisions, radios, fixed landlines, internet connections and service networks within the same areas which are less than 2% (CCK, 2007). These are areas inhabited by the most marginalized and excluded poor who need to be leapfrogged from the vicious cycles of poverty and ignorance.

Despite the notable mobile phone technology growth by over 67% in the developing

countries and having reached a high peak for countries like Kenya with 22 million registered mobile phone (CCK 2010), one is left wondering why only few individual have taken advantage of the mobile handsets with enabled internet protocol for their businesses Most of the current researches and studies being undertaken in most parts of the world are focusing on impact of ICT4D yet in the developing world issue of access and utilization remain unresolved. It is therefore incumbent upon researchers in the developing countries to do more in-depth researches on the access and utilization factors to unravel the underlying cause of continued limited access and utilization of ICT4D. The researches should also aim at coming up with practical recommendations to both policy makers, service providers and the consumers on the most appropriate strategic actions to take in bridging the gaps.

2.5 Technological Application factors in Access and Utilization of ICTD

According to Oolusegun and Oguseye, (2008) the types and modes of mobile phones and their inbuilt features/capability to download and transmit data coupled with the life of the handset battery and availability of power/energy source to recharge the battery greatly influence the frequency and level of utilization of gadgets. There other issues like internet and mobile phones network down time which may affect the timing of utilization especially where the service is through public access points and in a given geographical location with defined operational time.

Most of Personal Computers/desk top computers in the telecenters and some of the cybercafés are the Pentium II and III whose processing capacity and speed has been overtaken by the current demand, as they are so slow thus they discourage users. The user ability to manage and maintain an ICT equipment/tool even the simplest form of service is bound to affect utilization. There is rapid technological change due to market competition by the ICTs manufactures which tend to render some devices obsolete within a very short time. A researcher should also consider issues of compatibility of the technology with the existing communication pattern and the communication needs of the user, based on gender and age as well as who controls what programs to watch/listen as additional and partial determinants of utilization. The above view is linked to a study in

Nigeria which identified lack of proven technologies which ensure higher productivity and food security to be unavailable among millions of small scale farmers scattered in rural areas (Oolusegun and Oguseye, 2008). However, the same was accessible to the larger farmers who were considered as progressive bringing out the issue of exclusion of the marginalized poor in the rural areas as was found out in a similar study by Qamer, (2002).

Utilization of ICT4D is among the important drivers of change in poverty eradication and consequential development. However, a multi dimensional analysis of factors affecting access and utilization need to be made regularly to ensure people/communities are able to have access and appropriate environment to engage and perform activities that spur development using ICTs. A study by Colle (2008) on building ICT4D capacities for African Universities recommended the application of information and communication technology for rural development, training students in the application of information technologies to national development priorities, including those linked to economic development and the Millennium Development Goals, developing cost effective ICT mechanisms to enable the free flow of information within and among universities, developing locally relevant multi-disciplinary content for rural populations using multi-media dissemination channels, developing a range of ICT applications that strengthen the participating universities' outreach and extension programs to marginalized populations such as women, older people, and the poor and engaging in research and development initiatives related to the role of universities as incubators of telecenters and other outreach implementations.

Developing countries need these capacities as large parts of the developing countries lack the capacity to even offer simple maintenance service like dust blowing of a key board of computers or cleaning of a video deck head. It is also important to appreciate that ICTs succeed well when well integrated within other development initiatives as they are tools but not an end as they have not so far proved to have significant socioeconomic development on their own (Avgerou,2010). The human capital is important not only for technical support but in changing perception, attitude and directing in application for the

same within the various spheres of human development.

2.6 Legal frame work in Access and Utilization of ICTD

Government policies and regulations framework are core determinants in operations of any business in a country. The policy and regulations guide the "how" of any operations and help define boundaries and limitations of commercial, charity /philanthropic industries and private undertakings. Where the policy and regulations fail to exist, operations are likely not to conform to a given standard and may even contravene rights of individuals and groups including violating constitutions of a country. This emphasizes the criticality of government policies and regulations in access and utilizations of information communication technology and their application for development in any given country and area.

According United Nations Development Programme-Asia Pacific Development Information Programme (UNDP- APDIP, 2004) in a ICT4D, information communication technology is said to be basically information-handling tools—a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. The source book observes that, with appropriate content and applications, these tools are now able to work together, and combine to form a 'networked world'—a massive infrastructure of interconnected telephone services, standardized computing hardware, the Internet, radio and television—which reaches into every corner of the globe. In order to assess the potential role of information and communication technologies for development, a proper understanding is required of what ICTs actually are, (UNDP 2002).

According to Zuckerman, (2010), some of the major achievements and advancement in development has been realized through the rapid growth and development of the telecommunication sector worldwide. The sector has continued to play a key role as far as wireless and internet communication is concerned. With this speedy growth, there is throat cut competition for sizable market share among the players. As a result, both landline and mobile service providers have tended to be much of greater gatekeepers of the telephone and internet service provision, due in part to the centralized nature of

mobile networks, and to limited wireless bandwidth, with its subsequent challenges for quality of service as dominant players, mobile operators consolidate their power through increased market share, and they are therefore beginning to resist more open and liberal telecommunications policies (Melody, 2010).

According to Dot Force (May 2001), access to ICT tools and networks, and thus their transformative effects and the new "digital opportunities" they create, is extremely uneven, in ways that both reflect and exacerbate existing inequalities in both developing and developed world. One third of the world population has never made a telephone call. As per the same report, 70% of the world's poor live in rural and remote areas, where access to information and communications technologies, even to a telephone, is often scarce. Burtseva et al., (2006); Weigel and Waldburger,(2003)- UNESCO, all concur that in determining access and utilizations factors, policies that are enshrined within social and political dimensions need to be put in place as the resource allocation to sectors and regions is political as well as the regulatory environment and provision of supportive infrastructures. Without the appropriate and supportive policy framework with respective political goodwill and well functioning institutions with policies that govern how they regulate the sector, there will be weak systems and institutions hence uncoordinated provision of the services that will continue to marginalize poor areas in the developing countries.

For information communication technology to be well grounded, well developed physical infrastructure need to be in existence to enable the service providers deliver the service in commercially competitive environment as well as taking into consideration social and environmental factors among others. This will not happen where policies that support the same are nonexistent.

The United Nations Economic and Social Council,(UNESC,2009),in their resolution on science and technology for development recommended among others; formulation and implementation of policies that include developing mechanisms, including innovative solutions for expanding rural power supply, and the provision of broadband access to poor communities in rural areas not covered by market-driven investment to ensure access to

science, technology and engineering for women, youth, the rural poor and other marginalized groups in all countries.

E-readiness of a country highly determines the rate of access, availability, diffusion and utilization of ICTs. Where a country is ready, the adoption of ICTs are said to be fast. The E-readiness is majorly in terms of presence of technical skills within a country, institutions to deliver the services, availability of the equipments in a country, cost of access and enabling regulatory environment. Where the human capacity does not exist or is minimal, there should be strategy for investing in human resources development to offer support at micro and macro levels in a country. The above readiness in relation to the aforesaid factors has helped India Tel-health project to succeed in terms of operations and sustainability (Srinivasan, 2007). He urges developing countries and especially Africa on the need to analyze and factor the same in their E-readiness

Understanding the critical relationship between various strategic interventions in context of local conditions and need to secure commitment and participation of all stakeholders; local community, nongovernmental organizations and private sector is seen as one of the ways of invigorating penetration of ICTs and their utilization in marginalized rural areas. Realization by policy and decision makers that they hold key to this is critical as ICTs are envisaged to be drivers in achieving millennium development goals (UNDP-APDIP, 2004). If government supported policy of computerization and connectivity/e-government within all their offices, this will act as incentive to service providers as they are assured of substantial and ready market of their services and products (UNDP, 2010).

The existing government policies and regulations can either create a barrier to investors or provide the right environment for investment. High tariffs and control by government have implication in terms of accessing the services to all parts of a country. Where license fee is high, the potential investors may be discouraged and if they venture, they will concentrate in areas which provide high returns in form of profits. New entrants to the market or local investors with limited capital will be discouraged setting phase for monopoly in service provision. These aspects tend to marginalize the rural areas where the poor live as it has ultimate impact in network investment and pricing as investors

recover their cost (UNESCO- Waema, Adeya and Nyabura, 2010).

Government and donor policies highly influence the level of access and utilization of ICTs in any country and community. In developing countries, government policies on ICTs acquisition are normally weighted against provision of other basic life needs of the populations such as fighting endemic diseases, food and illiteracy. This view tend to lean on argument of Warschuer, (2003) and Wade,(2004) who questioned the national and international policy initiatives that direct resources to bridging digital divide. In their view, this is unlikely to have any significant economic effect for there are neither human capabilities nor economic conditions to utilize the ICTs in developing countries. If policy makers in developing countries take this view, access and usage will be very minimal.

Charlotte and Roger (2011), aver that many developing countries both in Asia and America pacific have realized the importance of ICTs in enhancement of development and poverty alleviation as well as the socio-cultural transmission hence initiated policies for universal access centers for communities which provide free access to internet as well as other ICT service such as printing, faxing and telephone services. These policies have helped communities in these countries to also access to government services and support through the e-government linkages within various government sectors.

The consumer ability to filter and find useful information counts in continued use of the technology. This can be backed through government and other public institutions policies which if formulated and well implemented, will upscale the utilization of the ICTs not as objects but tools to aid in execution of various functions, roles and responsibilities. A case study on integration of Information Communication Technology in teaching by Gakuu and Kidombo (2010) revealed that the leadership and institutional policies influenced the level of utilization of ICTs in both rural and urban schools. While urban schools were able to use the PCs as teaching tools, the rural schools mostly used them as objects of teaching.

A study by Lashgarara, Mirdamadi and Hussein,(2010) found food utilization pattern to be wanting in Iran but with supportive ICT policies, the tools proved to be useful in disseminating the required knowledge and information in terms of research findings, extension services, social development amongst others and would helped to improve food

security .Similarly, a study on marketing of silk in Thailand found that lack of supportive policies for infrastructure in the rural areas limited the diffusion of internet services which were required in those rural areas to market the silk in the Diaspora. It faults government failure to put in place a robust mechanism to facilitate access and utilization of Internet in the rural areas yet silk is among the core income earners for the country (Graham 2011).

Most of the privatization done by the African states has ended up benefiting a few wealth individuals as this has created private monopolies in the telecommunication sector as opposed to liberation which would have had the industry managed by the state. Example of creation of this monopolies is found in South Africa (Horwitz and Currie, 2007), and Ethiopia (Guida and Crow, 2009). This means the state has limited control in influencing penetration of the telecommunication in the countries and availability to the hard to reach rural areas as the private investors are driven by markets and profit margins.

In Africa and specifically in Kenya, the government has adopted a policy on ICT as a pillar to achieving it vision 2030 (Kenya Vision 2030 strategy). Many ICT sectoral policies have since be formulated by various ministries like in Education where there is a policy on e-learning, Ministry of industrialization with e-commerce among others. The government of Kenya zero rated all taxes on computers and their accessories to encourage companies, Non governmental organizations and individual to acquire computers. It also liberalized the telecommunication and brought in many players in an effort ensure access and penetration of the ICT to every part of the country (CCK 2007).

2.7 Infrastructural Development in Access and Utilization of Information Communication Technology for Development

Physical and other supportive infrastructure need to be in place for any industrial, education, health, shelter and telecommunication development among other to occur, For effective information communication technology to be there, human capacity to develop the same as well as the physical infrastructure inform of telecommunication masts, satellite dishes, landline structures need to exist. These structures need power/energy to operate as well as good road network to make the areas where they have been installed accessible for operation and maintenance without which, the situation will be like they are

nonexistent and or will operate and provide service very minimally and erratically, (Unwin,2009e).

The existing statistics show variance in universal access and usage of ICTs especially when internet is taken into account even in the most developed countries (ITU, 2009c). There are about 1.5 billion people in the world who do not have access to electricity with 85% of them being in the developing world where the limited access is also skewed to urban centers and the regions considered being economically viable according to International Energy Agency (IEA 2009).The same IEA analysis of all forms of energy shares worldwide indicate 12.7 % for Africa by the end of 2007. All the ICT tools require energy in form of electricity to operate. Without the energy/power, the ICTs are unusable and this is the scenario in rural Africa where only 15% of the households have access to electricity (Unwin, 2009e). Among other potential barriers to ICT access are absence of telecommunication network, lack of equipments and technicians (human capacity) and the service providers. These factors contribute to "digital divide" which Isaacs et al, (2006 p212) sees as a broad allusion to the skewed distribution in the production, access, and consumption of ICTs as mechanisms for social and economic development between and within countries.

The issue of service and network distribution is critical in transfer, access and utilization. Despite the media proliferation within Kenya, there is continuous disparity in regional and geographical coverage by most of media houses and a notable historical under serving of regional media (vernacular).This may be attributed to the costs involved in acquisition, licensing and setting up the broadcasting equipments. A survey conducted by Kenya Advertising Research Foundation (KARF, 2008) for media houses revealed great disparity in access of ICTs between the rural and urban dwellers- only 39 % of Kenyans households owned a Television set which was skewed toward the affluent within the society and in the urban areas. The ownership of radio was at 71% country wide but was also skewed towards the affluent and urban dwellers.

The KARF 2008 survey revealed very low usage of internet among the interviewees as those who had used internet in the last one month were 2%, last seven days 5%. Majority

accessed the internet from cybercafé which were in major urban centers. The above study by KARF used Living standard Measures (SLM) as tool for their assessment. It measures; access to, use of wide range of products and services. SLM is a measure of affluence and development. Though good for purpose of survey, it negates other factors which can influence access and utilization of ICTs like the culture, capacity to operate and government policies which can influence the same a great deal. If additional tools were used, probably, this would have altered the finding in terms of access and usage among different community segments

The aforesaid finding on low internet usage concurs with findings of Thailand's National Electronics and Computer Technology Center (NECTEC, 2004), Palasri, Hutler and Wenzel, (1999) who in their studies found out that despite the massive expansion of Thai Internet, only 5% to 10% of the populations had access and usage of the same. Much of the internet had not reached rural Thailand hence the communities producing silk could not use the internet to exploit market opportunities outside their community and country. This was found to have been contributed by lack of well developed infrastructure which inhibits access to internet yet Ntoko, (2007: 1) in an ITU report observed that internet was an appropriate and unique opportunity for developing countries to compete in the markets that were beyond their reach. This opportunity is found in development of websites for profiling a company/product and marketing the same. Researchers and organizations have listed the underlying causes of low utilization of ICT penetration in developing countries to include insufficient telecommunications infrastructure and Internet connectivity, expensive ICT equipments, absence of adequate legal and regulatory frameworks- issues of suffocating patent rights, shortage of requisite human capacity, failure to develop local language content, lack of entrepreneurship and business culture open to change and social equality United Nations Conference on Trade and Development (UNCTAD 2005).

Information Communication Technology tools have gained worldwide use but others such as the internet have not. A review report conducted by Hellstrom (2010) for SIDA indicate that mobile phones had penetrated to 84% of the Kenyan population after deregulation of the sector by the communication commission of Kenya in 2007. A CCK (2007) study had indicated only 1% of learning institutions had access to internet and

between 2% to 5% had accessed internet in last one month. The CCK, (2007) deregulation of the communication sector which led to single licensing saw entrance of YU and Orange into the Kenyan market and provided a window of opportunity as the holders of the single licenses could offer many different services using the same. The CCK (2009) established policy on infrastructure sharing in an effort to ease burden of investment by new entrants into the market and to avoid duplication of resources. This saw infrastructure sharing deal between Airtel and YU but the YU services which are said to be among the ones with lowest tariffs are still inaccessible in most part of the country and especially the rural areas as this is evident with those registered with YU. Although the CCK 2009 gesture was supposed to create competing market tariffs and promote extended infrastructure network, what has been realized so far is high revenue for the service providers but the average revenue per user has declined (Hellstrom 2010) in a SIDA review on the Innovative use of Mobile phones in East Africa. The same review report indicate that although cost of mobile phones handsets has gone down, the cost of mobile handsets with Internet Protocol is still beyond the reach of the majority poor.

The scenario above presents some gaps in terms of telecommunication infrastructure and its related support structures as well as lack of detailed studies on the interrelationship between telecommunication services provision with reference to road network, terrain, power supply especially in Africa.

2.8 Conceptual Frame Work

2.8.1 Introduction

The conceptual frame work for independent and dependent variables is as shown in figure 2 below. As indicated below the independent variables tend to stand in the way of successful and prospective access and utilization of ICT4D when they are high. In other words, access and utilization of ICT4D opportunity could be enhanced and improved when these factors are low. There also other variables whose influence may contribute to the access and utilization of ICT4D though with very minimal significance. They include the moderating and intervening variables. All these variables interplay in influencing access and utilizations of ICT4D in Tharaka District, Kenya.

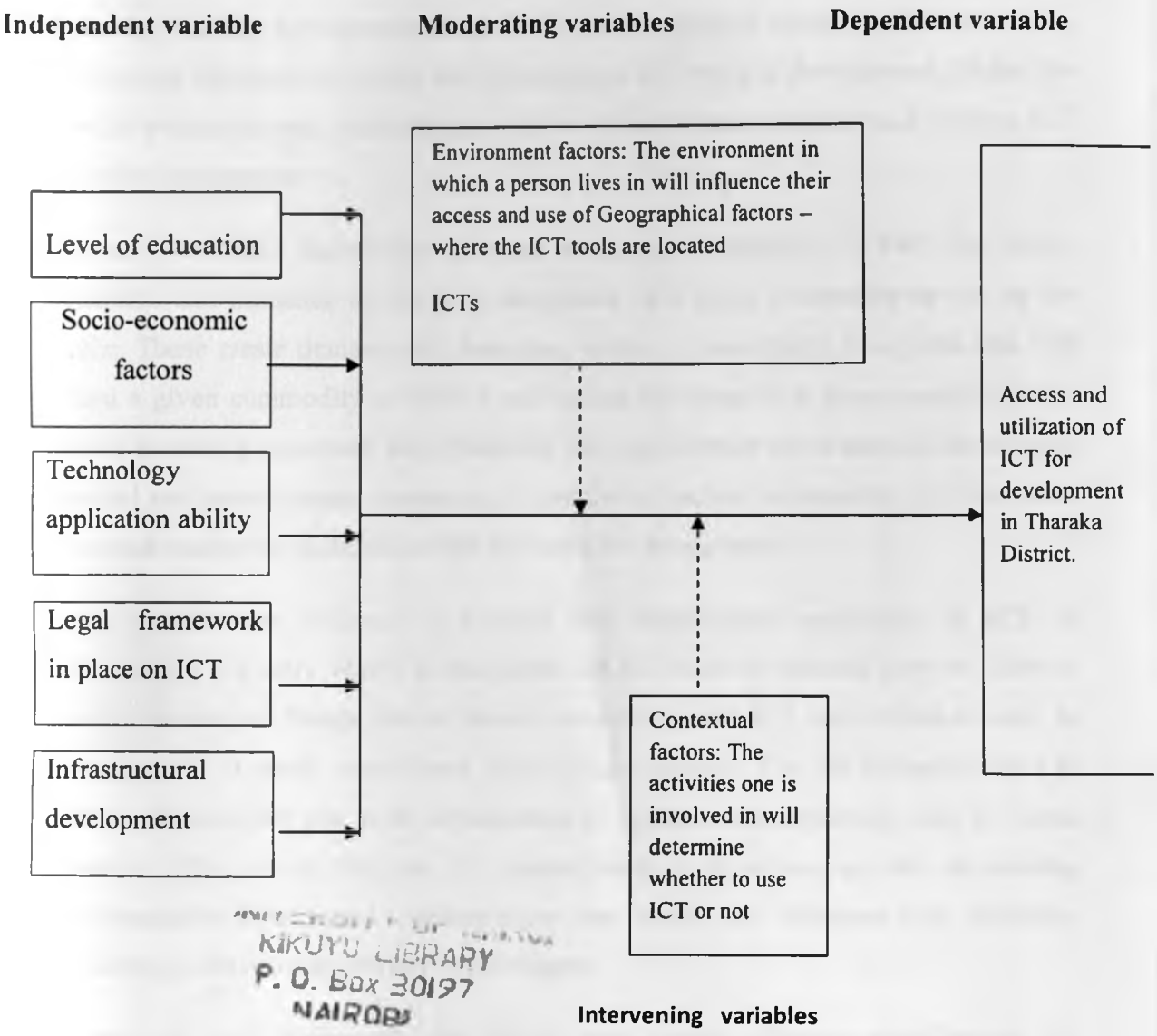


Figure 2: Conceptual Framework

2.8.2 The Relationship between Independent and Dependent Variables

According to literature reviewed previously in this chapter, education is key factor in utilization of ICT for development. Education level may positively or negatively influence access and utilization of ICT tools and their application in development. As the education level influences individual approach in life, it similarly influences ones perception and value attached to ICT tools and how an individual may utilize the

technology in their own development. The higher the level of education, the more skills, interest and likelihood of access and utilization of ICT tools in development. Higher the level of education, may lead to higher number of individuals accessing and utilizing ICT tools for development.

The socio economic factors may influence access and utilization of ICT4D. The factors determine and influence the level of acceptance of a given commodity/service by the public. These create demand and determine whether a community in a given area will afford a given commodity or service and sustain its usage. If a given commodity and service is socially acceptable and affordable, this may increase the chances of the business survival and growth hence increasing the number of service /commodity providers with increased access and utilization of the ICT tools for development.

From the literature reviewed it revealed that technological application of ICTs is influenced by the users' ability to manipulate the ICT tools for intended purpose. There is rapid technological change due to market competition. The ICT tools which are easy to use may tend to attract many users of every age category. The old technology tend to become obsolete fast due to the advancement of the same thus rendering some ICT tools obsolete within a short time yet. The compatibility of the technology with the existing communication pattern and communication user needs may influence their utilization according to the literature review in this chapter.

Government legal framework and policies may greatly influence establishment and success of any business in any given area. Where policies and regulations are none existence, there may be no proper guidelines and a bench mark for operation of a business. Some government policies especially those related to tariffs may be an obstacle to establishing any business whether for commodity or service provision. Good policies may create enabling environment for business growth and development hence increased number of service providers and outlets for ICT tools. This may increase access and utilization of the ICT tools for development

Infrastructural development in any given area may affect other forms development positively or negatively. Where there is improved road network and power supply,

investors may be attracted to that area as they are likely to get high returns on their investment and to break even within a short time. The literature review in this chapter reveal that where there is developed infrastructure in terms of all weather roads, power and water supply, the population density may tend to be high thus attracting investors who see a ready market opportunity for their products. The presence of the physical infrastructure may therefore influence access and utilization of ICT4D

The environmental factors especially the level of exposure to ICT technology is likely to influence access and utilization of the technology in development. Where a community has limited and or no exposure to certain technologies, their interaction with the technology is also limited so is the utilization of the same. The geographical location of the ICT tools such as cyber cafes, telephone booths, radio stations is likely to influence their access and utilization by the target communities. If they are located in area(s) which are not easy to reach or are not save enough, the number of users will be limited.This implies that despite the independent variables having the greatest influence in access and utilization of ICT4D, the moderating variable will still have some influence positively or negatively which will interplay in the access and utlization

Contextual factors also influence the access and utilization of ICT4D. These variables relate to the kind of activities an individual is involved in on daily basis or most of their time. The nature of activities and or work may dictate the need and frequency of use of the ICT tools and the way they apply the same in their daily chorus. Though the factors may not be very strong in their influence of the access and utilization of the ICT4D, they will interplay and their role cannot be neglected

2.9 Summary of the literature reviewed

The various case studies and papers in various journals and publications by individuals and international organizations point to the significant role played by communication technology tools in development within the developed and developing countries. Various factors have been identified as influencing access and utilization of information communication technology in development. The factors which have been mentioned by most of the past researches on the topic include, infrastructure which include existence of

wireless communication masts and satellite dishes as well as landlines, power source installations and roads. The other identified factors include environmental, government policies and legal frame works, education, level of participation, technology, socio economic, contextual as well as cultural factors. The literature review reveals that most of the success case studies have been based on the best example and tend to be over generalized ignoring the various the diversities within the different parts of the world. Majority of the previous researchers have confined to targeting specific group only.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the methodology used in carrying out the research. It highlights the research design, target population, sample and sampling procedures, research instruments, reliability and validity of the instruments, data collection and data analysis procedures.

3.2 Research Design

The research design employed for purposes of this study was descriptive survey design. Survey design was assumed to be the best in studying individuals as units of analysis for purpose of generalization, Borg and Gall (1999). The survey was well suited for this study because the population in question was large and it was difficult to observe the characteristics of each individual. This design allowed the researcher to generate both numerical and descriptive data that were used in measuring the relationship between variables.

3.3 Target Population

According the Kenya National census of 2009, the total population of Tharaka District is 139,058 people. The target population for the study therefore was all the 139,058 people living within Tharaka District. However, since the size of the population was too large to be reached individually, the researcher identified existing community structures and institutions which have representation of all the cross section of the community and purposively identified representatives from these structures as respondents for the study.

3.4 Sample Size and Sampling Procedure

Due to the large number of the population, this study dealt with members drawn from the CBOs, government departments, NGOs, learning institutions both public and private and internet/telecommunication service providers and cyber cafes. According to Mugenda and Mugenda(1999) a sample of 10 % of the universe is representative enough to provide data which can be generalized. Therefore, the total sample size was drawn from 10 % of

the registered CBOs, learning and government institutions; NGOs and ICT service provider's institutions within Tharaka district. There are 201 learning institutions (source- education department Tharaka), 35 CBO (registered), 4 NGOs, 34 established government departments, 3 telecommunication service providers and 6 known cyber cafes. These make a total of 283 institutions. Therefore 10% of these institutions will be 28 institutions (283*10/100= 28).

The institutions and their members who participated in the study were picked in a way which ensured fair representation per each category. The researcher purposively selected the numbers to participate per each category taking into considering geographical locations, composition, gender and age. A total of 6 CBOs were picked to represent women groups, youth, men, business people and marginalized groups. To select the learning institutions to participate, they were segmented into private and public schools and were picked as follows: - A total of 3 primary and 2 secondary schools were selected respectively out of 12 primary and 4 secondary private schools in the district while 4 primary and 3 secondary public schools were selected respectively out of 152 primary and 32 secondary schools in the district while the existing 1 university was picked. From the government departments, 3 departments which had role in policy and legal framework formulation and implementation were selected. Two (2) telecommunications service providers and 2 cyber cafes were selected randomly while 2 NGOs were also selected randomly for the purpose of the study.

Individual respondents from the participating institutions/groups were picked purposively by the researcher as follows: - Learning institutions, 1 head of each institution were picked and 2 pupils/students by gender making a total of 13 heads and 26 pupils/students who were picked randomly from class 8 and form 4 from each of the selected schools and students in any academic year from the university, for CBOs, 1 chairman and another 1 member of none office bearers management committee making a total of 12, for the key informants government departments 3 heads, NGOs 2 heads, 2 heads of service providers companies, and 2 cyber cafes managers. Therefore, the total sample size of the study was sixty (60) respondents drawn from the participating institutions.

3.5 Research Instruments

Three types of data collection instruments were used, these were, a questionnaire and an interview schedule which were developed plus observation method. A were used to collect data from the various respondents where the researcher mainly focused on the experience and skills of various groups and their ability to apply the ICT in development. The instruments also focused on education levels of the respondents and how that influences their access and utilizations of Information Communication Technology for Development. The Socio economic factors in Tharaka were studied under the instruments to determine how they influence access and utilization of ICT4D. The instruments, also sought to establish the existence and or non existence of governmental legal framework in form of policies, procedures and tax regimes and how the same influences access and utilization of ICT in development within Tharaka district and whether the population is aware of the same. Through administration of the questionnaire/interview, the researcher was able to isolate the existing physical infrastructures that support the access and utilization of ICT for development in Tharaka. Since some of the variables under study could be studied through one or more research instruments, the researcher also used observation when studying variables such as infrastructural development as they could be physically observed and counted. In respective to the above, the main research instruments were the questionnaire and interview while observation and transect walk was used to inform the study on what was observable.

Items in the questionnaire were structured, semi structured, open ended while others were closed ended based on the answer sought. Some of the sampled respondents did self administration of the questionnaire while others were interviewed. The questionnaire/interview had various questions segmented on each of the variable under the study. For the respondents who were not ready to respond by the time the questionnaire was delivered or were visited but were willing and able to provide the information, the questionnaire were dropped and agreement made on when the same were to be picked or posted. There other respondents who were willing to respond but were not be able to due to their level of education or another reason. The researcher was flexible to interview the respondents and filled in the answers provided. Where applicable, a call

was made to administer the questions and get the responses over the phone. The items developed were simple and unambiguous. Generalization was be made thereafter.

The variables which were included in the questionnaire were based on literature review. The administration of the questionnaire was to the respondents from the community representatives and key informants who were selected for their first-hand knowledge about the topic. The same technique used to gather information from service providers like internet service providers, mobile phone network service providers, appropriate government departments, NGOs, and primary and secondary schools which were targets. The views of all the respondents were regarded as very important because of their experience in the policy arena, service provision as well as utilization of the ICTs. It was also assumed that the target groups may not always be able to articulate their issues adequately because of limited information, skills and experience. Often, service providers working with the target group were assumed to be in a better position to articulate their challenges and needs.

3.6 Validity of the Instruments

Validity is the accuracy and meaningfulness of influences based on research results. It is the ability of an instrument to measure what they are intended to measure (Mugenda, 1999). A pilot study was conducted prior to the actual research. One school and one CBO were involved in the study; the school and the CBO were included in the sample of the study. Through this pilot study, the researcher was able to determine whether there were any ambiguities in any of the items. Where ambiguities were detected; the instrument was modified or reviewed accordingly to remove the same. The researcher also ensured that the instrument collected the type of data anticipated to answer the research questions. The items that failed to measure the variable intended were either modified or discarded. Expert advice was sought from the supervisor and other lecturers who were present during the project proposal defense. They all critically examined the items of the instruments

3.7 Reliability of the Research Instruments

Reliability refers to the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 1999). To test reliability of the instrument, the researcher employed the split half reliability method. Lokesh, 1994 states that the split half method can be used to determine internal consistence during pre-test. Gall and Borg (1996) concurs with this. The test is divided into two equivalent "a halves" results from one a half are compared with the result from the other a half. From the reliability of the half test, the self correlation of the whole test is estimated using the spearman-brown correlation formula to obtain the person product moment correlation coefficient.

$$\text{Reliability of entire test (R2)} = \frac{2\ (\text{reliability of half the test})}{1 + (\text{reliability of half the test})}$$

The correlation results value provides the internal consistency of one half which is the degree to which two halves of the test was equivalent or consistent in terms of items. The value of the co-relation was between 0-1.The higher the value the higher the co-relation. A correlation between 0.5 and 0.9 was considered to be high correlation. The reliability analysis realized a reliability coefficient of 0.782 hence was deemed reliable.

3.8 Data Collection Procedures

An introductory letter to the target government heads of departments was presented. To administer the questionnaire to the selected respondents from learning institutions, the researcher booked an appointment for a meeting in their respective institutions. Where they were unavailable, arrangements were made to drop the questionnaire with instructions on how to fill the same and a pick date was proposed. The researcher visited the District Social Development office to seek permission to carry out the research among the members of the CBOs as well as inform the officer(s) about the impending study. The researcher then booked appointment with the selected CBO representative at a time and venue convenient to them for administration of questionnaire. To avoid respondents influencing each other on the kind of information/data to give, the questions were administered to each of the CBO representatives independently. Where they were

unavailable, the researcher sought for an alternative date for the administration of the questionnaire. For the key informants, an introductory letter introducing the researcher and explaining the purpose of the study was presented. The researcher then visited the offices of the key informants and administered the questionnaire. Where the informants were not available, the instrument were left with a request note to fill and a date for collection was suggested. Follow up through phone calls was also made.

3.9 Data Analysis Tools

Due to qualitative/descriptive and cross sectional nature of the data collected, the study used descriptive analysis. The data was presented using frequencies, tables, percentages and Pearson correlation coefficient formula which appropriately display at a glance the trend of the data, thus making the analysis easier. The Statistical package for social science (SPSS) for analysis of quantitative data and Microsoft excel were used based on frequencies. Percentages, frequencies were used to analyze the quantitative data while descriptive method was applied for qualitative data analysis. Data was tabulated and classified into sub-samples for common characteristics with responses being coded to facilitate basic statistical analysis. These were used to determine the correlation within the variables under the study.

3.10 Ethical Issues

Kabiru and Njenga (2009) states that a research is governed by rules and regulations which help to reduce conflicts and misunderstanding among researchers and respondents. In this research, subjects were informed about the nature and the purpose of the research. All the respondents' identity was kept confidential and information gathered was only used for the purposes of this study. The researcher respected the respondents' decisions on what information to give. The researcher did not coerce the respondents to give certain information or doctor their feedback. The researcher avoided cases of plagiarism by ensuring that all data obtained from secondary sources were acknowledged herewith. The researcher ensured that respondents were free to participate in the study. Finally, the researcher was more than willing to share or give feed back of the research findings to the respondents.

Table 3.11: Operationalization of variables

Objectives	Variables	Indicators	Measurement scale	Type of analysis
To examine how the level of education affects access and utilization of information and communication technology for development in Tharaka District	**Independent variables** 1. Education level	Number of male/ female by age who are literate among the CBO committee members Percentage of males/ females by age who can utilize one or more ICT tools without support	Ordinal scale	Quantitative analysis. Frequencies and Percentages
To examine the influence of technological application factors in access and utilization of information communication technology for development in Tharaka District	2. Technology application abilities	1. Number of male and female by age who are aware of at least one type of ICT tools 2. Challenges faced by community members in application of ICT in development 3. How the ICT skills are applied by various community members in development 4. Number of male and female by age who apply more than one ICT skill in development 5. Percentage of male and female by age who have challenges in applying ICT tools in development 6. Number of ICT tools repair and maintenance centers in the area	Ordinal scale Ordinal Ordinal Ordinal Ordinal	Quantitative and qualitative analysis Frequencies and Tables Frequencies and percentages Frequencies and percentages tables Frequencies , percentages, tables Pearson Correlation Coefficient

To examine the influence of the legal framework in utilization of information communication technology for development in Tharaka District	3. Socio-economic factors	Number of male and female owning one ICT tool Percentage of male and female by age with more than one ICT tool Percentage of male and female with access and use ICT4D at will	Ordinal	Quantitative analysis Frequencies ,tables and percentages Pearson Correlation Coefficient
To determine the importance of infrastructural development in utilization of information communication technology for development in Tharaka District	4.Infrastructu-ral development	1.Number of mobile phones masts in the area 2. number of ISP masts in the area 3. Number of cybercafés in the area 4. Location of the cybercafés in the area 5. Type and existence of power source in the area.	Ordinal	Qualitative and quantitative analysis Frequencies and percentages Frequencies, tables and percentages Pearson Correlation Coefficient
To determine the importance of infrastructural development in utilization of information communication technology for development in Tharaka District	5. Legal framework in place on ICT	Government policies / regulations on ICT4D implemented in the area. Time taken to get licensed to operate a business in the area. Level of taxation by both central and local governments. Existing ICT distribution policy plans by the service providers in the area. Number of Female	Content description Range Content description Content description	Descriptive analysis Cross tabulation Frequencies, percentages, tables Frequencies , percentages and table Pearson Correlation Coefficient

		and male by age who are aware of the any one government policy on ICT4D		
	Dependent variable Access and utilization of ICT4d	Number of ICT tools owned by male and female by age among the CBO members and how they are utilized	Ordinal	Quantitative analysis Frequencies Frequencies
		Number of male and female who have been utilizing one or more ICT tools for development in the last three months.	Ordinal	Frequencies Cross tabulation Frequencies Pearson Correlation Coefficient
		Number of the operational cybercafe's in the last six months.	Ordinal	
		Types of services offered in the cybercafés	Ordinal	
		Frequency and time of internet and mobile network downtime in the area		

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents an analysis of the data on the study. Data analysis was undertaken primarily in terms of percentages and to a lesser extent, through descriptive analysis. Tables were and Pearson correlation coefficient formula was used in presenting data. Data interpretation was done based on the research questions.

4.2 Response rate

Questionnaire return is the proportion of the questionnaires returned after they have been issued to the respondents. In this study out of the 12 CBOs sampled, all of them returned the questionnaires. All the heads of learning institutions, government and key informants and service providers returned the questionnaires while of the 26 target students/pupils 2 university students did not return the questionnaire. The total response rate was therefore 96%

4.3 Demographic information

This section present demographic data within the target in situations as tabulated below.

4.3.1: Demographic information of the CBO

The demographic information of CBO members was based on gender, age, education level and occupation. To determine their gender, they were asked to indicate the same. Table 4.1 presents the data.

Table 4.1: Distribution of Community Based Organization members according to gender

Gender	Frequency	%
Male	10	83.3
Female	2	16.7
Total	**12**	**100.0**

Data shows that majority 10(83.3%) of the CBO members were male while 2(16.7%) of

members were female. The data shows that there is disparity in the gender representation in the CBOs. Based on the above data, the implication is that more men than women are accessing and utilizing available ICT tools owned by the CBOs. They were further asked to indicate their age. Data on their age is tabulated in Table 4.2.

Table 4.2: Distribution of CBO members by age

Age	Frequency	%
21 - 30 years	5	41.7
31 - 40 years	5	41.7
41 - 50 years	1	8.3
Over 51 years	1	8.3
Total	**12**	**100.0**

Table 4.2 shows that 5(41.7%) of CBO members were aged between 21 and 30 years, the same number were aged between 31 and 40 years , 1(8.3%) of CBO members were aged between 41 and 50 years while the same number indicated that they were over 51 years. This implies that majority of the CBO members accessing and utilizing ICT tools are aged between 21 and 40 years.

Table 4.3 Distribution of CBO per level of education

Level of education	F	%
Secondary education	9	75.0
Primary education	3	25.0
Total	**12**	**100.0**

Data on the level of education of the CBO revealed that majority 9(75.0%) of CBO members had secondary education while 3(25.0%) of CBO members had primary education. This implies that level of education could influence the use of ICT since people who have gone past primary level are deemed literate and hence able to use some various forms of ICT. .

Table 4.4 presents the Distribution of CBO members according to their occupation.

Table 4.4: Distribution of CBO members according to their occupation

Occupation	frequency	%
Farmer	7	58.3
Self employed	5	41.7
Total	**12**	**100.0**

The above Table shows that 7(58.3%) of CBO members were farmers while 5(41.7%) of CBO members were self employed.

4.3.2: Government and NGOs key informants demographic information

The demographic information of government and NGOs key informants was based on the name of their department and whether they accessed and used ICT tools. Table 4.5 tabulates the name of the departments / organization.

Table4.5: Government and NGOs key Informants departments/ organization.

Name of the organization	frequency	%
Plan International	1	20.0
Embu Community Programme	1	20.0
County Council of Tharaka	1	20.0
Ministry of state for planning and Vision 2030	1	20.0
Ministry of Information	1	20.0
Total	**5**	**100.0**

Table 4.5 shows that the Government and NGOs key informants respondents were from Ministry of State for Planning and Vision 2030, Plan International, Embu community programme, county council of Tharaka and Ministry of Information as shown by 1(20.0%) of the respondents. Table 4.3 presents the tools that were accessible to staff of Government and NGOs key informants respondents.

Table 4.6: Tools accessible to staff of Government and NGOs key informants

Tools	Yes		No	
	frequency	%	frequency	%
Desktops	5	100.0	0	00.0
Laptops	5	100.0	0	00.0
Mobile sets	5	100.0	0	00.0
Internet services	5	100.0	0	00.0
Landline	4	80	1	20
Wireless desktops	5	100.0	0	00.0
Ipads	5	100.0	0	00.0
Satellite phones	5	100.0	0	00.0

Table 4.6 shows that all the key informants were able to access, desktops, laptops, mobile sets, Internet services, Wireless desktops, Ipads and Satellite phones. Only 1(20.0%) of the respondent was not able to access landline. The data shows that basic ICT tools were accessible to the key informants.

4.3.3: Service providers' demographic information

This section presents the demographic information of the service providers. It was based on the name of the company, the kind of business involved by the companies, the operation duration of the company and the estimate number of the customers reached by the companies. Table 4.4 tabulates the name of the companies.

Table 4.7: Name of the service providers companies.

Name	frequency	%
ECP Computer centre & Cyber Cafe	1	25.0
Safaricom limited	1	25.0
Computer training Institute& Cyber Cafe	1	25.0
Telkom/Orange	1	25.0
Total	**4**	**100.0**

Table 4.7 shows that the service providers were from Embu Community Program Computer centre, Safaricom limited, Computer training Institute and Telkom companies as indicated by 1(25.0%) respectively. To determine the business that the companies were involved in, the service providers were asked to indicate the same. Data is tabulated in Table 48

Table 4.8: Distribution of service providers according to the business they were involved

Business	Yes		No	
	frequency	%	frequency	%
Telecommunication service provision	2	50.0	2	50.0
Internet service provision	2	50.0	2	50.0
Training on ICT use	2	50.0	2	50.0

Table 4.8 shows that half 2(50.0%) of the companies were involved in telecommunication service provision, internet service provision and training on ICT use.

Section 4.2.4 presents the demographic information of the school/ learning institutions heads.

4 .3.4: Demographic information of the heads of learning institutions

The school/learning institutions heads were asked to indicate whether their institution was private or public. Table 4.9 presents the finding.

Table 4.9: Response by various categories of learning institutions

Category	frequency	%
Private	5	38.5
Public	7	53.8
Private University	1	7.7
Total	**13**	**100.0**

Table 4.9 indicates that majority 7(53.8%) of the respondents were from public learning institutions while 5(38.5%) were from private institutions. When asked to indicate the level of their institutions/ schools, they responded as indicated in Table 4.10.

Table 4.10: level of institution

Category	frequency	%
Primary	7	53.8
Secondary	5	38.5
University	1	7.7
Total	**13**	**100.0**

As presented in Table 4.10, majority 7(53.8%) of heads were from primary schools, 5(38.5%) of heads were from secondary schools while 1(7.7%) were from university. The study further sought to investigate from the institutions heads the number of teachers employed in the schools according to gender. Table 4.11 presents the finding.

Table 4.11: Number of male teachers employed in the learning institutions as reported by the institutional heads

Number of male teachers per target schools	frequency	%
16	2	15.4
17	2	15.4
8	1	7.7
6	2	15.4
5	5	38.5
12	1	7.7
Total	**12**	**100.0**

Table 4.11 shows that 5(38.5%) of the heads indicated that were five male teachers employees, 5(15.4%) of heads indicated that there were 16 male employees, the same

number of heads indicated that there were 17 male teachers making a total of 64 male teachers. To determine the number of female teachers in the schools, the heads were asked to indicate the same. Data is presented in Table 4.12

Table 4.12: Number of female teachers employed in the learning institutions

Number of female teachers per target schools	Frequency	%
1	1	7.7
2	1	7.7
3	1	7.7
4	3	23.1
5	1	7.7
6	1	7.7
7	1	7.7
8	1	7.7
11	3	23.1

The data in Table 4.12 shows that 3(23.1%) of institutions / schools heads indicated that there were four female teachers, the same number said that there were 11 female teachers in the learning institutions. This gave a total of 46 female teachers.

The finding further shows that there were more male students than female in the schools/ institutions. Section 4.2.3 presents the demographic information of students and pupils. The interpretation of this data is that if disparity in enrolment in learning institutions has existed before and continues to be the same now and in future, then there are and there will continue to be more educated males than females. This mean the influence of level of education in access and utilization of ICT4D will be in favour of more males than females. Therefore, many males than females have access to ICT tools and utilize them in development more than females do.

4 .3.5: Demographic information of students and pupils

The demographic information was based on their level of education and the total number of students and teachers. Table 4.13 presents the level of education that the pupils were

in.

Table 4.13: Students level of education

Level	frequency	%
Primary	15	75.0
Secondary	5	25.0
Total	**20**	**100.0**

Table 4.13 in the above table that majority 15(75.0%) of the students were from primary level, 5(25.0%) were from secondary level. This shows that university students did not respond during the study. When the students were asked to indicate the kind/category of the institution, data showed that majority 14(70.0%) of the students were from public learning institutions (schools) while 6(30.0%) of students were from private learning institutions (schools). Table 4.14 shows the number of male pupils as indicated by students during the study.

Table 4.14: Students responses on the number of male pupils

Number male pupils per target schools	frequency	%
430	2	10.0
260	1	5.0
280	5	25.0
485	1	5.0
40	2	10.0
34	3	15.0
251	2	10.0
210	1	5.0
350	2	10.0
300	1	5.0

Number male pupils per target schools	frequency	%
430	2	10.0
260	1	5.0
280	5	25.0
485	1	5.0
40	2	10.0
34	3	15.0
251	2	10.0
210	1	5.0
350	2	10.0
300	1	5.0
Total	**20**	**100.0**

Table 4.14 shows that 5(25.0%) of students said that there were 280 male pupils, 3(15.0%) of students said there were 34 pupils while 2(10.0%) of students said there were 430,485,251 and 350 respectively. When asked to indicate the total number of female pupils, they responded as Table 4.15

Table 4.15: Total number of female pupils

Number of female pupils per target schools	frequency	%
260	2	10.0
295	3	15.0
270	2	10.0
140	3	15.0
485	3	15.0
70	2	10.0
210	2	10.0
450	1	5.0
480	2	10.0
Total	**20**	**100.0**

Table 4.15 that 3(15.0%) of students said that there were 295,140 and 485 female pupils in the school while 2(10.0%) of students said that the female pupils were 270, 70, 210 and 480.

4.4 Influence of level of education on access and utilization of Information and Communication Technology for development in Tharaka District

To examine how the level of education influences access and utilization of Information and Communication Technology for development in Tharaka District, the researcher sought to investigate the same from the CBO members. For example they were asked to indicate the number of members and their level of education. Data shows that 3(25.0%) of members had 4 members who had completed primary level, 2(16.7%) of members had completed secondary level, majority 9(75.0%) indicated that there was no member who was a university graduate. When majority of CBOs members have only attained primary level of education, there could be limitation on their ability to utilize advanced ICT and the tools for development in Tharaka district. This is so for higher the education, the

more exposure to ICT and tools. This has implication that level of education influence the rate of access and utilization of the ICT tools in the district

The government and NGOs key informant respondents were asked to indicate the number of staff who had ICT skills according to gender. Table 4.16 tabulates the findings.

Table 4.16: Number of male staff that has ICT skills

Number	frequency	%
Less than 2	3	60.0
More than two	2	40.0
Total	**5**	**100.0**

Table 4.16 shows that majority 3(60.0%) of key informants indicated that there were less than two male staff who had ICT skills while 2 said they were more than two male staff who had ICT skills. When limited number of government and other development organization have ICT skills, the diffusion of the same is also limited for this category of members in the community would be expected to use various ICT and tools to execute their work and serve the communities at the same time rolling out the access and utilization of the ICT and its tool for development in the community. Most of ICT skills are normally acquired through formal or none formal education. The higher the level of education an individual attains, the greater the exposure and opportunities to access and utilize ICT for development. It would be right then to argue that the level of education influences access and utilization of ICT tools for development in Tharaka district. The data shows that majority of the staff lacked the skill in ICT tools use. The study further sought to establish whether the CBO members read and understood their ICT tools(s) operational language and features. The findings are presented in figure 4.17

Table 4.17: CBOs responses on whether their members were able to read and comprehend own ICT tools(s) operational language and features

Response	frequency	%
Yes	11	91.7
No	8	8.3
Total	**29**	**100.0**

The Table 4.17 shows that majority 11(91.7%) of CBO members read and comprehended their ICT tools(s) operational language and features while 1(8.3%) of members did not operate. These findings can be linked to earlier one where majority of the CBO members indicated they had acquired a minimum of primary school level of education hence implied the level of education had a positive influence on access and utilization of simple ICT for development in Tharaka district. Further asked the reasons why they were not able to understand the operational language and features associated, 95% reported that it was as a result of limited level of education. This implied the level of education was a factor in the utilization of ICTs.

Table 4.18 shows the person who helped those unable to operate or use the tools/ services in development.

Table 4.18: Person who helped those unable to operate or use the tools/ services in development

Response	frequency	%
Relative(s)	4	33.3
Friend(s)	8	66.7
Total	**12**	**100.0**

The data in Table 4.18 shows that majority 8(66.7%) of CBO members sought help in the use of tools and services from friends while 4(33.3%) of CBO members were helped by their relatives to use the tools in development. This data implies that the level of education was a factor in the use of ICT whereby those unable to use sought help from

friends and relatives. Data further indicated that there were other members who had similar challenges as indicated by majority 11(91.7%) of the CBO members. This has an implication that without the support, majority would not utilize their ICT tools. When asked whether there was a person charged with the duty of assisting such members in their CBO who could do not read and comprehend their ICT tools operational language, they gave their responses as presented in Table 4.19 below.

Table 4.19 CBO members' responses on whether there was a person charged with the duty of assisting their CBO members who could not read and comprehend their own ICT tools operational language

Response	frequency	%
Yes	8	66.7
No	4	33.3
Total	**12**	**100.0**

Table 4.19 shows that 8(66.7%) of the members said that there was no person who was charged with the duty of assisting such members while 4(33.3%) of the members had a person charged with the duty. The researcher was also interested in establishing the kind of support the person was assigned to offer. Table 4.20 tabulates the finding.

Table 4.20: CBO members' responses on the kind of support offered by persons assigned the task

Support	frequency	%
Language interpretation	7	58.3
Technical operations of the ICT tools	3	25.0
Support in writing reports/ sending emails/ text messages	2	16.7
Total	**12**	**100.0**

Table 4.20 shows that 7(58.3%) of persons charged with assisting other interpreted the language, 3(25.0%) offered technical help while 2(16.7%) supported in writing reports/ sending emails/ text messages. Majority 11(91.7%) of CBO members said that they

considered their level of education to have influenced their access or none access to ICT tools as their level of education helped them to understand ICT tools, communicate and operate ICT tools and to be conversant with the tools as ICT machines are very complicated and require education. This implies the level of education influences access and utilization of ICT tool for development among CBOs in Tharaka district. Government and NGOs informant's responses on the issues that affected their ability to operate the ICT tools and to apply the tools in their daily business is tabulated in table 4.21

Table 4.21: Government and NGOs informants' responses on the issues that affected their ability to operate the ICT tools and to apply the tools in their daily business

Issues	Yes		No	
	frequency	%	frequency	%
Level of education of the staff; inability to operate ICT tools	3	60.0	2	40.0
Inability to apply the tools in their daily business	5	100.0	0	00.0

As shown in Table 4.22, majority 3(60.0%) of the government and NGOs informants indicated that the level of education of the staff influenced their ability to operate the ICT tools while 5(100.0%) said that it was due to inability to apply the tools in their daily business. This inability to apply the tools in development can also to linked to the level of education as the higher the level of education, the more the opportunity for exposure on how to utilize tools in development. The researcher was also interested in establishing from the CBO members how their level of education influences their utilization of communication technology in their development. Data is tabulated in Table 4.23.

Table 4.23: CBO members' responses on how their level of education influences their utilization of communication technology in their development

Response	frequency	%
It helps me to understand how to use ICT	3	25.0
I am able to operate my mobile phone , camera and desktop	1	8.3
I am able to help those who do not have the skills	1	8.3
I am able to interpret the symbols and signs used in ICT tools	2	16.7
I am able to network with others	2	16.7
I am able to understand the concept of the information	3	25.0
Total	**12**	**100.0**

Table 4.23 shows that the interviewed CBO members level of education helped them to understand how to use ICT and to understand the concept of the information as indicated by 3(25.0%) of members, 2(16.7%) of members said they were able to network with others and to interpret the symbols and signs used in ICT tools while 1(8.3%) of members said that they were able to help those who do not have the skills and to operate their mobile phone, camera and desktop computers. The study further sought to investigate how the level of education influenced the CBO members' access of ICT tools. Data indicated that those who lacked the skills were not able to access the tools and they were not competent and could not use mobile phones. When the CBO members were asked to indicate how the level of education among their CBO members influence their utilization of ICT in development, they responded as Table 4.24

Table 4.24: CBO members' responses on how the level of education among their CBO members influences their utilization of ICT in development

Influence	frequency	%
Technology is easy to understand	3	25.0
Those who have phones access different information	3	25.0
They are able to acquire knowledge on the use of ICT tools	1	8.3
Those who have camera were able to earn living	5	41.7
Total	**12**	**100.0**

Findings in table 4.24 shows that the interviewed CBO representatives confirmed that technology was easy to understand, those who had phones accessed different information due to their level of education as indicated by 3(25.0%) of members. 5(41.7%) of members said that level of education among their CBO members influenced their utilization of ICT in development as those who have camera and other tools were able to earn living. Findings further indicated that the level of education among the CBO members influenced their non utilization of ICT in development as it was hard for them to understand the language which was in ICT tools hence they were not able to use the tools including their phones.

The service providers said that they received complaints of computer being slow and they related this to their customers' level of education as they were not able to operate the tools. They further said that they managed to respond to the same by updating the computers antivirus to speed their operations and ensuring the tools were available. Table 4.25 tabulates the CBO member's responses on the main reason for their CBO members not being able to use computers, internet, and other ICT services.

Table 4.25: CBO member's responses on the main reason for their CBO members not being able to use computers, internet, and other ICT services

Reason	frequency	%
Fear	3	25.0
Level of education	5	41.7
Disinterest	2	16.7
Attitude	2	16.7
Total	**12**	**100.0**

Table 4.25 shows that 5(41.7%) of CBO members said that level of education was the main reason for their CBO members inability to use computers, internet, and other ICT, 3(25.0%) indicated fear while 2(16.7%) indicated attitude and disinterest. From the tabulation in table4.25, level of education influenced majority of CBOs members' inability to utilize ICT in development

Asked to indicate other challenges they faced, the CBO members indicated that they faced challenge of lack of electricity, lack of money to pay the ICT courses hence lack of ICT knowledge, lack of trained ICT teachers and centers, other challenges included community ignorance and communication barriers. The service providers indicated that they faced challenges relating to high cost of tariffs, debts from customers, machines breakdown while some areas were inaccessible. These challenges affected the customers as they were forced to move to the nearest town to access the ICT services when network was low and some new products never reached the customers.

Pearson Correlation of education and utilization of Information and Communication Technology for development

In order to examine the Influence of education on access and utilization of Information and Communication Technology for development in Tharaka District, the analyses were performed using the Pearson Correlation Coefficient the data is presented in table below.

Table 4.26: Pearson Correlation Coefficient Analysis

		Access and utilization of ICT	Education
Pearson	Education	1.000	0.68
Si 1 - tailed	Access and utilization of ICT	0.68	1.000
N	12	75	

The data in Table 4.26 show that there was a positive relationship (0.68) between student education and access and utilization of ICT for development. The results show that the level education influenced how respondents accessed and utilized ICT for development.

4.5 The Influence of Technological Application factors in Access and Utilization of Information Communication Technology for Development in Tharaka District.

To examine the influence of technological application factors in access and utilization of ICT for development in Tharaka District, the CBO members were asked whether they had access to various ICT tools. Table 4.26 presents the finding.

Table 4.27: CBO member's responses on the ICT tools accessible to.

Tools	Yes		No	
	frequency	%	Frequency	%
Landline Telephones	5	41.7	7	58.3
Wireless Telephones/ Mobile	10	83.3	2	16.7
Computer	6	50.0	6	50.0
Internet Service	3	25.0	9	75.0
Radio	10	83.3	2	16.7
Television	8	66.7	4	33.3
Video	5	41.7	7	58.3

Table 4.27 shows that majority 7(58.3%) of CBO members' never accessed landline telephones internet services and video. However they had accessed wireless telephones, computers, radios and television. With limited access to the internet services by the majority of CBO members, this implies access to bulky data and information through one of the most considered cheap means of communication (internet) is curtailed among the members with corresponding limited alternatives of ICT application in development in Tharaka district. In most places, internet connectivity is made through landline telecommunication means hence non access to the same influences the level of the application of the technology in development in Tharaka. They were further asked to indicate the influence of the access to ICT tools. Data on their responses in tabulated in Table 4.27

Table 4.28: CBO committee members' responses on what influences their access and utilization of ICT tools.

Statement	Yes		No	
	frequency	%	frequency	%
Technology is easy to understand ICTs tools	7	58.3	5	41.7
My education level enables me to understand the language and other features in the tools, hence easy to operate	9	75.0	3	25.0
I easily manipulate the inbuilt ICT tools features to meet my user needs	5	41.7	7	58.3
Fun influence most of my access to the ICTs tools	7	58.3	5	41.7

The findings in Table 4.28 show that majority 7(58.3%) of CBO members agreed that technology was easy to understand, fun influenced most of their access to the ICTs tools. The same number disagreed that they easily manipulated the inbuilt ICT tools features to meet their user needs. Majority 9(75.0%) of CBO members agreed that their education level enabled them to understand the language and other features in the tools, hence easy to operate. This shows the influence of education on access and utilization of the ICT in Tharaka district among CBO members. Asked how they used the ICT tools they responded as indicated in Table 4.28.

Table4.29: CBO members' responses on how they used the ICT tools.

Use	Yes		No	
	frequency	%	Frequency	%
Personal communication	11	91.7	1	8.3
Learning	8	66.7	4	33.3
Establishing social networks	7	58.3	5	41.7
Internet	3	25.0	9	75.0
Conveying information about meetings	9	75.0	3	25.0
Passing health education information/ messages	6	50.0	6	50.0
Sharing information on business opportunities	4	33.3	8	66.7

Results presented in Table 4.29 above shows that majority 11(91.7%) of CBO members used the tools in personal communication. 9(75.0%) used the tools in conveying information about meetings, 8(66.7%) of members used them in learning while 6 (50.0%) of members used them in passing health education information/ messages. Data further indicated that 4(66.7%) of members used the ICT tools in sharing weather information, 7(58.3%) of members did not use the tools in contributing money to merry go round/VSLA or marketing. Majority 11(91.7%) of CBO members did not use the ICT tools in trading. The implication is that though majority of the CBO members used ICT to for personal communication, learning and conveying messages on meeting dates, they had not applied the same in trade hence the influence of the information communication technology application was limited

The study sought from the institutions heads on what they used ICT tools for. Data is tabulated in Table 4.30.

Table 4.30: Use of ICT by the institutional heads

Use	Yes		No	
	frequency	%	frequency	%
Planning/ budgeting	0	00.0	13	100.0
Monitoring pupil performance	5	38.5	8	61.5
School data/information storage/Management	5	38.5	8	61.5
Development of scheme of work by teachers	0	00.0	13	100.0
Storage of teaching and non teaching staff work plans	0	00.0	13	100.0
Communication/internet	2	15.4	2	15.4

The findings in Table 4.30 shows that majority of the institutional heads did not use ICT tools in planning/ budgeting, development of neither schemes of work by teachers nor storage of teaching and none teaching staff work plans. However, 5 (38.5 %) indicated that they used tools in monitoring pupil performance and in school data/information storage/ management. The data implies that the heads of institutions did not use ICT tools in various areas in the schools. The researcher also examined the ways in which teachers made use of the ICT tools available in schools. Findings are tabulated in Table 4.30.

Table 4.31 Teachers used of ICT tools as responded by the institutional heads

Use	Yes		No	
	frequency	%	frequency	%
Developing scheme of work	5	38.5	8	61.5
E-teaching	2	15.4	11	84.6
E- learning	2	15.4	11	84.6
Communication /internet	2	15.4	11	84.6
Class attendance register	2	15.4	11	84.6
Accessing learning materials	0	00.0	13	100.0

Data in the Table 4.31 indicated that only few teachers used ICT tools in schools. For example, only 5 (38.5%) used in developing schemes of work, while only 2 (15.4%) used it in E-teaching, E-learning, communications and class attendance register. Teachers did not use the tools in accessing learning materials as indicated by 13(100.0%) of the institutions heads. When the heads were asked whether there were trained ICT tutors in the school, majority 11(84.6%) of the heads disagreed.

The study further sought to establish from the heads whether the students faced the challenges in accessing and utilization of the ICT tools. Data indicated that they faced challenges like not being aware on what to use the tools for, user problem, few desktops PCs compared to students/ pupils ratio and internet accessibility. The institution heads also indicated that the teachers/ lectures faced challenges like not being computer literate, user problem, power downtime, few desktops PCs compared to teacher/ lecturer ratio, internet accessibility and high cost of internet in accessing and utilization of the ICT tools. Majority of learning institutions in rural areas are public and that is where majority of learners are enrolled. Failure apply or limited application of ICT by learning institutions has implication that teachers and pupils/students who are many a times change agents in their communities have limitations in supporting diffusion in application of ICT for development in Tharaka district. When the learning institutions cannot apply the technology in their operations, this means limited exposure to the students/pupils on the technology application as they graduate from the learning institutions yet the same institutions are expected to support in rolling out the technological application of the ICTs in a country and community. This means that despite the diverse opportunities for applying the ICT technology, the same has not positively influenced the application of the communication technology for development in Tharaka district

The study further determined the frequency at which the ICT tools were used by CBO members. In business undertaking Data is tabulated in Table 4.31

Table 4.32: CBO members' responses on the frequency of use of ICT tools

Tools	Never		Rarely		Always	
	frequency	%	frequency	%		
Landline	7	58.3	3	25.0	2	16.7
Mobile phone	1	8.3	5	41.7	6	50.0
Computer	4	33.3	4	33.3	4	33.3
Internet	6	50.0	4	33.3	2	16.7

Table 4.32 shows that majority 7(58.3%) of CBO members never used landline in business, 5(41.7%) of members rarely used mobile phones in business while majority 6(50.0%) of members never used internet in business. The study further sought to investigate the ICT tools commonly accessible to the CBO members. Table 4.32 presents the finding.

Table4.33: CBO members' responses on the tools commonly accessible

Tools	Yes		No	
	frequency	%	frequency	%
Landline Telephones	3	25.0	9	75.0
Wireless Telephone/Mobile	6	50.0	6	50.0
Computers	2	16.7	10	83.3
Internet Service	3	25.0	9	75.0
Radio	7	58.3	5	41.7
Television	6	50.0	6	50.0
Video	7	58.3	5	41.7

Table 4.33 indicated that majority 9(75.0%) of CBO members never accessed landline telephones and internet services. 6(50.0%) accessed wireless telephones and television. Data further shows that majority 7(58.3%) of CBO members accessed radio and video. When the CBO members were asked to indicate the members who were proficient in use of the various ICT tools, majority 7(58.3%) of members said that above 16 members were proficient in use of landline & desktop computer and wireless telephone, 6(50.0%) of members said they were proficient with mobile phones. Figure 4.5 presents the CBO members' responses on whether there were ICT tools appropriate for their business undertaking. The data in Tables 4.25 and 4.26 imply the diverse opportunity of applying ICT in development has not influenced the application of the technology among majority

of CBO in Tharaka district

Table 4.34 CBO members' responses on whether there were ICT tools appropriate for their business undertaking.

Response	frequency	%
Yes	6	50.0
No	6	50.0
Total	**12**	**100.0**

Table 4.34 shows that 6(50.0%) of CBO members agreed that there were ICT tools appropriate for their business undertaking. Those who said that the tools were in appropriate, they said that they did not understand the operational language and features and others were not aware of how the technology can be used in their business. The study further sought to establish whether the CBO members faced the challenge of members not aware of how to apply the technology in their business and the operational procedure of the technology being complicated. Data indicated that majority 11(91.7%) agreed with the statement. When asked to indicate whether the members understood how to use the inbuilt features of the tools, majority 8(66.7%) of members agreed with the statement. This implies that technological application influenced access and utilization of ICT among CBO members in Tharaka district

Asked how they experienced challenges could be overcome, data revealed that they could be overcome by training on ICT user skills as indicated by 8(66.7%) of CBO and by creating awareness to the community on how and where to apply the technology as indicated by 9(75.0%) of members. This would increase the level of access and utilization of the tools as trained people operate carefully and they will interact with others who do not have knowledge. Majority 9(75.0%) of CBO members were of the opinion that challenge could be overcome by inbuilt features and language which was understood by the users.

The researcher further sought to investigate from the service providers the common

challenges faced by the customers. The finding indicated that the customers had language barrier, technical barrier and limited application challenges. The service providers were further asked to indicate the common uses and application of ICT tools by the clients. Table 4.35 tabulates the finding.

Table 4.35: Service provider responses on the common uses and application of ICT tools by the clients

Use	Yes		No	
	frequency	%	frequency	%
VoIP/voice communication	2	50.0	2	50.0
Internet	2	50.0	2	50.0
Data storage	2	50.0	2	50.0
Data transmission	2	50.0	2	50.0

Table 4.35 shows that 2(50.0%) of service providers indicated that their clients used the ICT tools by internet, data storage and transmission while the same number said their clients used in VoIP/voice communication. When the Government and NGOs informants were asked whether all of their colleagues' were aware of various ways in which ICT tools can be applied in their work and within the district/community they work in, 3(60.0%) of key informants said they were aware. Though all the above data is positive on use and application of the ICT, majority could be the few elites in the community or the neighboring districts where the communication signals may reach hence this does not necessarily imply the technology has been well applied in the district

In the application of ICT tools, the informants said that their colleagues faced challenges of user problem, unaware of how to apply the tools in development and lack of the appropriate skills. The key informants were asked how the challenges could have been addressed. Table 4.35 presents the finding.

Table 4.36: Key informants responses on how the challenges were addressed.

Response	frequency	%
In-house training	3	60.0
External training	2	40.0
Total	**12**	**100.0**

Table 4.36 shows that majority 3(60.0%) of informants said that the challenges were addressed through in – house training, 2(40.0%) of informants said it was addressed through external training. Findings further indicated that the key informants were aware that lack of capacity due to low level of education, high cost of ICT tools and ignorance and high cost of tools influenced application of ICT tools for development by the community in the district. The government and NGOs key informants further said that these could be addressed by creating awareness and introduction of ICT education at primary level.

To examine the Influence of socioeconomic factors on access and utilization of Information and Communication Technology for development in Tharaka District, the analyses were performed using the Pearson Correlation Coefficient the data is presented in table below.

Correlations for technological application factors in access and utilization of Information Communication Technology

Table 4.37: Pearson Correlation Coefficient analysis

		Access and utilization of ICT	**Technological application**
Pearson	Technological application	1.000	0.75
Si 1 - tailed	Access and utilization of ICT	0.75	1.000
N	12	75	

The Table 4.37 show that there was strong positive (0.75) relationship technological application and access and utilization of Information Communication Technology. The results showed that the different levels of technological application by the respondents meant how much they accessed and utilized IT for development.

4.6 The Influence of Socioeconomic factors in Access and Utilization of Information Communication Technology for Development in Tharaka District

The study sought to establish from the CBO members the number of members that had a monthly income. Data is presented in Table 4.36.

Table 4.38: CBO responses on the number of members who had monthly income.

Number of members	Frequency	%
1 – 5	3	25.0
6 – 11	2	16.7
12 – 16	2	16.7
17 - 21	1	8.3
Above 21	1	8.3
Total	**9**	**100.0**

Table 4.38 shows that 3(25.0%) of CBO members said that none of their members had a monthly income, 2(16.7%) of CBO members said that those who had an income were between 17 and 21 members, the same number said that they were above 21 members while 1(8.3%) of members said they were between 6 and 16 members. The CBO members were asked whether they owned one or more ICT tools. Data indicated that majority 10(83.3%) owned the tool. The study examined from the school/ learning institution head on whether their school had any ICT tools. This implies socioeconomic factors influences access and utilization of the ICT in the district. Those who may not afford may use their social networks to access and utilize the technology.

The study examined from the school/ learning institution heads and pupils on whether their schools had any ICT tools. Data is presented in Table 4.37.

Table 4.39: Students responses on whether their school had any ICT tools

Response	Frequency	%
Yes	16	80.0
No	4	20.0
Total	**20**	**100.0**

Results presented in Table 4. 39 show that majority 16(80.0%) of students said that their school had ICT tools. Asked to indicate the tool, they responded as indicated in Table 4.39

Table 4.40: Students responses on the available ICT tools

Tools	Yes		No	
	frequency	%	frequency	%
Television	12	60.0	8	40.0
Mobile phone	16	80.0	4	20.0
Video	5	25.0	15	75.0
Radio	17	85.0	3	15.0
Satellite phone	2	10.0	18	90.0
Desk top computers(s)	8	40.0	12	60.0
Laptops(s)	4	20.0	16	80.0
Internet connectivity	4	20.0	16	80.0

Table 4.40 show that majority 12(60.0%) of students said their schools had televisions, the same number of students indicated that they lacked desktop computers(s). Majority 16(80.0%) of students indicated that mobile phones were available while the same number said they lacked laptops(s) and internet connectivity. Data further shows that 15(75.0%) of students said they lacked video in their institutions. The study further sought to establish from the institution heads whether all pupils and teachers had access to the computers and other related ICT tools and services in the school. Data is presented in Table 4.41

Table 4.41 Institutions head responses on whether all pupils and teachers had access to the computers and other related ICT tools and services in the school

Response	Frequency	%
No	9	69.2
Yes	3	30.8
Total	**13**	**100.0**

Table 4.41 shows that majority 9(69.2%) heads said that all pupils and teachers have no access to the computers and other related ICT tools and services in the school because there was no power connectivity and school could not afford to pay for monthly power charges and pay for internet services. This implies the socio economic factors may influence access and utilization of ICT tools in schools. The researcher further sought to establish from the CBO members what influences their access and utilization of the tool. The researcher further sought to establish from the CBO members what influences their access and utilization of the tool. Data is indicated in Table 4.41

Table 4.42: CBO members responses on what influences their access and utilization of the tool

Use	Yes		No	
	frequency	%	frequency	%
Ability to buy	5	41.7	7	58.3
Social status attached to the tools and use of the technology	6	50.0	6	50.0
Both ability to buy and social status	5	41.7	7	58.3
It is necessity	6	50.0	6	50.0

Table 4.42 shows that majority 6(50.0%) of members said that they were socially attached to the tools and use of the technology and necessity of the ICT tools influences their access and utilization of the tool. Majority 7(58.3%) of members disagreed that both of their ability to buy and social status influences the access. When asked to indicate what influences the access and utilization of ICT tools in their community, 6(50.0%) CBO members said that affordability of the gadget and services influenced the utilization,

social status attached to the ownership and utilization influenced 7(58.3%) of members while the values they added in ones business, peer influence and necessity influenced only 5(41.7%) of members. This show the socioeconomic factors may influence on access and utilization of ICT tools by community

The study further sought to examine the number of ICT tools owned by the CBO members. Data is presented in Table 4.42.

Table 4.43: Number of ICT tools owned by CBO members.

Tools	One		Two		More than three	
	frequency	%	frequency	%		
Office landlines	8	66.7	3	25.0	1	8.3
Mobile phones	7	58.4	1	8.3	3	25.0
Wireless sets	10	88.3	1	8.3	0	00.0
Satellite phones	11	91.7	1	8.3	0	00.0
Computers	4	33.3	7	58.3	0	00.0
Laptops	6	50.0	3	25.0	3	25.0
Video	7	58.4	1	8.3	3	25.0
Television set	7	58.4	1	8.3	3	25.0

Table 4.43 shows that majority 8(66.7%) of members owned one office landline. 10(88.3%) members owned one wireless sets. Majority 7(58.4%) owned one video, television and mobile phones 7(58.3%) members owned two computers. The respondents indicated that the ownership was influenced by members social status while some members said that the tools were donated to them. The CBO members were asked whether there were some socio economic issues in their community that influence access and utilization of ICT tools. Table 4.43 presents the finding.

Table 4.44: CBO members' responses on whether social economic issues influenced access and utilization of ICT tools

Response	Frequency	%
Yes	8	66.7
No	4	33.3
Total	**12**	**100.0**

Table 4.44 shows that majority 8(66.7%) of CBO members said that there were some economic issues while 4(33.3%) of members said that there were no issues. The CBO member further said these socioeconomic issues mostly affected the youth as they were the energetic and influenced by peer. The students who had no ICT tools were asked to indicate reasons why they lacked them. Findings are tabulated in Table 4.44.

Table 4.45: Students responses on why they lacked ICT tools

Use	Yes		No	
	frequency	%	frequency	%
The school community cannot afford to buy	5	25.0	15	75.0
Not a priority	3	15.0	17	85.0
School community cannot afford maintenance cost	4	20.0	16	80.0
The school community does not understand and appreciate their values in learning	0	00.0	20	100.0
No means for powering the tools hindering their acquisition	6	30.0	14	70.0

Data in Table 4.45 shows that majority 15(75.0%) of students said that the school community inability to afford the ICT tools was not the reason why they lacked ICT tools. Majority 17(85.0%) of students also said that the maintenance cost of ICT tools by the community was not a reason why they lacked them. Data further shows that majority 14(70.0%) of students disagreed that lack of means for powering the tools hindered their

acquisition was not the reason why they lacked ICT tools

When the students were asked whether all pupils and teachers had access to the computers and other related ICT tools and services in the school, majority 15(75.%) of students said they did not have an access. The tools indicated by students that were inaccessible were as shown in Table 4.45

Table 4.46: Students responses on the tools inaccessible

Tools	Yes		No	
	frequency	%	frequency	%
Computer/ desktop	5	25.0	15	75.0
Laptops	4	20.0	16	80.0
Mobile phones	3	15.0	17	85.0
Television	4	20.0	16	80.0
Internet	7	35.0	13	65.0
Radio	6	30.0	14	70.0
Videos	7	35.0	13	65.0
satellite phones	10	50.0	10	50.0

Table 4.46 shows that majority 15(75.0%) of students did not access computers/ desktop. Majority 16(80.0%) of students were not able to access laptops and television. Data further shows that majority 13(65.0%) of students could not access internet and videos. The service providers were asked to indicate the economic challenges that were faced by the company in service delivery. Majority 3(75.0%) of service providers said they faced challenge of high maintenance cost, high cost of equipment and high transport costs. The service providers further indicated that the common socio economic related complain that their customers made regarding to their service was that some services could not be affordable by the community.

Data from Government and NGOs informants indicated that high hardware cost, maintenance cost and high tariffs affected their organization access and utilization of ICT tools in their departments.

Table 4.47: Government and NGOs key informants rank of social economic factors in terms of their significance in access and utilization of ICT tools for development in Tharaka district.

Factors	Highly significant		Second significant		Third significant		Last in significance	
	frequency	%	frequency	%				
High costs of the hardware	3	60.0	0	0.00	2	40.0	0	0.00
Social status attached the same	0	0.00	0	0.00	0	0.00	5	100.0
High tariffs for the services	2	40.0	0	0.00	3	60.0	0	0.00
High maintenance costs	0	0.00	5	100.0	0	0.00	0	0.00

Table 4.47 shows that majority 3(60.0%) of the Government and NGOs key informants rank the high costs of the hardware being highly significant in access and utilization of ICT tools. 5(100.0%) of informants ranked high maintenance costs as the second significant while the same number ranked social status attached to the same being last in significance. Most of the above finding shows socioeconomic factors had great influence access to ICT tools and their utilization especially the affordability and maintenance aspects.

When service providers were asked whether they had any plan to expand their coverage area in the district, they responded as Table 4.47.

Table 4.48: Service providers' responses on whether they had any plan to expand their coverage area in the district

Response	Frequency	%
Yes	8	66.7
No	4	20.0
Total	**12**	**100.0**

Findings in Table 4.48 show that majority 8(66.7%) of service providers had a plan to expand their coverage. This was by establishment of more cyber cafes in remote areas to ensure that people had an access to information and also conducted trainings on the use of the ICT tools.

Correlations on socioeconomic factors and access and utilization of Information Communication Technology

Table 4.49: Pearson Correlation Coefficient analysis

		Access and utilization of ICT	Social economic factors
Pearson	Socioeconomic factors	1.000	0.58
Si 1 - tailed	Access and utilization of ICT	0.58	1.000
N	12	75	

The scores obtained as shown in Table 4.49 on the independent variable (socioeconomic factors) were correlated with the predicted variable access and utilization of ICT in development. The results indicated that there was a positive relationship between the two variables as indicated by a correlation of 0.58. The results indicated that socio economic factions influenced the access and utilization of ICT in development.

4.7 The Influence of the Legal framework on Access and Utilization of Information Communication Technology for Development in Tharaka District

To examine the influence of the legal framework in utilization of Information

Communication Technology for Development in Tharaka District, the CBO members were asked whether they were aware of any government policies and regulations in relations to ICT access and utilization. Majority 10 (83.3) of members said that they were not aware. While 2(16.7%) of members were aware of licenses policies which its implementation caused fear on utilization and access to the tools. When community members are unaware of the existing ICT policies, it is a challenge for them to demand implementation of the same for their benefit hence the influence of the policies in access and utilization of the ICT become limited in Tharaka district.

The school/ heads institutions heads were asked to explain the ministry of education ICT policies. Table 4.48 tabulates the finding.

Table 4.50: school/ heads institutions responses on ministry of education ICT policies

Response	frequency	%
Learners should be able to access learning materials from the internet	7	53.8
There are no tools to implement ICT policies	4	30.8
Not familiar with ministry of education ICT policies	2	15.4
Total	**13**	**100.0**

Table 4.50 shows that the policies indicated that learners should be able to access learning materials from the internet as indicated by 7(53.8%) of the heads, 4(30.8%) of heads said that there were no tools to make ICT policies implemented while 2 of the heads were not familiar with the policies. The researcher asked the students to indicate the number of Ministry of education ICT policies that had been implemented in their school. Data is presented in Table 4.49

Table 4.51: Students responses on the number of Ministry of education ICT policies that had been implemented in the school

Number	Frequency	%
More than 2	8	40.0
Less than 5	3	15.0
None	9	45.0
Total	**20**	**100.0**

Table 4.51 shows that 8(40.0%) of students said that more than two ICT policies had been implemented, 3(15.0%) of students indicated that they were less than five while 9(45.0%) of students said that none of the policies had been implemented. The study further sought to investigate from the students the challenges they face in having the ICT policies implemented in their school. Table 4.50 presents the finding.

Table 4.52: Students response on the challenges they face in implementation of the ICT policies in the school

Challenges	Yes		No	
	frequency	%	frequency	%
Unclear policies	16	80.0	4	20.0
Lack of clear direction/guidance	15	75.0	5	25.0
Policies non existent	11	55.0	9	45.0
Financial constraints	14	70.0	6	30.0

Table 4.52 shows that majority 16(80.0%) of students said that unclear policies was the challenge that they faced in demanding implementation of the ICT policies in their school. Majority 15(75.0%0 of students faced challenges on lack of clear direction/ guidance on the use of ICT while 14(70.0%) of students their schools/parents had financial constraints challenges in the implementation. The heads of schools/ institutions were further asked to indicate the challenges they faced in implementation of the ICT policies in their schools. Data indicated that there were challenges of unclear policies,

lack of guidance and financial constraints. They recommended that the community and institutions should train teachers/ pupils/ students on the ICT use and application as they lobby and advocate for implementation of ICT infrastructure.

Table 4.53: CBO responses on ways that the government regulations/policies can assist the members of the community in accessing and utilizing ICTs for development in this district

Policies	frequency	%
Increased number of affordable ICT tools	3	25.0
Reduce calling tariffs	3	25.0
Affordable license fees for operating ICT business	1	8.3
Community education on application of ICT for development	5	41.7
Total	**12**	**100.0**

Table 4.53 indicated that the government could increase the number of affordable ICT tools and reduce calling tariffs' as indicated by 3 (25.0%) of members. 5(41.7%) of CBO members said that the government should conduct community education on application of ICT for development while 1(8.3%) of members said that government should have fordable license fees for operating ICT business.

Majority 11(91.7%) of CBO members also considered the community as a key player in implementation of the government ICT policies as the government is formed from the community and the community is a key player in ICT implementation and government policies. Students were asked to indicate the role that they and school community could play in ensuring access and utilization of ICT tools in education. They responded as Table 4.52.

Table 4.54: Students responses on the role that they and school community could play in ensuring access and utilization of ICT tools in education

Roles	Yes		No	
	frequency	%	frequency	%
Lobby and advocate for implementation of ICT infrastructure	15	75.0	5	25.0
Mobilize resources to acquire ICT tools and power supply for ICT tools use	20	100.0		
Train teachers/pupils/students on ICT use and application	18	90.0	2	10.0
Introduce E-learning in the institution	14	70.0	6	30.0

Table 4.54 indicate that majority 15(75.0%) of students indicates that the school community should lobby and advocate for implementation of ICT infrastructure. The community should mobilize resources to acquire ICT tools and power supply for ICT tools use as indicated by 20(100.0%) of students. To ensure access and utilization of ICT tools in education the school community should train teachers/ pupils/students on ICT use and application as indicated by majority 14(70.0%) of students. The study further sought to establish from the government and NGOs key informants the current government policies and regulation as related to ICT access and utilization for development in the district.

Table 4.55 Government and NGOs key informants responses on the current government policies and regulation as relates to ICT access and utilization for development in the district

Policies	frequency	%
ICT policy on communication, education and information	2	40.0
Free access to information	2	40.0
Signal distribution policy	1	20.0
Total	**5**	**100.0**

Findings in Table 4.55 indicated that there was ICT policy on communication, education and information, and free access to information as indicated by 2(40.0%) of the informants. Data further shows that there were signal distribution policies as shown by 1(20.0%) of the informants. When asked to explain how the policies influenced access and utilization of ICT for development in the district, majority 4(80.0%) of the informants said that most of them communicate all the information online while 1(20.0%) of informants said that the policies ensured non- discrimination in distributing of license for signals. The study further sought to investigate from the informants whether there were ICT policies and regulations which had not been implemented. Data is presented in Table 4.56.

Table 4.56: Informants responses on whether there were ICT policies and regulations which have not been implemented

Response	Frequency	%
Yes	3	60.0
No	2	40.0
Total	**5**	**100.0**

Table 4.56 shows that majority 3(60.0%) of the informants said that there were ICT policies and regulations which had not been implemented. They further gave the reasons as lack of ICT skills among departments and inadequate ICT tools in their organizations. To mitigate the challenges on lack of ICT skills, the organization trained the community members in the use of the ICT tools. From all the above findings under this section, it is evident that the government legal framework has not positively influenced access and utilization of ICT in Tharaka district as most of the community members are not aware of the policies while to others the policies are not clear and to the government employees, they lack skills and resources to roll out the same.

Correlations on legal framework and access and utilization of Information Communication Technology

To examine the Influence of legal framework on access and utilization of Information and Communication Technology for development in Tharaka District, the analyses were performed using the Pearson Correlation Coefficient the data is presented in table below.

Table 4.57: Pearson Correlation Coefficient analysis

		Access and utilization of ICT	Legal framework
Pearson	Legal framework	1.000	0.78
Si 1 - tailed	Access and utilization of ICT	0.78	1.000
N	12	75	

The scores obtained in Table 4.57 on the legal framework and access and utilization of ICT in development. The results indicated that there was a positive relationship between the two variables as indicated by a correlation of 0.78. The results indicated that legal framework influenced the access and utilization of ICT in development.

4.8 The Influence of Infrastructural Development in Utilization of Information Communication Technology for development in Tharaka District

The researcher was interested to establish from the students whether they had access of internet in their school. Data shows that they had no access as indicated by majority 17(85.0%) of the students. They were further asked to indicate the reasons. Table 4.55 presents the finding.

Table 4.58: Students responses on reasons for not accessing internet

Reasons	Yes		No	
	Frequency	%	frequency	%
No network	11	55.0	9	45.0
Not connected	3	15.0	17	85.0
Cost challenges	12	60.0	8	40.0
Lack of connection licenses	2	25.0	15	75.0
No internet connection gadgets	7	35.0	13	65.0

Findings above Table 4.58 show that majority 12(60.0%) of students said that they had no access to internet due to cost challenges. 11(55.0%) of students said it was due to lack of network. Data further shows that lack of connection was not a reason onto why students lacked access to internet as shown by majority 17(85.0%) of the students. The study further sought to investigate from the students whether network was available all through. Findings shows that majority 16(80.0%) said it was not available all through. To investigate the reasons why the network was unavailable all through, the students were asked to indicate the reason for same. Table 4.56 tabulates the finding.

Table 4.59 : Students responses on why network was unavailable all through

Reasons	Yes		No	
	Frequency	%	frequency	%
Power blackout	5	25.0	15	75.0
No telecommunication network	11	55.0	9	45.0
Communication breakdown	11	55.0	9	45.0

Table 4.59 shows that only 5 (25%) indicated that network failure was due to power blackout. Data further indicates that majority 11(55.0%) of students said that network failure was due to lack of telecommunication network and communication breakdown. Majority 3(75.0%) of service providers on the other hand indicated that they faced challenges of power blackout which made them to lack connectivity hence losing

business opportunities. This finding agreed with that of Schools/ institutions heads who indicated that their learning institution network was sometimes unavailable due to power blackout which affected their access and utilization of the ICT tools due to communication breakdown. From the above, it is clear that infrastructure availability influences limited access and utilization of ICT in Tharaka district due to poor clarity of the communication networks, lack of electricity power and inaccessibility of the network in majority of areas due to limited telecommunication masts in the area.

The study sought to find from the government and NGOs key informants on the service providers in the district. The study found out that there were Safaricom, Telkom and cyber cafes providers. When the informants were asked to rate the providers clarity, majority 3(60.0%) of the informants said that less than three providers were clear.
Government and NGOs key informants were asked to indicate the number of cyber cafes that existed in the district. They responded as Table 4.57.

Table 4.60: Government and NGOs key informants responses on the number of cyber cafes that existed in the district.

Response	frequency	%
Less than 5	2	40.0
11 – 20 cyber	2	40.0
More than 21	1	20.0
Total	**5**	**100.0**

Table 4.60 shows that 2(40.0%) of government and NGOs key informants said that here were less than 5 cyber cafes in the district, the same number said there were between 11 and 20 cyber cafes. A significant number 1(20.0%) of informants said there were more than 21 cyber café. When there is conflicting data from key informants on number of cyber cafes existing in the district, planning to support the diffusion or rollout of the same for purposes of availing the ICT services to the community become a challenge.

When asked to indicate the source of power supply in the district, they said that it was from hydro-power which is unreliable.

From the service providers, the researcher sought to examine the number of mobile masts that the companies' had erected in the district. Data is presented in Table 4.58.

Table 4.61 service providers' responses on the number of mobile masts that the company had erected in the district

Response	frequency	%
Less than 3	2	50.0
2	2	50.0
Total	**4**	**100.0**

Table 4.61 shows that 2(50.0%) of the service providers indicated that they had less than 3 masts while the same rate said they had erected between 4 and 6 in the district. The service providers were also asked to indicate the square kms that one mast covered. Table 4.59 tabulates the finding.

Table 4.62: Service provider responses on square kms that one mast covered

Square Kms	frequency	%
1 – 5	1	25.0
6 – 10	2	50.0
Over 20	1	25.0
Total	**4**	**100.0**

Table 4.62 shows that 2(50.0%) said that the mast covered between 6 and 10 square kms, 1(25.0%) of providers said it covered between 1 and 5 square kms while the same number said it covered over 20 square kms.

The study further sought to establish from the informants whether all parts of the district were accessible through the year. Data indicated that not all parts were accessible as

shown by majority 2 (66.7%) of the informants. The researcher was also interested in establishing from the CBO members how existence or non existence of ICT infrastructure influenced access and utilization of information communication technology for development. For example the members were asked to indicate whether there were cyber cafes in their community where people could access the internet.

The study found out that majority 11(91.7%) said there were no cyber cafes in their community where people can access the internet. The members 1(8.3%) who said that there were cyber cafes, they further indicated that they were not easily accessible. The study further sought to establish from the member the number of telecommunication service providers exist in their community. Data is tabulated in Table 4.60.

Table 4.63: CBO members responses on the number of telecommunication service providers exist in their community.

response	frequency	%
Less than 3	2	50.0
2	2	50.0
Total	**4**	**100.0**

Table 4.63 shows that 3(25.0%) of CBO members indicated that there was one telecommunication service providers, 4(33.3%) of members said there were two, the same number said there were no providers while 1(8.3%) of members said there were three. When the members were further asked to indicate the number of telecommunication masts are within their administrative location, majority 7(58.3%) of member said there not available.

Table 4.64: CBO members' responses on clarity of networks

	Clear		Not clear	
	frequency	%	frequency	%
Safaricom	6	50.0	6	50.0
Airtel	7	58.3	5	41.7
Yu	4	33.3	8	66.7
Landline	6	50.0	6	50.0
Orange	4	33.3	8	66.7

Data in Table 4.64 shows that 6(50.0%) of the CBO members said that Safaricom was clear with the same number indicating that it was not clear. Majority 7(58.3%) of CBO members indicated that Airtel was clear. Data further shows that majority 8(66.7%) of members said that Orange services were not clear. The study further sought to establish the time of the day that power down time commonly occur. Table 4.62 presents the finding.

Table 4.65 CBO member responses on the time of the day that power down time commonly occurs

Response	frequency	%
7 am – 12 pm	9	75.0
1 pm – 6 pm	2	16.7
7 pm – 10pm	1	8.3
Total	**12**	**100.0**

Table 4.65 shows that the power down time was between 1pm and 6 pm as indicated by majority 9(75.0%) of the members. 2(16.7%) of the members said that it occurred between 7 am and 12 pm while 1(8.3%) of members said it occurred between 7pm and 10 pm. This made it hard to operate business, and lack of information access. For effective access and utilization of ICT in any given environment is determined by availability of power to operate the tools and continuous existence of telecommunication network. From

the above findings in this section, limited access to these infrastructure seem to greatly influenced limited access and utilization of ICT for development in Tharaka district

Correlations for infrastructural development and access and utilization of Information Communication Technology

To determine the influence of infrastructural development in utilization of Information Communication Technology for development in Tharaka District, analyses were performed using the Pearson Correlation Coefficient the data is presented in table below.

Table 4.66: Pearson Correlation Coefficient analysis

		Access and utilization of ICT	Infrastructural development
Pearson	Infrastructural development	1.000	0.69
Si 1 - tailed	Access and utilization of ICT	0.69	1.000
N	12	75	

The Table 4.66 show that there was strong positive (0.69) relationship infrastructural development and access and utilization of Information Communication Technology.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the research findings, discusses the same and presents conclusions, recommendations and suggestions for further research.

5.2 Summary of findings

Below is the summary of the study findings.

5.2.1 How the Level of Education Influences Access and Utilization of ICT4D in Tharaka District

Data on how the level of education influences access and utilization of Information and Communication Technology for Development in Tharaka District revealed that among the CBO members, none was a university. Majority of the CBO members who could read and comprehended their ICT tools operational language and features associated their ability to their level education. The findings revealed that there were CBO members charged with responsibility of supporting their members in interpreting the ICT tools operational language signifying the critical role played by level of education in the access and utilization of the ICT tools in development. Asked to indicate other challenges they faced, the CBO members listed challenge of lack of trained ICT teachers/tutors and centers, community ignorance and communication barriers. The Key informants indicated that the level of education highly influenced their employees' access and utilization of ICT4D in Tharaka District.

The findings implied that the level of education influenced to a great extent the access and utilization of ICT in the district. This is so because the higher the level of education an individual has, the more chances one will have in accessing various and advanced ICT tools and utilization of the same.

5.2.2 The Influence of Technological Application in Access and Utilization of ICT4D in Tharaka district

Findings on what was the influence of technological application factors in access and utilization of Information Communication Technology for Development in Tharaka District revealed that most of CBO members agreed that technology was easy to understand and fun in using the tools influenced most of their access to the ICTs. The same number disagreed that they easily manipulated the inbuilt ICT tools features to meet their user needs implying the interplay of the factor among others.

Almost all CBO members used the ICT tools in personal communication and in conveying information about meetings while others used the tools in learning. Most of the CBO members did not use the tools for money transfer to their merry go rounds groups /VSLAs or marketing. This limitation in terms of diversifying use of the ICT implies majority of the community members are yet to take advantage of the ICT and apply the same in their development. Through use of ICTs, individuals can send or download bulky data through internet. This is unutilized opportunity as indicated from the data collected hence a clear indication on the limited influence of the technological application in development in Tharaka district.

The study revealed that all the institutional heads did not use ICT tools in planning/ budgeting, development of both schemes of work by teachers nor storage of teaching and none teaching staff work plans. When the learning institutions cannot apply the technology in their operations, this means limited exposure to the students/pupils on the technology application as they graduate from the learning institutions yet the same institutions are expected to support in rolling out the technological application of the ICTs in a country and community. This means that despite the diverse opportunities for applying the ICT technology, the same has not positively influenced the application of the communication technology for development in Tharaka district as for most of the community members do not know how to apply the technology in their development

Half of CBO members agreed that their ICT tools were appropriate for their business

undertakings. Those who said that the tools were inappropriate, they indicated technological application inhibited their extent of access and utilization of the tools as the members did not have the capacity to apply the technology in their work.

5.2.3 The Influence of Socioeconomic factors in Access and Utilization of ICT4D in Tharaka District

Data on how the socioeconomic factors influenced access and utilization of Information Communication Technology for Development in Tharaka District showed that the CBO members indicated that majority owned a tool. Highest number of learning institutions heads said that all pupils and teachers have no access to the computers and other related ICT tools and services in the school because there was no power connectivity and schools could not afford to pay for monthly power charges and pay for internet services. Half of CBO members said that they were socially attached to the tools, use of the technology and necessity of the ICT tools influences their access and utilization of the tools. The respondents indicated that the ownership of the tools was influenced by members' social status while some members said that the tools were donated to them. The affordability and social attachment shows the influence of the socioeconomic factors in access and utilization of ICTs in Tharaka district.

Majority of service providers said they faced challenge of high maintenance cost, high cost of equipment and high transport costs. The service providers further indicated that the common socio economic related complains that their customers made regarding to their services was mostly on affordability.

Data from Government and NGOs informants indicated that high hardware cost, maintenance cost and high tariffs affected their organization access and utilization of ICT tools in their departments. All key informants ranked high maintenance costs as core in access and use of the ICT tools in their organizations. From the above findings, it is clear that socioeconomic factors influenced access and utilization of ICTs in Tharaka district.

5.2.4 The Influence of Government Legal framework in Access and Utilization of ICT4D in Tharaka District

Findings on how the legal framework influenced access and utilization of Information Communication Technology for Development in Tharaka District showed that all the CBO members were not aware of any government policies and regulations in relations to ICT access and utilization. Most of the students said that unclear policies were the challenge they faced in demanding implementation of the ICT policies in their schools. The CBO members also considered the community as a key player in implementation of the government ICT policies as the government is formed from the community and the community is a key player in implementation of government policies. When the community members are not aware of the existing government policies and regulations on ICTs, they will not be able to demand for the provision of services on the same hence the existing government legal framework has not positively influenced access and utilization of ICTs for development in Tharaka district.

5.2.5 The influence of infrastructural development in access and utilization of ICT4D in Tharaka district

Findings on what was the influence of infrastructural development in access and utilization of Information Communication Technology for development in Tharaka district revealed that most students said that internet failure was due to lack of telecommunication network/masts and communication breakdown within their schools. Majority of service providers on the other hand indicated that they faced challenges of power blackout which made them to lack connectivity hence losing business opportunities. This finding agreed with those of schools/learning institutions heads who indicated that their institution network was sometimes unavailable due to power blackout which affected their access and utilization of the ICT tools due to communication breakdown. The above is a clear indication of the extent to which the limited physical infrastructures influenced access and utilization of ICT4D in the district. The data from all service providers indicated that not all parts of Tharaka district were accessible due to poor road network. Majority of CBO members said there were no cyber cafes within

their locality where they could access the internet. The limited number of ICT infrastructure, power black outs, limited number of cyber cafes has negatively influenced access and utilization of ICTs for development in Tharaka district as indicated by the data on the same.

5.3 Discussions

5.3.1 Influence of level of education in access and utilization of ICT in development

The findings by the researcher in this study revealed that majority of community members and key government informants concurred that level of education influenced access and utilization of ICT among their institutions members. Education was found to play a key role in the members' ability to read and comprehend their ICTs tools operational language and manipulation of the features while individuals were using the tools.

These findings are in concurrence with Blumestock and Eagle, (2009), who in their research titled "sessional paper on mobile phones and development, mobile divides; gender, socio-economic status and mobile use in Rwanda", found out that there was high disparity in access where those who had mobile phones were seen to be different from the "normal" people as mobiles were associated with the "better off" members of society who were better educated and wealthy. Lashgarara, Mirdamadi and Hussein, (2010) identified high illiteracy levels among rural Iranian communities as barrier to their ability to utilize ICT tools in development. In conclusion of their study, among their key recommendation was eradication of illiteracy of rural people and promoting technical information infrastructure among others.

5.3.2 Influence of technological application in access and utilization of ICT in development

Under this variable, the researchers' findings revealed that in all the schools studied, teachers were not using ICTs in their operations and management of their learning institutions. A limited number used ICT tools for e-teaching while most teachers and pupils were not accessing ICTs in their schools yet schools channels for skills and technology.

The findings confirms similar finding by Cole (2008) who in his study "on building ICT4D capacities for African Universities" recommended the application of information and communication technology for rural development, training students in the application of information technologies to national development priorities, including those linked to economic development and the Millennium Development Goals, developing cost effective ICT mechanisms to enable the free flow of information within and among universities, developing locally relevant multi-disciplinary content for rural populations using multi-media dissemination channels, developing a range of ICT applications that strengthen the participating universities' outreach and extension programs to marginalized populations such as women, older people, and the poor and engaging in research and development initiatives related to the role of universities/learning institutions as incubators of telecenters and other outreach implementations.

5.3.3 Influence of Socioeconomic factors in access and utilization of ICTs

The findings of the data and information gathered when this variable was studied revealed that students in target learning institutions asserted that their school communities did not understand and appreciate the value of ICTs in their learning hence did not prioritize the same. Majority of the schools could not afford to pay for monthly charges of electricity for their schools while most of the CBOs who owned ICT tools indicated that the same had been donated to their organizations. The findings are inline with similar ones by Madons (2007) who in her study on utilization of telecenters argued that the centers were unviable in rural communities as most of those targeted to use them were the extreme poor whose appreciations for the benefits of ICTs services were very minimal leave alone their ability to pay. The United Nations Information Economy

Report (UN-IER, 2010), observed that many decision-makers in some developing countries as well as in the international development community still remain skeptical or unaware of the contribution that ICT can make to development. The above will point to the likely aspect of resource allocation and prioritization especially when top decision makers both locally and internationally cannot appreciate the role of ICTs in invigorating development.

5.3.4 Influence of government legal framework in access and utilization of ICT4D

The finding by the researcher in this study, clearly revealed out that Tharaka community was not aware of the existing government ICT policies. Without knowledge and awareness on the same, the policies do not support the communities to access and utilize ICTs for development .The findings in the above variable reaffirm similar findings by Weigel and Waldburger,(2003), all who per the literature review concurred that in determining access and utilizations factors, policies that are enshrined within social and political dimensions need to be put in place as the resource allocation to sectors and regions is political as well as the regulatory environment and provision of supportive infrastructures. Without the appropriate and supportive policy framework with respective political goodwill and well functioning institutions with policies that govern how they regulate the sector, there will be weak systems and institutions hence uncoordinated provision of the services that will continue to marginalize poor areas in the developing countries.

5.3.5 Influence of telecommunication infrastructure in access and utilization of ICT4D

The data collected and analyzed by the researcher indicated that most of the service providers had challenge of power supply; inaccessibility to large part of Tharaka District due to poor or non existent road network, learning institutions had both in access to power supply and internet services while CBO experienced challenge of lack of internet network, power and far and flung cyber cafes. With these challenges, it was difficulty to make use of the existing ICT tools in development in the district.

The above findings concur with similar one by Unwin, (2009e) whose findings showed that without the energy/power, the ICTs are unusable and this is the scenario in rural Africa where only 15% of the households have access to electricity. Thailand's National Electronics and Computer Technology Center (NECTEC, 2004), Palasri, Hutler and Wenzel, (1999) also found that despite the massive expansion of Thai Internet, only 5% to 10% of the populations had access and usage of the same. Much of the internet had not reached rural Thailand communities.

5.4 Conclusions

Based on the finding by the researcher, it was concluded that level of education influenced access and utilization of Information and Communication Technology for development in Tharaka. For example respondents who had not been to school sought assistance on the use of ICT tools. The respondents particularly the CBO members considered their level of education to have influenced their access or none access to ICT tools. Majority of the government and NGOs informants indicated that the level of education influenced their staff ability to operate the ICT tools.

The finding concluded that technological application factors influenced access and utilization of Information Communication Technology for Development in Tharaka District. For example the CBO members' never accessed landline telephones, internet services and videos. They also agreed that the technology was easy to understand and fun influenced most of their access to the ICTs tools. The CBO members used the tools in personal communication in conveying information about meetings, learning and in passing health education information/ messages. The institutional heads did not use ICT tools in planning/ budgeting, development of neither schemes of work by teachers nor storage of teaching and none teaching staff work plans. Only a few used the tools in monitoring pupils performance and in school data/information storage/ management.

The data collected indicated that socioeconomic factors influenced access and utilization of Information Communication Technology for Development in Tharaka District. For example the CBO members said that none of their members had a monthly income, which influenced ownership of the ICT tools. Majority of students said that their school

had ICT tools which included televisions, the same number of students indicated that they lacked desktop computers(s). Majority however lacked video in their institutions. Majority heads said that all pupils and teachers have no access to the computers and other related ICT tools and services in the school because there was no power connectivity and school could not afford to pay for monthly power charges and pay for internet services. Majority of members said that their social attached to the tools and use of the technology and necessity of the ICT tools influences their access and utilization of the tool.

Majority of students said that the school community inability to afford the ICT tools was the reason why they lacked ICT tools. Majority of students also said that the maintenance cost of ICT tools by the community was not a reason why they lacked them. Data further shows that majority 14(70.0%) of students disagreed that lack of means for powering the tools hindered their acquisition was not the reason why they lacked ICT tools. Majority of students did not access computers/ desktop while majority were not able to access laptops and television. Majority of the Government and NGOs key informants ranked the high costs of the hardware being highly significant in access and utilization of ICT tools.

The information and data collected on legal framework showed that government policies influenced access and utilization of Information Communication Technology for Development in Tharaka District. Majority of CBO members were not aware of any government policies and regulations in relations to ICT access and utilization while most of the students said that unclear policies were the challenge that they faced in demanding implementation of the ICT policies in their schools. The CBO members considered the community as a key player in implementation of the government ICT policies as the government is formed from the community and the community is a key implementation of government policies.

The study finally concluded that infrastructural development influenced the utilization of Information Communication Technology for development in Tharaka District. For example government and NGOs key informants said that there were less than 5 cyber cafes in the district, the same number said there were between 11 and 20 cyber cafes. A significant number of informants said there were more than 21 cyber café. Data indicated

that not all parts were accessible as shown by majority 2 (66.7%) of the informants. Majority said there were no cafes in the community where people could access the internet.

The diffusion of innovation theory which on which this study was anchored on fully support the finding of this research. The diffusion of the information communication technology for development was found to have been hinged on various variables which were studied and that interplay for success or non success in access and utilization of the ICT4D in the district under study

5.5 Recommendations

The Government, other development partners and communities need to find alternative source of power which is cheap and reliable for learning institutions. Service providers need to make similar move. This will ensure optimal utilization of the information communication technology and tools to spur development in the district

The Government and other development partners need to take keen interest in disseminating and creating awareness to the communities and learning institutions on the existing ICT policies and how they can benefit them

Schools boards, management committees and district education office need to create awareness on the value of use of ICT in learning to the school communities. The same will enable them prioritize resource allocation in support of the venture. Future learning will be based on ICT.

Learning institutions need to take lead in introducing use of ICT in running the institutions business on daily basis as this will spur and enable permeation of utilization of the technology and the tools for development in the community

The Government and other development partners need to create more awareness to communities on application of commonly accessible ICT tools in development. For Instance, radio and televisions were common but majority of CBOs did not indicate how they could make optimal use of the same to disseminate developmental education in areas

of health, agriculture among other which would reach majority of their members and community in general within a very short period

5.6 Suggestions for Further Study

Further research need to be undertaken on the factors contributing to ineffective dissemination of government policies to its staff and communities. This has a significant impact on implementation of the policies and use of the policies to support development within the communities. Under this study, there was a significant gap

Other researchers can conduct a detailed study on how the communities can be guided in utilization and application various IC technologies and tools in their business

A detailed study on individual categories of institutions can be made to provide more information and data on access and utilization of ICT4D

REFERENCES

Amartya Sen (2011) Capability approach, Choice Framework. Telecentres: Chile; *journals.ohiolink.edu/ejc/search.cgi?q...*

Blumenstock.J & Eagle. N. (2009).Mobile Divides: Gender, Socioeconomic Status, and Mobile Phone Use in Rwanda.

Brown (2001), Making ICT work for pro –poor development, Herstellung und vertlag: Books on demand GmbH, Norderstedt Garmany: ISBN: 9783833495885; *books.google.co.ke/books?isbn=383349588X*

Bezanson & Chen (2003); ICTs for Poverty Reduction –ICT4P(IDRC Concept Note): Governance and Regulation of ICT- pro-Poor,Pro-Market(GRIPP). *www.docstoc.com/.../ICTs-for-Poverty-Reduction*

Chirsanthi Avgerou, (2008).Information systems in developing countries: a critical research review; *Journal of Information Technology (2008) 23, 133–146. doi:10.1057/palgrave.jit.2000136* Published online 17 June 2008

Chirsanthi Avgerou, (2010). Discourses on ICT and development. *Information Technologies & International Development, 6(3), 1–18. USC Annenberg Press. Banks, K. (2007).*

Chirsanthi Avgerou, C. (2010). Discourses on ICT and development. *Information technologies and international development, 6 (3). pp. 1-18: http://eprints.lse.ac.uk/35564*

Charlotte A. Harris & Roger W. Harris. (2011) Information and Communication Technologies for Cultural transmission Among Indigenous Peoples: *The Electronic Journal on Information Systems in Developing Countries:http://www.ejisdc.org.*

Colle, R. (2005/2008). Building ICT4D capacity in and by African universities. *International Journal of Education and Development using ICT [Online]http://iiedict.dec.uwi.edu/viewarticle.php?id=13*

Communications Commission of Kenya (2009); Kenya ICT Sector Performance Review 2009/2010 - Research ICT ... . *www.researchictafrica.net/.../Policy...ICT_Policy ...*

Communications Commission of Kenya (1999). The way forward for community radios :http://amarcwiki.amarc.org/upload/documents/Community_Radios_in_Kenya.pdf, *ww.epzakenya.com/User Files/File/ictKenya.pdf*

Communications Commission of Kenya (2007). Internet Market Analysis Study: www.cck.go.ke/.../Final_Internet_market_analysis

Communications Commission of Kenya (2010): Mobile subscribers Hit 22 million by September 2010; *www.cck.go.ke › News Updates › 2011*

Dorothea Kleine. (2008/2010). ICT4 what?-using the choice framework to operationalize the capability approach to development. *onlinelibrary.wiley.com › ... › Vol 22 Issue 5(down loaded, November 23,2011)*

Dorothea, Kleine & Timothy Unwin. (2009e). Technology Revolution, Evolution, and New Dependencies: What's new about ICT4D*? Third World Quarterly. 30(5), 1045—1067* Electronic Journal on Information Systems in Developing Countries (EJISDC) (2011)

Ericsson 2008: Telecoms innovation hub to focus on applications for the poor: *www.engineeringnews.co.za/.../telecoms-innovati:* By Leandi Kolver:

Farhad L, S. Mehdi M & S. Jamal Farajollah Hussein,(2010). The causal model role of ICTs in food utilization of Iranian rural households (Research Paper):-*African Journal of Agricultural Research Vol. 5(20), pp. 2747-7:2756:http://www.academicjournal.org/AJAR*

Folorunso, Oolusegun. & Oguseye S.O. (2008). Applying enhanced technology acceptance model to knowledge management in Agricultural extension services: *Data science Journal, Volume*

Global knowledge partnership, 1997: http://www.linkedin.com/company/global-knowledge-partnership_2.

Guida & Crow (2009); Horwitz & Currie,2007, A UNDP Report, on ICT4D and Human Development and Capability Approach;
hdr.undp.org/en/reports/.../HDRP_2010_37.pdf

Gakuu, Christopher & Kidombo, Harriet, (2010). Pedagogical integration of ICT in Kenya Secondary schools *Journal for continuing, open and distance education, volume 1.issue 1-2010:*

Graham Mark (2011). "Perish or Globalize" Network Integration and the reproduction and replacement of weaving Traditions in the Thai Silk Industry; www.acme-journal.org/vol10/Graham2011.pdf *(April 20,2012)*

Graham Mark (2011). Disintermediation, altered chains and altered geographies. The internet in the silk Industry in Thailand: *Journal of strategic Information system*

G8, (July 2008); The Okinawa charter on Global Information Society:
archive.kremlin.ru/eng/events/.../128876.shtml

Quaggiotto & Wielezynski,. *2007*; Thompson, 2000/8; "Open" information-networked activities in *international development:*
itidjournal.org/itid/article/viewFile/692/290

Hamel,Yves.(2010). ICT4D and the Human development capability approach. The potentials of information and communication technology. UNDP, Human development research paper: *Journal of Education and development*- Razanian 2006:P51

Heeks Richard (2009). The ICT4D 2.0 Manifesto: Where next for ICTs and international development? Development Informatics Group Working Paper Series. Paper 42. Available:http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/di_wp42.htm

Heeks Richard. (2002). Information systems and developing countries: failure, success, and local improvisations. *The Information Society. 18(2), 101—112*

Heeks Richard, 2010, Do information and communication technologies contribute to development ?; *Journal of international development arena 2010* http://onlinelibrary .wiley.com/doi/10.1002/iid .1716/ abstract

Heeks Richard, (2010). The ICT4D value chain*: Journal of International Development policy Arena ICT4D - A Sourcebook for Parliamentarians*

Henry Ntoko, 2007:1; Disintermediation, Altered Chains and Altered Geographies: *www.ejisdc.org/ojs2/index.php/ejisdc/.../350*

ICT4D and Human Development and capacity Approach;(Unwin,2009e) *hdr.undp.org/en/reports/.../HDRP_2010_37.pdfZ*(April 20,2012)

Information Communication Technology for Development: A source book for parliamentarians: United Nations Development Programme - Asia Pacific Development Information Programme (UNDP-APDIP) – 2004: books.google.co.ke/books? (April 20,2012)

Isaacs (2006). Educator discourses on ICT in education; *jedict.dec.uwi.edu/include/getdoc.php?id...(down loaded in April 20,2012)*

International Energy Agency (IEA-2009) www.ieabioenergy.com/libitem.aspx?id=6479 (downloaded in April *20,2012)*

International Telecommunication Union (1999c); Challenges to the network: Internet for development. Geneva: ITU. http://ictlogy.net/bibliography/reports/contacts.php?idc=238

International Telecommunication Union (2010); the world 2010-ITU: *www.itu.int/ITU-D/ict/.../FactsFigures2010.pdf*

Johan Hellstrom 2010: 12: Sida Review ;(pdf) The Innovative Use of Mobile Applications in East Africa. *sidapublications.citat.se/.../mabstream.asp?...*

Jyotsna Puri, Patricia Mechael, Roxana Cosmaciuc, Daniela Sloninsky, Vijay Modi, Matt Berg, Uyen Kim Huynh, Nadi Kaonga, Seth Ohemeng-Dapaah, Maurice Baraza, Afolayan Emmanuel, Sia Lyimo ; A study of connectivity in millennium villages in East Africa http://www.mobileactive.org/files/file_uploads/ICTD2010 Puri et al.pdf (October 23, 2011)

Kalim Qamer & Van Crowder, 2002; The Impact of ICTs on Agricultural Extension Delivery Services: India; *ageconsearch.umn.edu/.../XiaolanAkter1-IAAE20*

Kannan Srinivasan, 2007; Utilization of Tel-health in India; *mpra.ub.uni-muenchen.de/15001/* (down loaded in November 12, 2011)

Kenya Advertising Research Foundation & Association of Practitioners in Advertising, 2007/8; Kenya Media Sector Analysis: www.pioneers4change.org/index.php?....:

Kenya Economic Household Survey (2007): apps.who.int/medicinedocs/.../s18696en.pdf

Lashgarara.F,Mirdamadi.S.M & Hussein.S.J (2010); The casual model role of ICT in food utilization of Iranian rural households: *African Journal of Agricultural research vol.5(20) pp 2747-2756*

Lekoko R & Morolong B. (2006). Case studies of student support systems from sub-Saharan Africa. London: Department for International Development. A UNDP Report, hdr.undp.org/en/reports/.../HDRP_2010_37.pdf

London Conference on Information Communication Technology for Development (2010). Managing Information and Knowledge in Inter Organisational Networks; *Journal of Strategic Information Systems 2000*

Michael. L Best, (2010). Connecting In Real Space: How People Share Knowledge and Technologies in Cybercafés. Presented at the 19th AMIC Annual Conference, Singapore

Mitra Sorrells (2009); Innovative Use of mobile Applications in East Africa: *www.melissadensmore.com/.../chi2012-bulksms-...*

Nazima Shaheen (2010) & Zhao,(2007): Prospects &Challenges for women empowerment through open ICT4D in Pakistan: - file:///c:\open-and-conference 2010

Paisley Lynnita & Richardson Don (1998), the First Mile of Connectivity rural telecommunication services and stakeholder participation: bridging the gap between telecommunication experts and communication for development practitioners ; http://www.fao.org/docrep/x0295e04.htm

Palasri Hutler & Wenzel (1999); the history of the Internet in Thailand*library.stks.or.th/koha_report/filter.php?p=0&cond=&s...1*

Plan International ICT Managers workshop in Ghana (2010); http://www.planapps.org/

Sonia David & Christopher Asamoah (2011); Video as a tool for agricultural extension in Africa: a case study from Ghana: *International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2011, Vol. 7, Issue 1,*

Su Chen (2008). A Framework for Managing Access of Large-Scale Distributed Resources in a Collaborative Platform. *Data Science Journal, Volume 7, 2008*Collaboration in using ICT for education and development, 2005, volume 1-issue 1: *International Journal of education and development using ICT-vol.1 no1: - Open Journal System.*

Thailands National Electronic and Computer Technology Center(NECTEC 2004); *https://www.nectec.or.th/*

Tharaka District Development Plan (2008-2012); Ministry of planning and Vision 2030-Tharaka District development Office

Tharaka District Education Survey (2008); District Education Office, Tharaka District

Tharaka District Steering Group (February 2011)- Ministry of Arid and Semi-Arid Lands Tharaka District

The Kenya Communications (Amendment) Act No. 1 of 2009; Kenya Gazettte Supplement Acts, 2009

United Nations Development Programme,2010: Country Programme Action Plan 2010-2015: www.undptkm.org/.../CPAP_2010-2015_UNDP_...

United Nations Development Programme (2001) information communication technologies and poverty; *books.google.co.ke/books?isbn=142008822X, www.apdip.net/.../policy/.../Essentials05092001.p (down loaded April 20,2012)*

United Nations Development Programme (UNDP) ... Human Development Report 2002 .hdr.undp.org/reports/global/2002/en/ (downloaded April 20, 2012)

United Nations Education, Scientific and Cultural Organization; the relationship between local content internet development and access prices: Kenya Case by Tomothy Waema, Catherine Adeya and Nyambura Ndugu,2010.

United Nations Education, Scientific and Cultural Organization: Burtseva , 2006, Weigel and Waldburger, 2003: Transforming education: the power of ICT policies - unesdoc - Unesco ok : http://unesdoc.unesco.org/images/0021/002118/211842e.pdf

United Nations (2003) Poverty Reduction Practices: Information and Communication Technology For Rural Poverty Reduction. Bangkok: United Nations Economic and Social Council.

United Nations Economy and Social Council (UNESC, 2009) *esango.un.org/paperless/content/E2009INF4.pdfZ* (April 20, 2012)

United Nations Commission for Africa (UNECA, 2005); Achieving millennium development goals: *books.google.co.ke/books?isbn=1604975741 (April 20,2012)*

United Nations Conference on Trade and development Information Economy report; Information Economy report 2005;unctad.org/en/docs/sdteecb20051overview_en.pdf (downloaded on April 20, 2012)

United Nations Conference on Trade and development Information Economy report 2010 (ICTs, Enterprises and Poverty Alleviation);unctad.*or/en/docs/ier2010.(April 20,2012)*

United Nations Economy report, 2010, *unactad.org/en/docs/ier 2010_embergo_en.pdf*

United Nations Information and communications Technologies Task Force- UN ICT TF: (Dot Force); http://en.wikipedia.org/wiki/United_Nations_Information_and_Communication_Technologies_Task_Force

Robert Chambers (2010) Paradigms ,Poverty and adaptive pluralism; *www.ntd.co.uk/idsbookshop/details.asp?id=1187Z*

Unwin,Timothy.(ed.) (2009e).ICT4D: Information Communication Technology for Development .Cambridge: Cambridge University press

Wade (2004) & Warschauer Mark (2003); Rethinking digital divide: *gse.uci.edu/person/warschauer_m/.../equity.pdf(October 3,2011)*

World Bank (1998); Knowledge for development-report: http://wdronline.worlbank.org/worldbank/a/c.htr(October 3, 2011)

World Telecommunication and Information Society day (WTISD),May 17,2011: www.ictworks.org/network/ictworks-network/908

World Bank Study, 2000; A discourse on ICT and Development –Information technologies itidjournal.org/itid/article/download/560/246, Wang (1999);

Wolf Sachs, 1992: The concept of development; what is development: http://www.sagepub.com/upm-data/18296_5070_Sumner_Ch01.pdf

Zuckerman Ethan. (2010). decentralizing the mobile phone: A second ICT4D revolution? *Information Technologies & International Development, 6(Special Edition), 99–103. Volume 7, Number 1, Spring 2011 ix*

APPENDIX 1: INTRODUCTION LETTER

Dear Respondent,

I am a student undertaking a master's degree program in project planning and management at the University of Nairobi. In partial fulfillment of the requirement for the course, I'm currently undertaking a research in the area. I therefore wish to request you to respond to the questionnaires as required. The questionnaire is basically on access and utilization of information communication technology for development. The focus is on how the following influence the access and utilization: Level of education, socio economic factors, government policies, application of the information communication technology and infrastructure. The information you will provide will be treated as confidential and will not be used for any other purpose other than for the academic research. Your support and participation in responding to the questionnaire shall be highly appreciated.

Yours faithfully

Benedict M Nganga

APPENDIX 2: SAMPLING FRAME

LISTING OF INSTITUTIONS/ORGANISATIONS IN THARAKA

	Type of Institution /Organization	Total Number in Tharaka per category	Number Of Participating institutions per each Category	Number of participating respondents per each category of institution	Total Sample Unit
1	CBOs	35	6	2	12
2	Government departments	34	3	1	3
3	NGOs	4	2	1	2
4	Telecommunication service providers	3	2	1	2
5	Cyber cafes	6	2	1	2
6	Private primary schools	12	3	3	9
7	Private Secondary schools	4	2	3	6
8	Public primary schools	152	4	3	12
9	Public secondary schools	32	3	3	9
10	Universities	1	1	3	3
Total	10	**283**	**28**	**21**	**60**

APPENDIX: 3. QUESTIONNAIRE FOR COMMUNITY BASED ORGANISATION MEMBE

Kindly answer the questions below as honestly as possible. All the information you provide will be treated confidentially. Your participation is voluntary.

The questions are designed for self administration but in case you may not be able to do the self administration, a face to face interview can be arranged.

If you prefer I interview you, the discussions will take 1 hour or less. I am also ready to answer any questions that you may have if I have answer(s) for the same.

ICT tools include the following: - television, radio, land line and desk top wireless telephone lines, mobile telephones and their related services, satellite telephones, computers including desk tops and laptops, Ipads, videos, use of internet and intranet services. Utilization of the ICT tools refers to how an individual or group of people use or apply these tools to facilitate their daily activities/work and development in general.

PART 1: Demographic information

Please answer the following question as honestly as possible by ticking (√) where necessary. Explain briefly as per instructions.

1) Indicate your sex. Tick (√) as appropriate

   Male ( ) Female ( )

2) Indicate your age bracket. Tick (√) as appropriate

   Below 20 ( ) 21- 30 ( ) 31-40 ( ) 41-50 ( ) Over 51 ( )

3) Indicate your level of education Tick (√) as appropriate.

   Primary level ( ), Secondary level ( ), "A" level ( ), University level ( ), none ( )

4) Indicate what you do for a living.

   a) Farmer ( ),b) Self employed ( ),c) Civil servant( ),d) Any other : indicate_____

PART 2

SECTION A: Level of Education

This part of the questionnaire requires that you indicate how the level of education influences access and utilization of information technology for development in your community. Answer the questions as honestly as possible.

5) Kindly categorize the level of education for your CBO members by providing the numbers in the categories below

i) Completed primary level ( )

ii) Completed secondary level ( )

iii) Completed 'A' level ( )

iv) University graduate ( )

v) Dropped before completing class 7 or 8 ( )

vi) Never attended school ( )

6) Do you easily read and comprehend your ICT tool(s) operational language and features? Tick (√) as appropriate

Yes ( ) No ( )

7 a) If you do not read and comprehend the operational language and features in your ICT tools, can you associate this to your level of education? Tick (√) as appropriate Yes ( ) No ( )

b) If you are unable to use the ICT tools due to your level of education, who helps you to operate or use the tools/services in development? Tick appropriately (√)

i) Relative(s) ( ), ii) Friend (s) ( ) iii) Any other: Explain_____

8 a) Are there members of your CBO who have similar challenge related to (qn) 7b

above? Tick (√) as appropriate Yes ( ) no ( )

b) if yes, how many? Tick (√) as appropriate

i) between 1-5 ( ), ii) between 5- 10 ( ), between 10 -15( ),over16 ( )

9 a) If yes to (8 a) above, is there a person charged with the duty of assisting such members in your CBO? Tick (√) as appropriate. Yes ( ), No ( )

b) What kind of support is the person assigned to offer? Tick (√) as appropriate

i) language interpretation ( )

ii) technical operations of the ICT tools ( )

iii) support in writing reports/sending emails/text messages ( )

iv) others: Specify _____

10) Do you consider your level of education to have any influence in your access or none access to ICT tools? Yes ( ) No ( )

Explain for either

Yes_____

_____

No_____

_____

_____

11) Kindly explain how your level of education influences your utilization of communication technology in your development _____

_____

_____

_____

_____

_____

12) Based on your experience on level of use of ICT tools by your CBO members, kindly share how their level of education influence their access of ICT tools_____

_____

_____

_____

_____

13) Based on your experience, kindly share how the level of education among your CBO members influence their utilization or non utilization of ICT tools in development

Influence on utilization _____

_____

_____

Influence on none utilization _____

_____

_____

_____

_____

_____

14) What do you think is the main reason for your CBO members not being able to use computers, internet, and other ICT services? Tick (√) as appropriate

I) Fear ( )

ii) Level of education ( )

iii) Disinterest ( )

iv) Attitude ( )

v) Any other reason- explain _____

_____

15) Kindly list the challenges in the access and use of ICT tools facing members of your CBO in the space below

_____

_____

_____

_____

_____

SECTION B: Application of Information Communication Technology

The questions in this section solicit information on application of information communication technology for development. Please answer as precisely and honestly as possible.

16) Which of the following ICT tools do you have access to? Tick as appropriate (√)

i) Landline telephones ( )

ii) Wireless telephones/mobile ( )

iii) Computers ( )

iv) Internet service ( )

v) Radio ( )

vi) Television ( )

vii) Video ( )

viii) Other – specify _____

_____

17) What would you say influences most your access to the ICTs tools? Tick (√) as many as appropriate from choices provided below

i) The technology is easy to understand ( )

ii) My education level enables me to understand the language and other features in the tools, hence easy to operate ( )

iii) I easily manipulate the inbuilt ICT tools features to meet my user needs ( )

iv) Fun ( )

v) Others –specify _____

_____

18) What activities do you commonly use your ICT tools in? Tick (√) as many as appropriate

i)	Personal communication	( )
ii)	Learning	( )
iii)	Establishing social networks	( )
iv)	Internet	( )
v)	Conveying information about meetings	( )
vi)	Passing health education information/messages	( )
vii)	Sharing information on business opportunities	( )
viii)	Sharing weather information	( )
ix)	Contributing money to merry go round/VSLA	( )
x)	Marketing	( )
xi)	Trading	( )
xii)	None of the above	( )
xiii)	Others	

Specify_____

_____

_____

19) How frequent do you use the following ICT tools in undertaking your business? Tick (√) from the scale provided below (where 1 is lowest and 3 is highest)

	(1) never,	(2) rarely,	(3) always
i) landline	( )	( )	( )
ii) mobile phone	( )	( )	( )
iii) computer	( )	( )	( )
iv) internet	( )	( )	( )

20) Which of the following ICT tools are commonly accessible to your CBO members? Can tick (√) more than one category as may be appropriate?

i) Landline telephones ( )

ii) Wireless telephones/mobile ( )

iii) Computers ( )

iv) Internet service ( )

v) Radio ( )

vi) Television ( )

vii) Video ( )

viii) Others –specify _____

_____

21) How many of your CBO members are proficient in use of the following? Tick (√) the range

i)	Computers	(1- 5)	(6 -10)	(11 -15)	(above 16)
ii)	Landline &desktop wireless telephones	(1-5)	(6 – 10)	(11 -15)	(above 16)
iii)	Mobile phones	(1-5)	(6-10)	(11-15)	(above 16)
iv)	Internet services	(1- 5)	(6-10)	(11- 15)	(above 16)

22) Indicate the ways in which your CBO utilizes its ICT tools in. tick (√) form the list below and can tick as many as appropriate

i) Training ( )

ii) Communicating to members on meetings ( )

iii) Internet ( )

iv) Conveying information about meetings ( )

v) Passing health education information/messages ( )

vi) Sharing information on business opportunities ( )

vii) Sharing weather information ( )

viii) Contributing money to merry go round/VSLA ( )

ix) Marketing ( )

x) Trading ( )

xi) None of the above ( )

xii) Others

Specify_____

_____

_____

23) Are the ICT tools in question 16 appropriate for your business undertaking (purpose for which you use them for)?

Yes ( ) No ( )

24) If you no to qn 23 above, what is the reason? Tick (√) from the choices given below

i) Do not understand the operational language ( )

ii) The gadget is complicated ( )

iii) Limited or no ICT user skills ( )

iv) Do not understand how to apply the inbuilt features of the ICT tools ( )

v) Do not know how to apply the same in my business/ undertaking ( )

vi) Not aware I can apply the technology in my business ( )

vii) The technology is too complicated for me ( )

viii) Others-specify _____

_____

25) Specify the challenges your CBO faces in application of the ICT tool in execution of your business

i) members are not aware of how to apply the technology in our business ( )

ii) The operational procedure of the technology are complicated ( )

iii) Members do not easily understand how to use the inbuilt features of the tools ( )

iv) Lack or limited skills on ICT among CBO members ( )

Others- Specify _____

_____

_____

26) How can the challenges be overcome both at personal and community level? Tick as appropriate from choices provided below

i) Train on ICT user skills ( )

ii) Create awareness to the community on how an d where to apply the technology ( )

iii) Design simple and easy to use ICT tools ( )

iv) Inbuilt features and language which is easy to understand by the users ( )

v) Other –specify _____

_____

27) In what ways can ICT be used to enhance development in your community? Tick (√) as many as appropriate from the choices below

i) Convey Market information(prices) for our goods ( )

ii) Weather update ( )

iii) Human and livestock diseases update ( )

iv) Security information ( )

v) For learning in schools ( )

vi) For trainings ( )

vii) Others –specify _____

_____

28) Do you think the application of the ICT in areas in q26 above can increase the level of access and utilization of the tools? Yes ( ) no ( )

Explain

_____

_____

SECTION C: Socio – Economic Status

This part of the questionnaire requires answers related to the social-economic status of the community members and its relation to the use of ICT for development. Please answer them as precisely and honestly as possible.

29) Indicate the number of your CBO members having a monthly income.

i) 1-5 ( )

ii) 6- 11 ( )

iii) 12- 16 ( )

iv) 17-21 ( )

v) above 21 ( )

vi) All ( )

viii) none ( )

30) Do you own any ICT tool? Tick (√) as appropriate yes ( ) no ( )

31) Kindly indicate what influences your access and utilization to ICT tools. Tick (√) as appropriate

i) Can afford to buy ( )

ii) Social status attached to the tools and use of the technology ( )

iii) Both affordability and the social status attached to the same ( )

iv) It is a necessity ( )

v) Others –explain _____

_____

32) Among your CBO members, indicator the number who own the following ICT tools by gender and age. Tick (√) within the range of choices given below

i) Land line/desk top wireless telephones Male (1-5) (6-10) (11-15) (above 16)

Female (1-5) (6-10) (11-15) (above 16)

Youth (1-5) (6-10) (11-15) (above 16)

Children (1-5) (6-10) (11-15) (above 16)

ii) Mobile telephone Male (1-5) (6-10) (11-15) (above 16)

Female (1-5) (6-10) (11-15) (above 16)

Youth (1-5) (6-10) (11-15) (above 16)

Children (1-5) (6-10) (11-15) (above 16)

iii) Computers (desk tops/laptop) Male (1-5) (6-10) (11-15) (above 16)

Female (1-5) (6-10) (11-15) (above 16)

Youth (1-5) (6-10) (11-15) (above 16)

Children (1-5) (6-10) (11-15) (above 16)

Others-specify _____ Male (1-5) (6-10) (11-15) (above 16)

Female (1-5) (6-10) (11-15) (above 16)

Youth (1-5) (6-10) (11-15) (above 16)

Children (1-5) (6-10) (11-15) (above 16)

33) What factors do you think influence access and utilization ICT tools in your community? Tick (√) as appropriate

i) affordability of the gadget and services ( )

ii) social status attached to the ownership and utilization ( )

iii) the value they add in ones business ( )

iv) peer influence ( )

v) necessity ( )

vi) others: specify _____

34) How many ICT tools are owned by your CBO per the category below? Fill in the numbers below (range of 1,2 or more than 3)

i) Office land lines ( )

ii) Mobile Phones ( )

iii) Wireless sets ( )

iv) Satellite phones ( )

v) Computers (desktop) ( )

vi) Lap tops ( )

vii) Radio ( )

viii) Video ( )

x) Television set ( )

35) What influenced the ownership? Tick (√) as appropriate

i) members could afford ( )

ii) was donated to us ( )

iii) social status attached ( )

iv) others: specify _____

_____

36) Are there some socioeconomic issues in your community that influence access and utilization of ICT tools?

Yes ( ), no ( )

Kindly explain in the space below

_____

_____

_____

37) Kindly explain who is most affected by these socioeconomic issues, how and why.

_____

SECTION D: ICT Infrastructure

The questions in this section solicit information on how existence or non existence of ICT infrastructure influences access and utilization of information communication technology for development. Please answer as precisely and honestly as possible.

38) Are there cyber cafes in your community where people can access the internet?

Yes ( ) No ( )

39) If your answer to question no 34 above is yes, are these cyber cafes located in accessible places?

Yes ( ) No ( )

Explain _____

40) Indicate if the following ICT tools and facilities are available in your community/area. You can tick more than one as may be applicable

		Yes	No
i)	public resource centers with computers	( )	( )
ii)	Public pay phones	( )	( )
iii)	Mobile phones	( )	( )
iv)	Cyber cafes	( )	( )
v)	Videos centers	( )	( )
vi)	Television	( )	( )
vii)	Others: Specify_____		

41) How many telecommunication service providers exist in your community? Tick (√) as appropriate

i) One ( )

ii) Two ( )

iii) Three ( )

iv) None ( )

42) How many telecommunication masts are within your administrative location? Tick (√) as appropriate

v) One ( )

vi) Two ( )

vii) Three ( )

viii) None ( )

43) Indicate the following in relation to clarity of frequencies of the network

	Clear	not clear
i) Safaricom	( )	( )
ii) Airtel	( )	( )
iii) Yu	( )	( )
iv) Landline	( )	( )
v) Orange	( )	( )
vi) Any other	( )	( )

44) What challenges do you encounter in accessing and utilization of internet services in your area?

Tick as many as appropriate (√)

i) Distance to the nearest cybercafé ( )

ii) Location of the caber café not convenient ( )

iii) No existing caber cafes within ( )

iv) Existing net work not clear ( )

v) No power ( )

vi) Poor network/ no access to telecommunication network ( )

vii) Long hours of telecommunication down time ( )

viii) Long hours of power down time ( )

vii) No internet facility in my personal mobile phone ( )

viii) Others specify below

_____

_____

45) What is the source of power in the community? Tick(√) as appropriate

i) Hydro Electricity ( )

ii) Solar ( )

iii) Wind mill ( )

iv) Diesel/petrol Generator ( )

v). Any other specify _____

_____

46) Is the power supply consistent?

Yes ( ) No ( )

47) If the answer to 43 above is no, what is the power down time duration in a day?

i) Less than 1hr ( )

ii) 2hrs ( )

iii) 3hrs ( )

iv) more than 3hrs ( )

48) What time of the day does this power down time commonly occur?

i) 7am – 12 pm ( )

ii) 1 pm- 6pm ( )

iii) 7pm -10pm ( )

49) What time of the day does this telecommunication/internet down time commonly occur?

i) 7am – 12 pm ( )

ii) 1 pm- 6pm ( )

iii) 7pm -10pm ( )

50) How does this affect your utilization of your ICT tools?

explain_____

_____

_____

SECTION E: Government ICT Regulatory Policies

The questions in this section solicit information on government policies and regulations as relates to ICT and how the same affect access and utilization of ICT tools for development in your community. Please answer as precisely and honestly as possible.

51) Are you aware of any government policies and regulations in relation ICT access and utilization? Tick (√) as appropriate Yes( ) no ( )

52) If yes to the above no 48, please name the policies known to you (skip if the answer is no)

_____

_____

_____

53) Please explain how the implementation or non implementation of these policies has affected your access and utilization of ICT tools (skip if the responded is not aware of the policies)

_____

_____

_____

54) In what ways do you expect government regulations/policies to assist you and members of your community in accessing and utilizing ICTs for development in this district? Tick (√) as appropriate

i) Increased number of affordable ICT tools ( )

ii) Reduce calling tariffs ( )

iii) Affordable license fees for operating ICT business ( )

iv) Community education on application of ICT for development ( )

v) Other (explain) _____-

_____

_____

55) Would you consider the community as a key player in implementation of the government ICT policies? Please (√) tick as appropriate Yes ( ) No ( )

Please explain

_____

_____

_____

APPENDIX 4: SCHOOL/ LEARNINGINSTITUTION QUESTIONNAIRE

Kindly answer the questions below as honestly as possible. All the information you provide wi treated confidentially. Your participation is voluntary.

The questions are designed for self administration but in case you may not be able to do the administration, an interview can be arranged.

If you prefer I interview you, the discussions will take 1 hour or less. I am also ready to answer questions that you may have if I have answer(s) for the same

Part 1

Demographics

1. What is the name of your schools?

2. Is your school/institution public or private .Tick (√) private ( ) public ( )

3. How many teachers are employed in this school – male ( ), female ( )

4. How many pupils/students are in this school /institution - male ( ) female ( )

PART 2: Socio- Economic Factors

SECTION A

This section solicits answers on how socio economic factors affect access and utilization of ICT tools in your institution.

Please skip the sections which may be inapplicable as specified

5) Does your school have any ICT tools? Tick (√) as appropriate yes ( ) no ( )

6) If yes to (5) above, kindly indicate them by ticking(√) from the list provided below

i) Television ( )

ii) Mobile phone ( )

iii) Video ( )

iv) Radio ( )

v) Satellite phone ( )

vi) Desk top computer(s) ( )

vii) Laptop(s) ( )

viii) Internet connectivity ( )

ix) Other: Explain _____

_____

7) If no to (5) above, kindly indicate reason(s) by ticking (√) from the list provided below

i) The school community cannot afford to buy

ii) Not a priority

iii) School community cannot afford maintenance cost

iv) The school community does not understand and appreciate their value in learning

v) No means for powering the tools hindering their acquisition

vi) Others: Explain _____

_____

8) Do all pupils and teachers have access to the computers and other related ICT tools and services in the school? Tick (√) as appropriate (skip if the school has no ICT tools)

Yes ( )

No ( )

9) If the answer to 7 above is no, state which tools/services are not accessible and why in the space below. (√) tick as appropriate

i) Computers /desktop ( )

ii) Laptops ( )

iii) Mobile phones ( )

iv) Television ( )

v) Internet ( )

vi) Radios ( )

vii) Videos ( )

viii) Satellites phones ( )

ix) Others: Specify _____

_____

Why

(i) No power supply for connectivity ( )

(ii) School cannot afford to pay for monthly power charges ( )

(iii) School cannot afford to pay for internet services ( )

(iv) Few ICT tools as the school community cannot afford more ( )

x) Others: Specify

_____

_____

_____

SECTION B: Application of Information communication Technology in Schools

This section solicits answers related to ability to apply the ICT technology by teaching staff and pupils

10) What do you use the ICT tools in your school for? Tick (√) as appropriate (skip if the school has no ICT tools)

i) planning/ budgeting ( )

ii) monitoring pupil performance ( )

iii) monitoring teachers/lecturers performance ( )

iv) school data/information storage/Management ( )

v) development of scheme of work by teachers ( )

vi) storage of teaching and non teaching staff work plans ( )

vii) communication/internet ( )

viii) none ( )

ix) others: Specify

_____

_____

_____

11) In what ways do the teachers make use of the ICT tools available?

Tick (√) as appropriate (skip if the school has no ICT tools)

i) developing scheme of work ( )

ii) E-teaching ( )

iii) E- learning ( )

iv) communication /internet ( )

v) class attendance register ( )

vi) accessing learning materials ( )

vii) other – specify/explain _____

12) Are there trained computer/ICT tutors in the school? yes ( ), no ( ),

If yes how many? Insert the numbers in the brackets ( ) below

i) Male ( )

ii) Female ( )

13) How many pupils/students make use of the computers and other ICT tools available

in this institution per class and by gender? Insert totals in the spaces below (skip if the school has no ICT tools)

i) Class 1 to 3 - male	( )	female	( )
ii) Class 4 to 6 - male	( )	female	( )
iii) Class 7 to 8 - male	( )	female	( )
iv) Form 1 to 2 - male	( )	female	( )
v) Form 3 to 4 - male	( )	female	( )
vi) First to fourth year - male	( )	female	( )

14) What do the pupils/ students use ICT tools for? Tick (√) against and as applicable (skip if no ICT tools in the schools)

i)	computer lessons	( )
ii)	E-learning	( )
iii)	revisions	( )
iv)	internet /communication	( )
v)	playing games	( )
vi)	establishing social networks	( )
vii)	others-	

specify_____

_____

_____

_____

15) What challenges do the pupils/students face in access and utilization of the ICT tools (explain in the space below)

i)	not computer literate	( )
ii)	pupils/students	( )
iii)	pupils/students not aware on what to use the tools for	( )
iv)	user problem	( )
v)	few desktop Pcs compared to student/pupils ratio	( )
vi)	internet inaccessibility	( )
vii)	other –specify/explain _____	

16) What challenges do the teachers/lecturers face in access and utilization of the ICT tools in your institution?

i)	not computer literate	( )
ii)	user problem	( )
iii)	power downtime	( )
iv)	few desktop Pcs compared to teacher/lecturer ratio	( )
v)	internet inaccessibility	( )
vi)	high cost of internet	( )
vii)	other –specify/explain_____	

SECTION C: Government ICT Regulatory Policies

This section solicits answers on available government ICT policies as relates to education and their implementation/application in schools

17) Explain the ministry of education ICT policies_____

_____

_____

_____

18) How many have been implemented in your school? Tick (√) as appropriate. More than 2 ( ) less than 5 ( ) none ( )

19) What challenges did/ do you face in implementation of the ICT policies in your school? (Tick (√) as many as applicable)

i) policies un clear ( )

ii) lack of clear direction/guidance ( )

iii) policies non existent ( )

iv) financial constraints ( )

v) others –explain _____

20) What role do you think you and the school community can play in ensuring access and utilization of ICT tools in education? Tick (√) as appropriate

i) Lobby and advocate for implementation of ICT infrastructure ( )

ii) Mobilize resources to acquire ICT tools and power supply for ICT tools use ( )

iii) Train teachers/pupils/students on ICT use and application ( )

iii) Introduce E-learning in the institution ( )

i) Others –specify _____

SECTION D: Availability of ICT tools infrastructure

This section solicits answers on the existence of ICT tools infrastructures in and around your school

21) Do you have internet access in your school? Tick (√) as appropriate Yes ( ) no ( )

22) If no to no (21) above, why

i)	No network	( )
ii)	Not connected	( )
iii)	Cost challenges	( )
iv)	Lack of connection licenses	( )
v)	No internet connection gadgets	( )
vi)	Other –explain_____	

23) Is the network available all through? Yes ( ) no ( )

24) If no, what is the cause? Tick as appropriate (√) or explain in the space below

ii)	Power blackout	( )
iii)	No telecommunication network	( )
iv)	Other-specify _____	

25) How does the none availability of the ICT infrastructure affect access and utilization of ICT tools in your school

i)	Communication breakdown	( )
ii)	Inability to access/download/upload learning materials	( )
iii)	Limits level of utilization	( )
iv)	Other –specify_____	

26) What role do you think you and the school community can play in ensuring access and utilization of ICT tools in education? Tick (√) as appropriate

i) Lobby and advocate for implementation of ICT infrastructure ( )

ii) Mobilize resources to acquire ICT tools and power supply for ICT tools use ( )

iii) Train teachers/pupils/students on ICT use and application ( )

iii) Introduce E-learning in the institution ( )

v) Others –specify _____

_____

APPENDIX 5: SERVICE PROVIDERS QUESTIONNAIRE

Kindly answer the questions below as honestly as possible. All the information you provide will be treated confidentially. Your participation is voluntary.

The questions are designed for self administration but in case you may not be able to do the self administration, an interview can be arranged.

If you prefer I interview you, the discussions will take 1 hour or less. I am also ready to answer any questions that you may have if I have answer(s) for the same

Part 1

Demographics

1. Name of your company_____

2. What business is your company involved in here? Tick as applicable
   i) Telecommunication service provision ( )
   ii) Internet service provision ( )
   iii) Training on ICT use ( )
   iv) Others –specify

   _____

   _____

3. When did your company start its operations in this area (year)
   i) Less than 1 yr ( )
   ii) 1 to 2 yrs ago ( )
   iii) 3 to 5 yrs ago ( )
   iv) More than 5 yrs ago ( )

4. Give an estimate of the number of your customers/reached by your service(s) in the district

   i) 1000 – 10000 ( )
   ii) 10 000- 20 000 ( )
   iii) 20 000- 30000 ( )
   iv) 30000 – 40000 ( )
   v) Over 40000 ( )

PART 2

SECTION A: Level of Education

This part of the questionnaire requires that you indicate how the level of education influences access and utilization of information technology for development in your area of operation. Answer the questions as honestly as possible.

5. Briefly explain the common complaints you receive from your customers in terms of access and utilization of your services which you can relate to their education level_____

_____

_____

_____

_____

_____

_____

6. Briefly explain how you have managed to respond to above (no 5) mentioned complaints_____

_____

_____

7. What challenges do you face most in offering your service? Explain in the space below_____

_____

_____

_____

_____

8. How do they affect your customers/clients?

Explain_____

_____

_____

_____

_____

SECTION B: Technology Application

The questions in this section solicit information on application of information communication technology for development by your customers/clients. Please answer as precisely and honestly as possible

9. what are the common challenges faced by your customers in use and application of ICT tools
   i) language barrier ( )technical barrier ( )limited applications ( )
   ii) others –specify _____

10. What are the common uses and application of ICT tools by your clients? Tick (√)as applicable
   i) VoIP/voice communication ( )
   ii) Internet ( )
   iii) Data storage ( )
   iv) Data transmission ( )
   v) Other –specify _____

SECTION C: Socio – Economic Factors

This part of the questionnaire requires answers related to the social-economic factors and how they influence access and utilization of ICT tools for development in the district. Please answer them as precisely and honestly as possible

11) What are the economic challenges faced by your company in service delivery? Tick as applicable(√)

i) high maintenance costs ( )
ii) high cost of equipment ( )
iii) high transport costs ( )
iv) others-specify ( )

12) What are the common socioeconomic related complains which your customers make regarding your services which may be affecting their access and utilization of your services in their development work?

i) High tariffs/cost of VoIP services ( )
ii) High tariffs/cost of internet services ( )
iii) Some services not acceptable to the community ( )
iv) Others: Explain_____

13) Do you have a plan in place to expand your coverage area in the district? Tick (√) as appropriate Yes ( ) no ( ). Explain_____

_____

_____

SECTION D: ICT infrastructure

The questions in this section solicit information on how existence or non existence of ICT infrastructure influences access and utilization of information communication technology for development. Please answer as precisely and honestly as possible.

14) How many mobile masts has your company erected in the district? Tick (√) as appropriate

2 less than 3 ( )

3 4- 6 ( )

4 More than 7 ( )

15) How many square kms does one mast cover? Tick (√)

i) 1- 5 ( )

ii) 6-10 ( )

iii) 10 -15 ( )

iv) 16-20 ( )

v) Over 20 ( )

16) What challenges do you face in service provision? Tick (√) as appropriate

i) down time ( )

ii) power black out ( )

iii) vandalism ( )

iv) inaccessibility of some parts ( )

v) others:specify_____

_____

v) How does this affect your customers/clients? Tick (√) as appropriate

i) loss of data ( )

ii) loss of business opportunities ( )

iii) lack of connectivity ( )

iv) other –specify_____

_____

_____

vi) What is the source of your power supply? Tick (√) as appropriate

i) Hydro ( )

ii) Wind power ( )

iii) Solar ( )

iv) Diesel generated ( )

v) Other –specify_____

vii) How reliable is your power supply? Tick (√) as appropriate

i) Reliable ( )

ii) Un reliable ( )

viii) How reliable is the road network within the area of your operation? Tick (√) as appropriate. Reliable ( ) un reliable ( )

ix) How does it affect your operations in the district

Explain _____

SECTION E: Government ICT Regulatory Policies

The questions in this section solicit information on government policies and regulations as relates to ICT and how the same affect access and utilization of ICT tools for development in your community. Please answer as precisely and honestly as possible

17) Kindly list the existing government policies on ICT which apply to your organization

_____

_____

_____

_____

18) Do the policies sufficiently support your operations in the districts? Tick (√) as appropriate yes ( ) no ( )

19) How do the policies affect you operations – explain_____

_____

_____

20) What would you recommend as the appropriate measure which should be taken by government and other actors to enhance access and utilization of ICT tool in this district/region_____

_____

APPENDIX 6: GOVERNMENT AND NGOS KEY INFORMANTS

Kindly answer the questions below as honestly as possible. All the information you provide will be treated confidentially. Your participation is voluntary.

The questions are designed for self administration but in case you may not be able to do the self administration, an interview can be arranged.

If you prefer I interview you, the discussions will take 1 hour or less. I am also ready to answer any questions that you may have if I have answer(s) for the same

Demographics information

Part 1

1. What is the name of your department/organization?

   _____

   _____

2. What are the ICT tools accessible and in use by your staff? Tick (√) as appropriate

   i) Desktops ( )
   ii) Laptops ( )
   iii) Mobile sets ( )
   iv) Internet services ( )
   v) Landline ( )
   vi) Wireless desktops ( )
   vii) IPads ( )
   viii) Satellite phones ( )
   ix) Other- specify _____

PART 2

SECTION A: Level of Education

This part of the questionnaire requires that you indicate how the level of education influences access and utilization of information technology for development in your department/organisation. Answer the questions as honestly as possible

3. kindly provide number of staff with levels of education as categorized below

   i) Class 7/8 ( ) ii) Form 4 ( )iii) A levels ( )iv) University ( )

   v) No formal education ( )

4. How many of your staff have ICT skills? Male ( ) Female ( )
5. How many lack any skill in ICT tools use? Male ( ) Female ( )
6. How does their level of education affect their access and utilization of ICT tools? Tick (√) as appropriate

   i) Inability to operate ICT tools ( )
   ii) Inability to apply the tools in their daily business ( )
   iii) Others: Specify

   _____

   _____

   _____

SECTION B: Application of Information Communication Technology

The questions in this section solicit information on application of information communication technology for development in your department/organization. Please answer as precisely and honestly as possible

7. How do you and your staff apply the ICT technology in your business? Tick (√) as appropriate

i) planning and budgeting ( )

ii) reporting ( )

iii) internet ( )

iv) in implementation of development projects ( )

v) communication ( )

vi) management ( )

vii) others- specify _____

8. Would you say that all your colleagues' area aware of various ways in which ICT tools can be applied in their work and within the district/community they work in?

Yes ( ) No ( )

Explain_____

9. What challenges do you and your colleagues face in application of the ICT tools in your work? Tick (√) as appropriate

i) User problem ( )

ii) Unaware of how to apply the tools in development ( )

iii) Lack of the appropriate skills ( )

iv) Not appropriate to the nature of our organization/department work ( )

v) Others: Explain _____

10. How have the challenges been addressed? Tick (√) as appropriate

i) In-house training ( )

ii) External training ( )

iii) None of the above ( )

iv) Others: Explain

_____

11. Kindly share some of the challenges you are aware of which influence application of ICT tools for development by the community in the District

_____

_____

_____

_____

12. How can they be over come? explain

_____

_____

_____

SECTION C: Socio – Economic Factors

This part of the questionnaire requires answers related to the social-economic factors and how they influence access and utilization of ICT for development. Please answer them as precisely and honestly as possible.

13. What are the social economic challenges that affect your organization access and utilization of ICT tools by your department/organization?

i) high hardware cost ( )

ii) high maintenance cost ( )

iii) high tariffs ( )

iv) other-specify

_____

_____

_____

_____

14. Kindly rank the following socio economic factors in terms of their significance in access and utilization of ICT tools for development in Tharaka district. Rank them in terms of:- (1) Highly significant,(2) second significant,(3) third in significance, (4) last in significance

i) high costs of the hardware ( )

ii) high maintenance costs ( )

iii) high tariffs for the services ( )

iv) social status attached the same ( )

SECTION D: ICT Tools and Infrastructure

The questions in this section solicit information on how existence or non existence of ICT infrastructure and tools influences access and utilization of information communication technology for development. Please answer as precisely and honestly as possible

15. Name the mobile service providers in the district

_____

16. How reliable is their service reliable? Tick (√) as appropriate.

reliable Tick (√) as appropriate ( ) un reliable ( )

17. How would rate their clarity - all very clear ( ) less than three are clear ( )

18. Other than the VoIP service, which other services do the service providers offer in the district? Tick (√) as appropriate

i) internet service ( )

ii) ICT use capacity enhancement ( )

iii) Other –specify _____

19. How many cyber cafes exist in the district? Tick (√) as appropriate

i) less than 5 ( )

ii) 6- 10 ( )

iii) 11-20 ( )

iv) More than 21 ( )

20. What is the source of power supply in the district? Tick (√) as appropriate

i) solar ( )

ii) hydro ( )

iii) diesel powered ( )

iv) wind ( )

v) other- specify ( )

21. How reliable are they? Tick (√) as appropriate. reliable ( ) un reliable ( )
22. How many Kms of road are tarmacked in the district (estimate) (___ km)
23. Are all parts of the district accessible through the year? Ye ( ) no ( )

Explain

---

24. Briefly explain how existence or non existence of physical infrastructures influence access and utilization of ICT tools for development in Tharaka district_____

_____

25. What would you recommend as the actions to be taken to enhance access and utilization of ICT for development in the district and by whom?_____

_____

By who_____

SECTION E: Government ICT Regulatory Policies

The questions in this section solicit information on government policies and regulations as relates to ICT and how the same affect access and utilization of ICT tools for development in the district. Please answer as precisely and honestly as possible

26. Name the current government policies and regulation as relates to ICT access and utilization for development in this district

_____

_____

27. explain how they influence access and utilization of ICT for development in the district_____

_____

28. Are there ICT policies and regulations which have not been implemented? Tick (√) as appropriate -yes ( ) no ( )

Explain

_____

_____

29. if yes to (28) why –explain

_____

_____

30. What are the challenges in implementation of the policies/regulations in the district? Tick (√) as appropriate

i)	Limited financial resources	( )
ii)	Limited personnel	( )
iii)	No implementation frame work	( )
iv)	Lack of government commitment	( )
v)	Policies not clear	( )
vi)	Others;Explain _____	

31. Explain how your department/organization has been able to mitigate on the challenges

i)	Supporting communities with ICT tools	( )
ii)	Training the communities of use of ICT tools	( )
iii)	Influencing mother ministry to lower tariffs/licence fee	( )
iv)	Introducing ICT skills in the community through training	( )
v)	Introducing ICT tools through establishment of public ICT resource centres	( )
vi)	Others: specify _____	

32. What would recommend as the appropriate measures to put in place to ensure optimal access and utilization of ICT tools in development in the district? Explain_____

_____

_____