

بسم الله الرحمن الرحيم

Sudan University of Science and Technology

College of Graduated Studies

**An Information Communication Technology - Based Framework for Poverty  
Reduction in Sudan**

إطار مبنى على تكنولوجيا الاتصالات والمعلومات للحد من الفقر فى السودان

A Thesis Submitted in Partial Fulfillment of the Requirements of M.Sc. in  
Computer Science (Information and communication technology policy and  
regulation)

By

Nora Abdalla Hassan Basher

Bsc in Telecommunication- Faculty of Electronic Engineering 2004

Supervisor

Dr. Awad Mohamed Awadelkarim

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# **DEDICATION**

I dedicate this dissertation to

My loving parents Jolly and Toha

My children Ahmed and Lyeen

&

Special thanks to my husband Mugahid

## **ACKNOWLEDGEMENT**

First and foremost, I thank God for the numerous blessings.

A special thanks to Dr. Awad Mohamed Awad Karim who be more than generous with his experience and precious time and most of all patience throughout the entire process.

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## **ABSTRACT**

The research discusses the foundations for establishing a viable and sustainable Information and Communication Technology (ICT) framework for poverty reduction in Sudan by adopting a livelihood framework consist of five steps through eight selected areas because there are many initiatives to reduce poverty in Sudan but without real output and that refer to lack of coordination and absence realistic understanding of the impact of ICT in economic growth.

The main objective of this research is to develop an ICT-Based framework for poverty reduction by addressing case study for each area and implementing it on the framework. Those areas represent economic and social development opportunities, and address the challenges that are facing Sudan in its concerted efforts to participate fully in the information society and knowledge economy.

The key is to focus on the ICT as a sector for change. It is important to emphasize the need for government to manage and monitor the ICT sector. It is reaffirmed that ICT is crosscutting with the major impact and an enabler for growth and development and for maximum benefit, so the government must establish the right policy through interventions, resources, investments, appropriate rules and regulation and enabling environment.

Eight case studies that assist in mitigating effects of poverty in Sudan are briefly discussed in this research in order to show the implementation of the livelihood framework on each area and the impact of ICTs in awareness, education, health, employment, environment, social equity, agriculture and grazing.

Although the livelihood framework provide for the poverty reduction but also show a clear guidelines on the approach that may used in implement of each case study through the five steps of the framework.

## المستخلص

يناقش البحث الأسس لإقامة اطار مستدام لتكنولوجيا المعلومات والاتصالات للحد من الفقر من خلال تبني اطار المعيشه الذى بدوره يحتوى على خمس خطوات لتطبيقه على ثمانى مناطق مختاره حيث ان هناك العديد من المبادرات للحد من الفقر فى السودان ولكن دون الوصول الى نتيجة ملموسه والذى بدوره يشير إلى عدم وجود تنسيق وغياب فهم واقعي لتأثير تكنولوجيا المعلومات والاتصالات فى النمو الاقتصادى. الهدف الرئيسى من هذا البحث هو وضع إطار قائم على تكنولوجيا المعلومات والاتصالات للحد من الفقر من خلال أخذ دراسة حالة لكل منطقة وتطبيقها على الإطار. وتمثل تلك المناطق فرص التنمية الاقتصادية والاجتماعية، ومعالجة التحديات التي تواجه السودان في تضافر الجهود من أجل المشاركة الكاملة في مجتمع المعلومات واقتصاد المعرفة.

والمفتاح هو التركيز على تكنولوجيا المعلومات والاتصالات كقطاع من أجل التغيير. ومن المهم التأكيد على حاجة الحكومة لإدارة ومراقبة قطاع تكنولوجيا المعلومات والاتصالات. ولا بد من التأكيد على ان قطاع تكنولوجيا المعلومات والاتصالات قطاع شامل لعدة قطاعات وله تأثيراته الكبيره عليها ويمكن من توفير بيئة ملائمة للنمو والتنمية وتحقيق اقصى فائده، ولذلك يتعين على الحكومة وضع السياسات الملائمة لتهيئة هذا القطاع، توفير المصادر، تشجيع الاستثمار، سن القوانين والتنظيم. ويناقش البحث ثمان دراسات حالة التي تساعد فى تخفيف آثار الفقر فى السودان وذلك لاطهار تأثير تنفيذ اطار المعيشه فى كل منطقة ومدى تأثير تكنولوجيا المعلومات والاتصالات فى مجالات التوعية، التعليم، الصحة، العمل، البيئة، العدالة الاجتماعية، الزراعة والرعي.

على الرغم من أن إطار معيشة ينص على الحد من الفقر الا انه يظهر مبادئ توجيهية واضحة على النهج الذى قد يستخدم فى تنفيذ كل دراسة حالة من خلال الخطوات الخمس للإطار.

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## List of Abbreviations

ICT	Information and Communication Technology
UNDP	United Nation Development Program
HDR	Human Development Report
HDI	Human Development Index
HPI 1	HDI Poverty Index 1
HPI 2	Human Poverty Index 2
OECD	Organization for Economic Co-operation and Development
GDP	Gross Domestic Product
SDG	Sudanese Pound
UN	United Nation
HIV	Human Immunodeficiency Virus
SLA	sustainable livelihoods approach
GDCO	Gedaref Digital City Organization
UNICEF	United Nations International Children's Emergency Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
FAMWEZ	Federation of African Media Women of Zimbabwe
GHETS	Global Health Education Training Service
EMIS	Education Management Information Systems
NRENs	National Research and Education Networks
NFPTED	National Framework for Professional Teacher Education and Development
PAN	Pan Asia Networking Program
IDRC	Canadian Government's International research Development Centre
LVEMP	Lake Victoria Environmental Management Project
GEF	Global Environment Facility
GIS	Geographical Information Systems
NGOs	Non Governmental Organizations
LITS	Livestock Identification Trace-back System
RFID	Radio Frequency Identification
FAO	Food and Agriculture Organization



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# CHAPTER 1

## INTRODUCTION

### 1.1 Foreword

According to income-based measures of poverty, 1.2 billion people live with \$1.25 or less a day. However, according to the United Nations Development Program (UNDP) Multidimensional Poverty Index, almost 1.5 billion people in 91 developing countries are living in poverty with overlapping deprivations in health, education and living standards. And although poverty is declining overall, almost 800 million people are at risk of falling back into poverty if setbacks occur. Many people face either structural or life-cycle vulnerabilities. [1]

In the developing countries, there is not enough food, access to education and healthcare. Because of the weak possibilities there are a lot of marginalized areas and people. Poverty affects the economic growth and this leads to many negative consequences; poor people do not have access to basic human needs which include food, clean water, sanitation facilities, health care, shelter, clothing, education, information and access to services.

To help in resolving all these problems, it is important to use ICT as a tool for economic, social and political development.

The International Telecommunication Union (ITU) address many successful stories in the world using ICT for poverty reduction and development, by connecting people to information and sharing knowledge, bridging the digital divide and facing the challenges of sharing the information with people who have little access to ICTs, low levels of literacy, little time or money, and inadequate skills. [2]

This research will take the view of introducing new transparent regulation framework which supports the development in both national and international levels.

## **1.2. The Problem Statement**

In Sudan there are some initiatives to reduce poverty (e.g. microfinance projects for the youth, family bank to finance small projects for the families), but there is no effort done to reduce poverty through ICT, because of absence realistic understanding of the impact of ICT in economic growth, transforming lives, support freedom, and poverty reduction. So this research shows the importance of ICT in development. Introducing technology is so easy compared with using it in a necessary condition, so the challenge is to create a full potential technology to meet the necessary needs.

Also there is a need to move beyond waste of resources and work in isolation to one ICT based framework for poverty reduction in Sudan. Because there is a lot of effort in the poverty reduction for example poverty reduction strategy paper by the international monetary fund. [3]

Also the Government of Sudan and the UNDP Sudan Country Office make a mutual agreement to entering into a new period of cooperation (2013-2016) responsibilities in the implementation of the Country program to achieving Successful Transition to Inclusive Recovery and Sustainable Human Development. [4]

A successful ICT framework for poverty reduction will adhere to best practice, clear objectives, targets and realistic implementation plan.

## **1.3 Research Objective**

The main objective of this research is to develop an ICT-Based framework for poverty reduction. This will address specific approach:

- Study and examine the associated literature Review.
- Requirements collection and analysis.
- Design the proposed ICT-Based framework for poverty reduction in Sudan
- Case study

#### **1.4 Research Scope and Importance**

- The framework analyzed the connection between application of ICT and poverty reduction, according to rules and regulation, which largely encourage investment in the national ICT infrastructure; investments in the development applications to reduce poverty in the eight selected areas; and sufficient support for research and innovation. The framework is a must for changing local faces of economic, social and political life.
- The proposal framework shows - the value of ICT in Sudan and clarifies their roles in poverty reduction.
- This research seeks to provide a contribution to the concept of the ICT for development and poverty reduction by applying ICT approach in eight selected areas as a suitable framework and analysis it and taking a case studies of those areas as an important potential area n Sudan where ICT can be applied.
- The research describes eight case studies of each selected areas of how ICTs have contributed to poverty reduction, because those case studies reflect the benefit of the ICT framework in reducing poverty.
- The time scales of the framework will be 10 years, because first the budgeting must determine which will be national or international or share, second take up innovation solutions, third the implementation and finally the follow up, the assessment and lesson learned.

## **1.5 Research Methodology**

- Study the experience of other countries in such a topic in determine area
- Analyze each experience in the eight selected areas
- Outline the opportunities and challenges of using ICT to achieve poverty reduction in those areas
- Defining the basic aspects of sustainable development and addressing the needs of the poor people and opportunities for empowerment.
- Develop a framework for using the ICT as a tool for poverty reduction
- Examine the success of the implementation of the framework.

## **1.6. The Research Organization**

- In addition to this introductory chapter, the thesis consists of five chapters as follows:
- CHAPTER (2): literature Review  
This chapter clarifies the Sudan profile and ICT situation. Define the poverty and linked with ICT and outline the poverty selected areas of this research.
- CHAPTER (3): the requirement and analysis of the framework  
This chapter defines the framework, the scope of the framework, the link between poverty reduction and women empowerment and the relation between development, information and technology. Determine the requirement of the framework.
- CHAPTER (4): The design of the frame work  
This chapter illustrates the design of the framework for poverty reduction.
- CHAPTER (5): Case studies and Conclusion  
This chapter shows a successful case study for each area that adopts ICT for poverty reduction by highlights the lesson and approach of each case study.

# **CHAPTER 2**

## **LITERATURE REVIEW**

### **2.1 Introduction**

The world today is revolutionized by information and communication technology. This research tried to see the prevailing challenges and opportunities behind the application of the ICT technologies for poverty reduction in the eight selected areas. Specifically, it addressed the relationship between ICT and poverty reduction.

ICT play a key role in every sector, be it economic or social. This chapter discusses how (ICT) contributes towards poverty reduction and overall growth of the economy.

ICT-based initiatives tools that will be effective to the process of poverty reduction through the selected areas by discuss a successful story for each area.

The Human Development Report (HDR) developed by UNDP is an important document through which the debate on human development is understood. The annual HDRs are intended to open the development debate through well researched scientific and policy analyses followed by recommendations for action. The HDR combines annual thematic presentations, preceded by definition, measurement and analysis of indicators of education, health and income sufficient to ensure adequate living standards, to develop the Human Development Index (HDI Poverty Index 1 (HPI 1) for developing countries, and the Human Poverty Index 2 (HPI 2) for selected member countries of the Organization for Economic Co-operation and Development (OECD); the Gender Related Development Index; and the Gender Empowerment Measure. Each of these is developed using different dimensions and

indicators. The HDI is the average of measures of three indices. The HDRs are based on five development indices: the HDI; the Human life expectancy, education/literacy and standard of living. It is purported to be a way of comparing the level of development of a particular group of people (as in, developed, developing, underdeveloped) based on the availability of options. The logic is that the more developed a group of people are, the more options are available to them. The main causes of poverty are complex and multidimensional by their nature. Despite the existence measure of poverty, the prevailing relationship between poverty and ICT application have an implication and need more study. So this research aims to discuss the role of ICT in reducing poverty by defined a framework of five steps trace to reduce poverty through eight selected areas by using ICT application

## 2.2 Background

### 2.2.1 Sudan situation

The table below illustrated the situation of Sudan as a developing country

Sudan profile	
<b>Location:</b>	Northern Africa, bordering the Red Sea, between Egypt and Eritrea
<b>Total area:</b>	1882000 sq km
<b>People Population:</b>	36163778
<b>Age structure:</b>	0-14 years: 41.87% (female 7383819; male 7758503) 15-64 years: 54.81% (female 20447921; male 20842961) 65 years and over: 3.31% (female 1654294; male 1421470)



<b>Population growth rate:</b>	2.5%
<b>Birth rate:</b>	40.4 births/1,000 population
<b>Death rate:</b>	9.8 deaths/1,000 population
<b>Life expectancy at birth: total population:</b>	61.3 years Male: 59.7 years female: 62.9 years
<b>Literacy:</b>	age 6 and over can read and write Total population: 57% male: 63% female: 51%
<b>Economy:</b>	National product: GDP - purchasing power parity us\$67.9 bill National product real growth rate: 6.49% National product per capita: us\$1644
<b>Unemployment rate:</b>	15.9
<b>Exports:</b>	\$9598.6 million
<b>Commodities:</b>	crude oil 73.0%, gold 15%, livestock 3.0%, sesame 2.3%, gum Arabic 0.9%, cotton 0.3% foodstuffs 20.4%, petroleum products 8.0%, manufactured goods 19.4%, machinery and equipment 25.2% chemicals 11.5%, textiles 3.0%.
<b>Imports:</b>	\$9235.9 million
<b>Agriculture:</b>	Accounts for 34% (2010) of GDP; major products -

	cotton, oilseeds, sorghum, millet, wheat, gum arabic.
<b>Currency:</b>	Sudanese pound (#SDG)

Table 2.1: Sudan profile [5]

## 2.2.2 Historical background

The historical background illustrates the growth of the ICT sector in Sudan.

action	Year
Separation of Posts from Telecommunications.	1972
Transformation of Telecommunications Department into semi-commercial corporation.	1978
The 3-year economic salvation program (1990 – 1993) that stipulated the privatization of the Sector.	1990
Formation of National Information Center	1991
Establishment of Sudan Telecommunications Company (SUDATEL).	1993
Establishment of Telecom. Regulatory Authority, National Telecom. Council.	1996
Introduction of mobile telephone service (MOBITEL) and Internet service (SUDANET).	1997
Issuance of Telecom Act, 2001 and establishment of National Telecommunication Corporation.	2001
Issuance of the Public Corporations Law, 2003.	2003
Licensing of a second mobile operator, AREEBA.	2003

Licensing of a second fixed service operator, CANAR.	2004
Cabinet decree of formation of Informatics Fund.	2004
Liberalization of the International Gateways to main operators.	2005
Licensing of a third mobile operator, SUDANI.	2006

Table (2.2): The ICT sector in Sudan [6]

### 2.2.3 The structure of the ICT Sector

The structure of the ICT sector consists of:

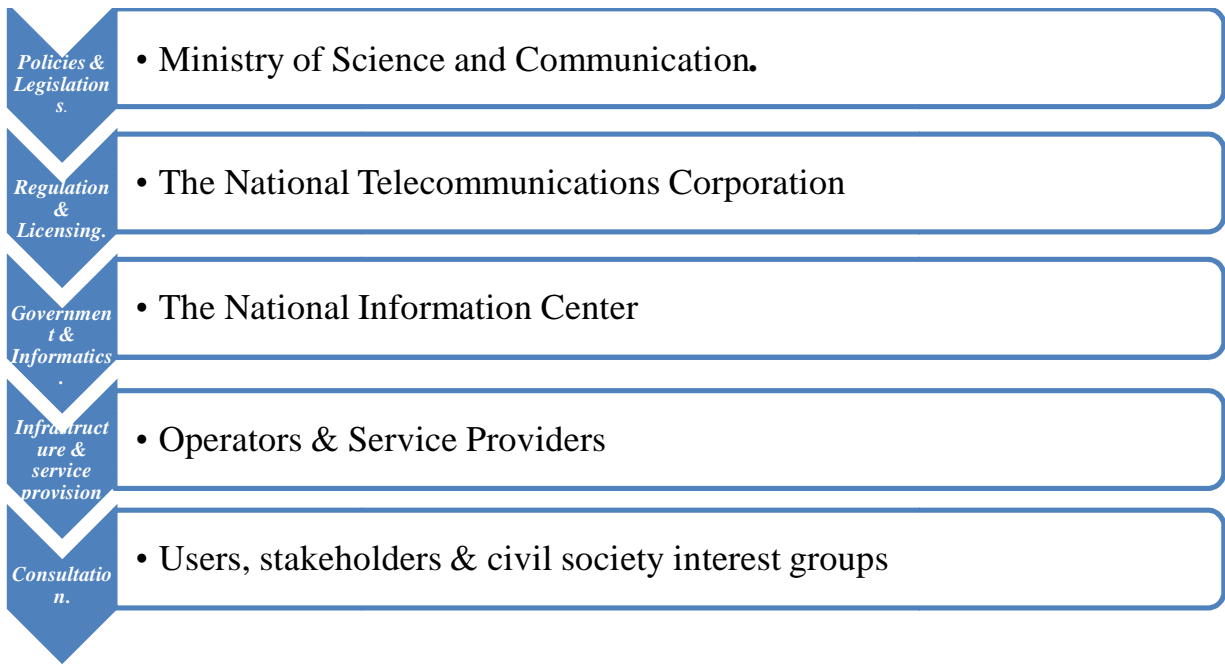


Figure (2.1): The structure of the ICT sector [6]

## **2.2.4 ICT and development**

All over the world ICT had been used for development, effective use of ICT can help in developing countries because it became a tool for transforming lives, reduction poverty, developing economy, improve education and health.

A key factor for development is ICT; the expansion of the infrastructure, service and application has made ICT an essential tool to improve economic opportunities for the poor and benefit social change both in developing and developed countries

## **2.2.5 Poverty and related issues**

### **2.2.5.1 UN DEFINITION OF POVERTY**

“Fundamentally, poverty is a denial of choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to; not having the land on which to grow one’s food or a job to earn one’s living, not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation” [7]

From the above definition realize that there are some issues that have strong relationship with poverty and could described them in a circle, because poverty leads to illiteracy and this lead to unemployment and also this lead to not enough food and bad health situation, and this lead to poverty. The poor people around the world struggle from the same situation like illiteracy, capacity building, social equity and they don’t have the ability to improve their bad situation.

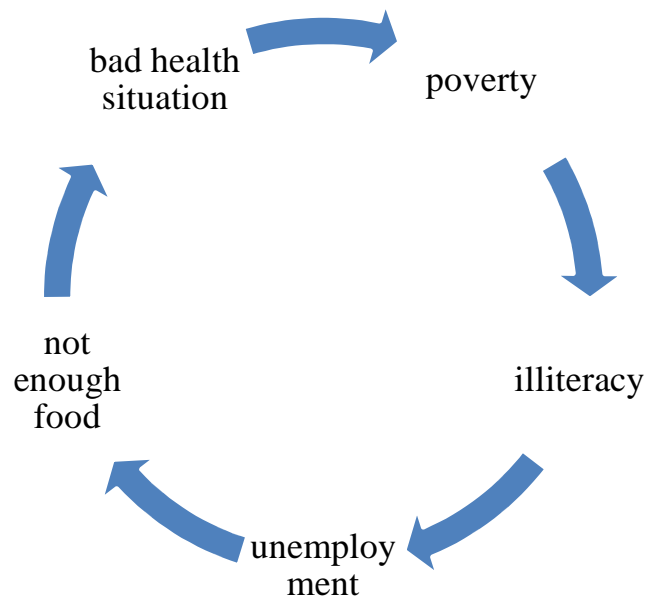


Figure (2.2): Poverty relationship

### 2.2.5.2 The relationship between ICT and poverty

There are strong relationship between ICT, development and poverty because the digital divide and knowledge gap are major issues in determining development and poverty, to achieve the knowledge and bridge the digital divide using the ICT is the best solution, also the effectiveness and acceleration of growth in the ICT sector became very clear in our society, so from all of that people did not have access to ICT lose economic and social opportunities to improve and secure their quality of life.

### 2.2.5.3 ICT and poverty reduction

There is strong relationship between economic growth and poverty reduction. Lack of financial resources and low income lead to lack of access to education, health, food, services, employment, social equity, natural resources, land and credit, political participation and infrastructure. Therefore lack to access to all these basic facilities lead to poverty.

The success developing countries all over the world adopt the use of the ICT as strategy for economic growth and poverty reduction. (E.g. Singapore)

#### **2.2.5.4 ICT and poverty reduction selected areas**

Sudan is rich in terms of natural and human resources, but it is a low-income country. In 2013 Sudan ranked 166 out of 187 countries in terms of human development indicators, with a Human Development Index of 0.473. GDP per capita was US\$ 771.08 in 2013.

The majority of poor people in Sudan depend on either agriculture or animal husbandry or both. Agricultural activities represent 34% from GDP

The research focus in reduce poverty by using ICT in eight selected areas. Use awareness program to distribute knowledge. Focus on Education, health and living standard as a multidimensional poverty index. Illustrate some ways to protect the environment because the environment affects the living standard. Discuss social equity and employment as index for human development.

Discuss agricultural and livestock because there are a major wealth in Sudan.

##### **2.2.5.4.1 ICT and awareness**

From thousands of years ago people know the important of communication like smoke signal, carrier ....etc , and they using all of these method to deliver information from one person or community to another, because information about our community give us a better chance to solve our problems.

ICT can facilitates awareness by using the media like radio or TV and also community centers can be used to deliver all kind of information that suitable for the community (e.g. natural disaster and disease).

#### **2.2.5.4.2 ICT and education**

ICT is strong tool to facilitate education and improve the quality of it in developing countries as the world development report said:

[ICTs] greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation. The new communications technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago. [8]

ICT can help in delivering the information at any where any time by using the ICT applications, and for the illiterate people the ICT can give them the appropriate education at any time that they want by using the community centers or radio or TV, because ICT can provide a remote access to marginalize areas or people. [9]

#### **2.2.5.4.3 ICT and health**

The revolution of ICT can also help in healthcare in rural and urban areas, access to the internet can help the people that work in the health sector to be up to date with new studies and diseases, also the ICT can delivered the diagnosis from the others that is far away from us. The government can build the information network to make the people aware of some diseases and how they can prevent them self from getting it like HIV, and also educate the women about pregnancy and child mortalities. Also the government can build medical centers in the rural areas to help the people in these areas to get early diagnosis. [9]

#### **2.2.5.4.4 ICT and social equity**

ICT is innovation technology and everyone in the world can benefit from it even the women, people in marginalized areas, illiterate people, and disable people.

Digital divide mean the technology gap and bridging the digital divide means inclusion of the information society with access to computer and internet. Digital divide is seen when a significant portion of the population has no access to ICT at an affordable cost and possibly also no skill to use them. Access to information technology is also useful to consider what role may play in people's struggle with their key problems and what other conditions should be met for this role to be effective; also digital divide tends to synchronise with most aspects of social inequalities. Anywhere in the world a person who is a member of a minority, poor, rural, ill educated has all chances to have no access to ICT neither than possibility to use them. [9]

#### **2.2.5.4.5 ICT and employment**

ICT sector is the one of the most growing sectors in the world, and this lead to a big demand for ICT products and services and these lead to creation of new jobs. Two areas of employment opportunity arise from the deployment of ICTs. First, unemployed people can use ICTs to discover job opportunities, and second, they can become employed within new jobs that are created through the deployment of ICTs. Poor people in rural areas suffer from lack opportunities for employment because they often do not have access to information. One use of ICTs is to provide on-line services for job placement. [9]

#### **2.2.5.4.6 ICT and environment**

ICT can be used to monitor the environment from water to the layer of the earth to the forest and this give us better understanding for the environment and also help



us in saving the natural resources, also the monitor of the environment can give us a prediction about natural disasters and also warning the effective areas. [9]

#### **2.2.5.4.7 ICT and agriculture**

Agriculture is an important sector in most of developing countries especially for the rural or marginalized areas that suffer from poverty, because of that the government needs always to enhance the production of crops and effective use of natural resources. The best innovation solution for all of these challenges is the ICT, because ICT play an important role in solving problems by making network of information that can study all the environmental factors and then inform the farmer about these factors, and also inform them about the prediction diseases and weather. At the end also this network can inform them about the price of the corps to get best price. [9]

#### **2.2.5.4.8 ICT and grazing**

ICT also can play a major role in grazing by using satellite system to determine which and where the green pastures are good, and also make an estimation of the numbers of animals that can pastured to avoid the risk to the environment and resources, also they can build an information network to predict the diseases and inform them about the ways to treat the animals diseases. [9]

### **2.3 Related work**

E- Primer on ICT for poverty alleviation is the best guide in using ICT for poverty reduction, because information and communication technology for poverty alleviation by Roger Harris is the most important book in this topic. [10]

Roger Harris adopts using ICT for poverty reduction, because ICTs offer the promise of easy access to huge amounts of information useful for the poor. Poor people will gain fruitful access to ICTs through shared facilities that are appropriately managed and properly constituted within sound development

strategies. Implementation efforts have to take into account the wide variety of factors that are critical for success. A poverty alleviation framework is presented to facilitate the full consideration of all such factors. Models of ICT adoption and diffusion are discussed followed by an examination of the areas in which ICTs have been shown to demonstrate effective poverty alleviation. Lessons learned from the examples are presented within the context of the adoption and diffusion models. An outline of development telecentres follows along with a consideration for project implementation. A framework for poverty alleviation is derived and it is used to analyze the outcomes and the factors that influence them.

ICT pathway for poverty reduction adopts the Sustainable Livelihoods Approach (SLA), a framework used in understanding the multidimensional aspects of poverty and poverty reduction strategies. The SLA illustrates the different linkages between livelihood assets, vulnerability context, institutions, and policies, and people's livelihood outcomes. The approach emphasizes the importance of the capital or assets that people have access to or draw on, and the context within which they devise strategies to improve their livelihoods. Due to its flexibility in understanding people's livelihoods and poverty reduction, the SLA has been extended and used to analyse ICT applications for poverty reduction. The framework shows the linkages between livelihood assets and the context including the vulnerability context that mediates people's livelihood strategies and leads to livelihood outcomes.

This research is a combination of Roger Harris ideas for using ICT for poverty reduction and sustainable livelihoods approach adopt by ICT pathway for poverty reduction, and also analyzed the case studies like Usha Reddi to explain the useful of ICT application on reducing poverty.

An Introduction to ICT for development by Usha Reddi addresses 26 successful case studies for using ICT for development around the world. By understand the

role of ICTs in the development process currently underway in the world, it is necessary to explore existing concepts of development, and study the historical role of ICTs in this process, and then link ICTs to development goals.[9]

Also necessary to understand emerging trends in global thinking on the purpose of development; and become familiar with the role of ICTs in the development process.

Also there is a need to move beyond waste of resources and work in isolation to one ICT based framework for poverty reduction in Sudan. Because there is a lot of effort in the poverty reduction for example Gedaref Digital City Organization (GDCO).developed an initiative with Gedaref ministry of education and other partners to start a project for those children and young's been out of the school. The project idea is to train those children's through e-learning and networks for two years and then the child will be moved to class 4 in the government schools. The partners trained 25 teachers as trainers. A Telecenter was established in Wad Almutshamir village connected with a wireless network, developed curriculum and 25 laptops provided by UNICEF. [11]

And also Gedaref digital city organization (GDCO) was established in partnership with The Digital City of Eindhoven (DSE) in Netherlands, GDCO is nongovernmental and nonprofit organization (Gedaref Sudan), it is part of the Telecenters movement where ICT is used for community development. [12]

And also poverty reduction strategy paper by the international monetary fund. [3]  
Many researchers have sought to apply the livelihoods framework to assess information and communication technology and poverty reduction, because there is a little understands of how the livelihood framework can be adopted to understand the reasons for poverty and provide ICT application to solve it.

## **CHAPTER 3**

# **THE REQUIREMENTS AND ANALYSIS OF THE FRAMEWORK**

The requirement and analysis of the framework aims to contribute to the coherence between the national strategy for development, beside the ICT rules and regulation, ICT investment and the existing ICT infrastructure to reduce the poverty through the eight selected areas.

### **3.1 The link between poverty reduction and eight selected areas in Sudan**

We can describe poverty as lack of access to resources, education, healthcare, employment, safe housing, good environment, physical goods and income, which result in political and social discrimination?

In the developing countries, finding some kinds of discrimination, but this discrimination will be more on vulnerable and powerless people on those communities and are usually excluded from decision making, freedom, and self respect like poor people. Because of that the research discusses social equity and employment as index for human development.

Sudan like most of developing countries around the world, the majority of population work in agriculture and livestock because of that the framework contains those two areas to reduce poverty through them by using ICT.

The research focuses in awareness program because the awareness is the most important tool in development by distributing knowledge. Also focus on Education, health and living standard as a multidimensional poverty index.

Illustrate some ways to protect the environment because the environment affects the living standard.

The climate change and the environment is the critical issue for the developed countries because the power of nature is the hugest power on the earth, so in spite of that the developing countries must take the environment in their account to outweigh the negative effects.

### **3.2 The relationship between development, information and ICT**

There is a strong relationship between the three areas and in any development strategy should consider the information and ICT as a basic tool for success. The figure below explains this relationship.

The development strategy is the first step in the ICT applications for development because it is essential to have clear development targets that are specific to the context before the form of use of the ICTs is defined. From that the information strategy should come first then the technology strategy.

According to Harries [10], the general rule is that the application of ICTs to development should always begin with a development strategy. From that, an information plan can be derived and only out of that should come a technology plan. It sounds simple and intuitive yet it is easy to find and recognize implementations that start the other way round, by beginning with the technology and working back to the development. Whilst the strategic thinking can be informed by an appreciation of the capabilities of ICTs, it is essential to have clear development targets that are specific to the context before the form of use of the ICTs is defined. Additionally, in considering the development strategy, it is well to note that bottom-up; demand-driven development objectives are usually preferable to top-down, supply-driven objectives, so that goals begin with an

appreciation of the needs of development recipients, as they would themselves express them.

From an unambiguous articulation of the development strategy, an information plan is drawn. This will set down the information resources that will be required to achieve the development strategy. Again, this determination can be made against an informed background with regard to the capabilities of ICTs, but it should not be driven by the mere application of technology. Finally, a plan for the technology can be drawn up that will be capable of delivering the information resources required for achievement of the strategy.

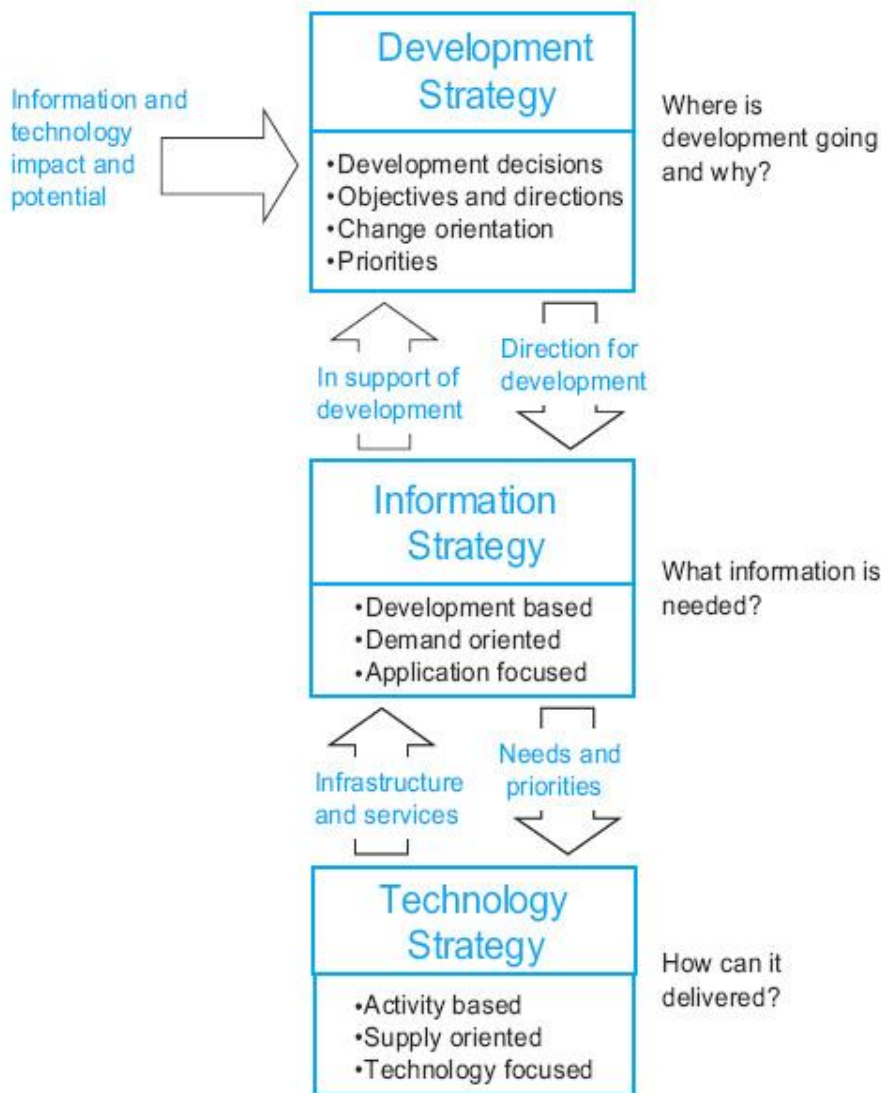


Figure 3.1: the ICTs Relationship [10]

### 3.3 What is the framework?

The framework is an essential tool for supporting poverty reduction, because the framework is a collaborative effort to provide a foundation to resolve the problem. The framework developed by the entire community, stakeholders and civil organization. The framework will take many years to develop fully, but the ICT infrastructure is being developed continuously.

The goal of the framework is to improve the ICT environment to reduce poverty by a basic set of needs.

### **3.4 The scope of the framework**

The scope is to develop a framework that would define the role of ICT in reducing poverty. This framework can give the foundation of development and growing economic; also the framework provides a mechanism for transformation and gives the potential for assessment and measurement for the results.

### **3.5 Methodological framework**

This research aims to discuss the role of ICT in poverty reduction, it is imperative to define a livelihood framework and where ICT could possibly play through it.

The term livelihood follows this definition *livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living*, (Chamber & Conway, 1992).[13]

The livelihood framework classified in to five main steps, as forwarded by FAO can demonstrates smooth flow of information between the five steps, available resources, intermediate actors, activities and final outcomes allows effective exchange of information between each steps of the livelihood framework and expected outcomes. The link between ICT application and livelihood framework can be helpful tool to facilitating poverty reduction through the eight selected areas. [14]



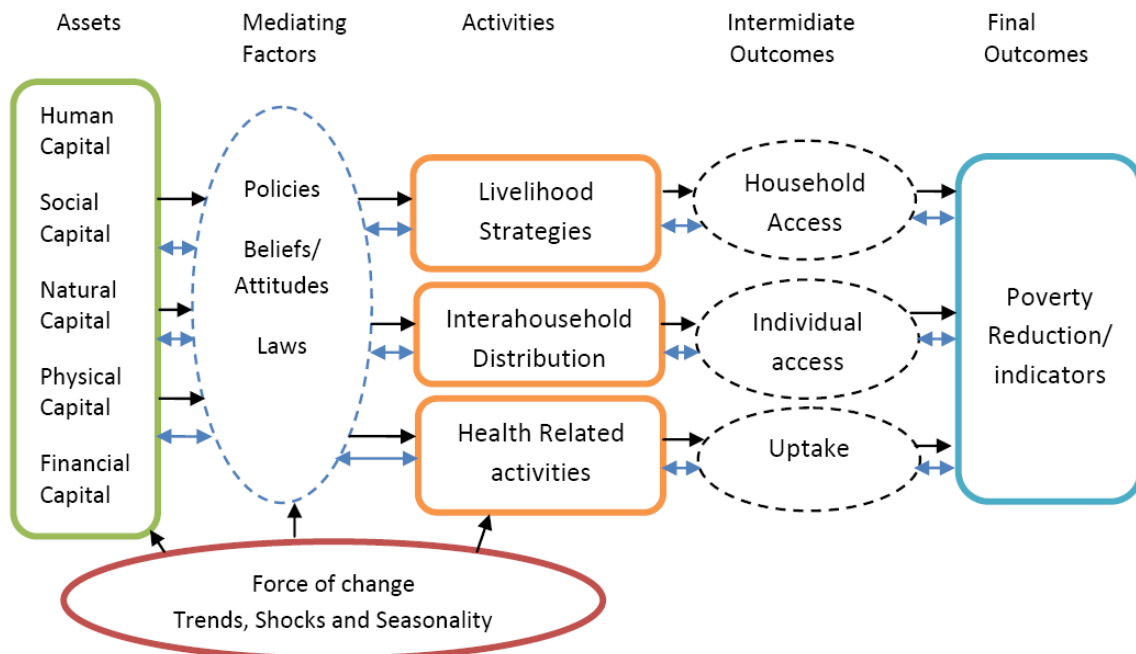


Figure 3.2: The Livelihood framework. [14]

### 3.6 What are the requirements of the framework?

The framework classified in to five steps. The assets which mean building ICT infrastructure, mediating factors including national strategy for development, rules and regulation and attract the investment, activities including the eight selected areas, intermediate outcomes represent the output of each area and the final outcomes lead to poverty reduction.

#### 3.6.1 Building ICT infrastructure

Infrastructure is the cornerstone of achieving the sustainable and affordable access of ICT. The first challenge facing the sector is how to expand and continue building ICT infrastructure to meet the rollout of ICT infrastructure by deployment of national ICT policies which include: [15]

- Globalization
- universal access and universal service

- E application/ service
- Broadcasting technology
- Human resource capacity
- Local content development
- Convergence

### **3.6.2 National strategy for development**

The purpose of the strategy is to create a national development plan and use it to reduce poverty in Sudan.

The subject of the strategy is to use the ICT in order to improve awareness, education, health, social equity, employment, environment, agriculture and grazing. The goal of the strategy is to outline the national priorities for development, reduce poverty and also determine the way of the implementation.

#### **3.6.2.1 Investment**

The ICT sector is a substantial sector in sustainable development strategies and development of a reduction poverty framework. So the investment in the ICT sector is an essential part of the development by providing the necessary infrastructure. The main issue is to encourage the investors to invest in the ICT sector are stability, transparency and independency.

#### **3.6.2.2 Rules and Regulation:**

The rules and regulation represent the solid foundation for the investment in the ICT sector.

Many countries around the world put a national strategy for development to help in building ICT infrastructure and encourage the participation of the private sector and increase ICT investment to establish a strong competitive ICT sector within the legal rules and regulation.

In a fascinating world of fast-changing information and communications, dramatic changes in poverty and myriad relationships among them, *ICT to Poverty Reduction* provides a wise development of theoretical perspectives and analytical studies, together with a knowledge-rich tapestry of the hundreds of ways in which ICTs are used by poor people and others in reducing (or sometimes increasing) poverty. Key public priorities are analyzed in depth, pointing to good regulation, which largely determines cost and access, investment in the national ICT infrastructure, investments in the development of poverty reducing and cost saving applications in governance and public services – notably education, health and sufficient support for research and innovation. [16]

## **CHAPTER 4**

### **THE DESIGN OF THE FRAMEWORK**

The design of the framework identifies the steps that illustrate how the poverty can be reduced within the eight selected areas. This framework also illustrate how the national strategies for development and investment in ICT infrastructure within the rules and regulations translated into solving problems, creating opportunities and removing obstacles.

#### **4.1 Investment in infrastructure according to rules and regulation**

The ICT infrastructure is a strategic resource, because the efficient deployment of ICT infrastructure will provide access to global world with the high capacity networks, and also the rules and regulation will enhance the development of ICT infrastructure and adjust the access to public right-of-way. The public right of way is one of the scare recourses in ICT sector which contain the roads, faibreoptic tracks, underground trucks, etc.

The government must encourage the investment in the ICT sector to have the necessary physical infrastructure which will facilitate the establishment of ICT related businesses; also there is a need for greater sharing of essential infrastructure and facilities among operators.

#### **4.2 National strategy for development**

The national strategic plan in Sudan is contain from eight axes:-

1. The sustainability of the peace, sovereignty, national reconciliation.

2. Sudanese citizenship and identity.
3. Good governance and the rule of law.
4. Sustainable development.
5. Poverty and achieving the objectives of the millennium.
6. Institutional and capacity-building and follow-up calendar.
7. Extend knowledge informatics.
8. Develop mechanisms for scientific research. [17]

### **4.3 The idea behind the framework**

The Framework defines a setting in which the poor are enabled and empowered to take advantage of national development strategy with the investment in the infrastructure according to rules and regulation, and coordinates global and national efforts into poverty reduction; which provided a set of effective and efficient social protection services; and are increasingly empowered to give voice to their collective concerns. Concerted and co-operative actions by a wide range of stakeholders will be needed to transform the vision and strategies outlined in this Framework into meaningful action.

Government must be one of many actors involved in the poverty reduction process. The private sector, NGOs and community-based organizations will surely play a key role in poverty reduction efforts. Where at all possible, the Government will encourage the involvement of all stakeholders to achieve the objectives outlined in this Framework.

The Framework defines a poverty reduction route in which the poor increasingly take advantage of the opportunities created in selected areas. Government will continue to provide essential infrastructure, social services and social protection services to poor communities. The aim is not to eliminate poverty through direct

public intervention, but to facilitate a process in which the poor become active participants in a rapidly growing market economy.

The Government strategy should cooperate with the civil society to realize the vision outlined in this framework, also the government could encourage the poor to participate in the selected areas by offering the awareness, skills, employment, market access, enabling environment, social protection and institutional empowerment necessary to prosper in the market economy.

The Framework, as presently prepared, facing the availability of actual resources for poverty reduction those will depend on a number of variables that are difficult to predict, such as the realization of a lasting peace, the willingness of the private sector to support infrastructure investment and the international and national economic environment. And also there is a need of some harmony between the policies and programs and the strategic goals that outlined in the framework.

We know that there is no poverty framework can be fully complete, because sometimes there are sectors, activities, and services which can contribute more effectively in the poverty reduction areas not specifically discussed in the Framework, the challenging to this framework is to discuss the choices and apply any approach that can lead to poverty reduction.

The figure below explains a process of the framework and illustrates the flow of information between the steps through available resources, intermediate actors, activities which contain the eight selected areas and final outcomes allows effective decision making by government.

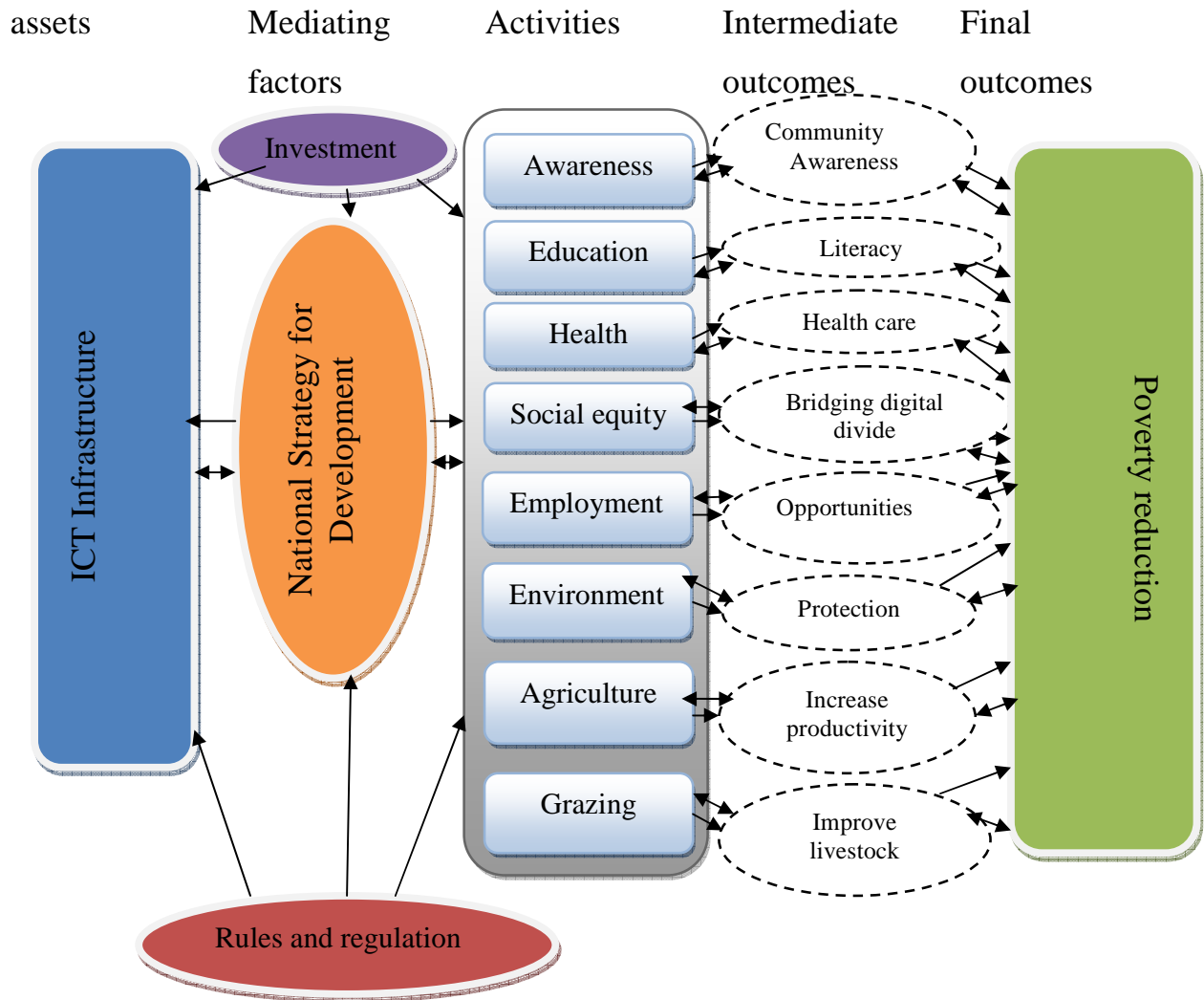


Figure 4.1: Poverty reduction framework

The research illustrates the relationship between ICT and development and the relationship between ICT and poverty reduction and explain the link between poverty and eight selected areas which are the most important areas for development of Sudan economic.

The research develop a framework that would define the role of ICT in reducing poverty by addressing the national strategies for development, the rules and regulation of the ICT policy situation in Sudan and attract the investment the basic conceptual of the framework is to analyze the poverty selected areas , access to resources, distribution of resources, the relationship between different factors and aspects of people lives, also we can identify the interaction between ICT, poverty reduction and the selected areas.

The framework must be transparency by participation of all stakeholders in the goals, formulation of the policy and the monitoring of implementation.

The framework must ensure consistency between stakeholders, structural of the framework and social policies and the areas of poverty reduction.

The government would be expected to take the lead in implementing the framework and conducting consultation with civil society and other stakeholders and also determine the structural reform and priorities.

The framework will need annual revision, to follow and update the progress, because always will find a knowledge gap and uncountable changes in the environment of the poor. Because of that the framework must be flexible enough to adapt to changing circumstances.

Also need monitoring effort for the framework to be put in place, because the causes and consequences of poverty will change over time, so there is need for improvement by evaluating progress, monitoring and analyzing the dimension of poverty.

The government would be expected to take the lead in implementing the framework and conducting consultation with civil society and other stakeholders and also determine the structural reform and priorities, also the government, the private sector, the civil society, and the rules and regulation must be joined



together to work on the poverty reduction framework, because if all stakeholders cooperate in implementing the principles and strategies outline in this framework, then there is hope that the poverty problems will be solved in the decades to come. Poverty reduction policy that adopt by policy makers and expertise is not enough to resolve the poverty issues that Sudanese face in their livelihood, so awareness must be addressed in the community and also the use of indicators to built a scientific way to measure the result of any projects.

The government must be steady in implementing the proposal frame work for poverty reduction that aims to use ICT to increase efficiency in solving the poverty issues by creating new income opportunities that reduce the poverty.

# CHAPTER 5

## Case study and Discussion

Reducing poverty with the ICT is not an easy way to take and also is not so complex, because the main challenges are not in the technology but in the strategies, access and implementation. The ICT frame work for poverty reduction is provided a tool for transforming a technology to achieve the goal, because the framework can consider as a practical tool for use by policy maker.

This chapter aims to discuss many existing solutions for poverty reduction, it also explain the output of these solutions.

The case studies here are only a sample, can add many more studies but identify some of the most interesting solutions that are capable for Sudan.

### 5.1 Case studies

#### 5.1.1 Case study (1) ICT and awareness

Case study	ICT and awareness
	Using Radio for Community Mobilization: Experiences in Zimbabwe and Kenya
reference	George, Nancy A. (1993) African Media Review, Using Radio for Community Mobilization: Experiences in Zimbabwe and Kenya. Vol. 7 No. 2, 52-67
What is it interesting	There is a variety of communication strategies, some more valuable than others, which can be employed to transfer information from the "experts" to those who need that

	<p>information on infant and young Children’s nutrition. Until quite recently, those involved in development communication tended to be derided as technocrats or, even worse, simply Ignored. Those actively involved in development considered the content of their messages more important than the means of delivering them, believing - quite incorrectly - that if one can generate useful subject-related information, those who can benefit from it will use it. That belief could be supportable only if those who can benefit from the information are aware of its existence.</p>
<p>The approach</p>	<p>Since 1985, the Federation of African Media Women of Zimbabwe (FAMWEZ), with funding from UNESCO and the Friedrich Ebert Foundation and the partnership of the Zimbabwe Broadcasting Corporation's Educational station, ZBC Radio 4, has established a total of 45 radio listening clubs in four provinces of the country. The project, called "Development through Radio", is targeted to women in the rural areas of Zimbabwe, who, in many cases, have been left to manage the household and farm because the men of the family have migrated to urban areas to find work. The DTR model has evolved from the Radio Farm Forum concept.</p> <p>The Radio Listening Clubs (RLCs), originally formed from local branches of the Zimbabwean Association of Women's Clubs, have membership ranging from 10 to 20</p>

	<p>women who gather together once a week to use the radio cassette recorder provided through the project to listen to a DTR radio broadcast in their local vernacular language and to discuss and comment on the broadcast. Additionally—and perhaps, most importantly—the DTR members raise issues from their discussions to be addressed in future DTR programs. Thus, although the programs are compiled and produced in an urban setting—the Harare studios of ZBC Radio 4, they avoid the inherent danger of making the women's groups essentially the programmes producers.</p>
<p>results</p>	<p>In 1991. The Communications Division of IDRC agreed to support the evaluation of the DTR pilot experiment. FAMWEZ has received many enquiries from other Women's Clubs in Zimbabwe requesting that they be allowed to join the project. However, FAMWEZ felt that any expansion should be preceded by an evaluation of the project as it has operated thus far. In keeping with the participatory nature of the RLCs, FAMWEZ wanted to conduct a participatory evaluation themselves to determine whether the RLC concept should be expanded, and if so, what improvement needed to be made in the project's structure and administration. Preliminary results have identified several operational difficulties with the project, but, nevertheless, they show an enthusiastic affirmation of the concept of the Radio Listening Clubs as contributing</p>

	<p>positively to mobilization of the community around its particular development needs. FAMWEZ is currently compiling the findings of this evaluation for incorporation into a larger community-based development scheme in Zimbabwe, and possible replication of the DTR model in other countries in Southern Africa.</p>
<p>lessons</p>	<p>In most cultures in the African continent, women are solely responsible for providing food for their children. They are the farmers and the cooks, and they determine how to manage the family inputs to meet their children's nutritive requirements. If one can motivate the women of Africa to discover the role of nutrition-related information in the health of their children, and if the women can then participate in a dialogue with nutrition experts through the radio medium, one can anticipate that child health will be sustainably improved. Mothers must be the target of such an information campaign.</p> <p>The DTR project in Zimbabwe is targeted exclusively to rural women.</p> <p>The evaluation of the DTR project has provided evidence that women are willing and able—sometimes in the face of extreme difficulties—to invest time and effort in a radio-focused development activity, and that they believe the effort is worth the return of their investment. Since reaching and creating a dialogue with women would be a</p>

	primary aim of any communication strategy attempting to improve Infant and young child feeding, it is important to know that it can be done—effectively and over a considerable period of time.
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National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.  Extend knowledge informatics	Using radio for awareness of rural women to improve their lives	Radio stations	funding from UNESCO and the Friedrich Ebert Foundation and the partnership of the Zimbabwe Broadcasting Corporation's Educational station, ZBC Radio 4

According to awareness case study (using radio for community mobilization experiences in Zimbabwe and Kenya), and the application of this case study to the ICT framework for poverty reduction will go through the five steps of the framework assets, mediating factors, activities, intermediate outcomes and final outcomes. Implementing of radio stations as an ICT infrastructure to develop the community through radio listening club, with funding from UNESCO and the

Friedrich Ebert Foundation and the partnership of the Zimbabwe Broadcasting Corporation's Educational station, because people in rural areas should have broad awareness on their live issues by designed awareness program for women in their local vernacular language. The evaluation of the experience of the development through radio project has provided evidence that women are willing and able sometimes in the face of extreme difficulties to invest time and effort in a radio-focused development activity, and that they believe the effort is worth the return of their investment. As a final outcome of development through radio pilot experiment, FAMWEZ has received many enquiries from other Women's Clubs in Zimbabwe requesting that they be allowed to join the project.

### 5.1.2 Case study (2) ICT and agriculture

Case study	ICT and agriculture
	M-FARM
reference	M-Farm connecting farmers, (2013) Create solutions that empower farmers to work and communicate in new and innovative ways (online) available from: <a href="http://mfarm.co.ke">http://mfarm.co.ke</a>  © Copyright 2010 - 2013 M-Farm. Developed by Dev Team M-farm.
What is it interesting	Farmers are plagued with problems affecting their productivity and livelihood--middlemen only offering meager prices for their produce, cereal boards delaying with payments, and expensive farm inputs.

	<p>M-Farm gives these farmers a voice by connecting them with each other in a virtual space. With M-Farm, they not get affordable farm inputs but also are able to sell collectively</p>
The approach	<p>Kenya is a country of 5 million farmers, ranging from the smallest subsistence growers to large industrial agriculturalists. It is also increasingly a hotbed of technological innovations such as M-Farm, a mobile service that aims to improve Kenya’s agricultural sector by connecting farmers with one another, because peer-to-peer collaboration can improve market information and enhance learning opportunities.</p> <p>Since many farmers do not have access to internet, M-Farm has adopted an SMS-based solution where they send a simple text to 3555 depending on what they are looking for.</p>
results	<p>M-Farm helps farmers by providing them with access to current market prices, aggregating their needs into discount orders with suppliers, and giving them direct, collective access to both regional and export markets for their products.</p>
lessons	<p>It’s so exciting, the little effort you put into technology, and how it can change people’s lives. The beauty of it is that you can do whatever you have to do anywhere and anytime. As a technologist, you can come up with something that touches a lot of people’s lives.</p>



National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.	M-Farm, works as a transparency tool for farmers	Software solution for web/mobile platform	M-Farm took away the €10,000 prize as capital investment.

If the livelihood framework applied on M-Farm case study, the mobile platform represents the ICT infrastructure with the sustainable development strategy, while the investment was about 10,000 € came from a prize. All those lead to connecting farmers, because peer-to-peer collaboration can improve market information and enhance learning opportunities. M-Farm has adopted an SMS-based solution beside access to the internet to cover all farmers and give them what they are looking for.

The intermediate outcome of that M-Farm helps farmers by providing them with access to current market prices, aggregating their needs into discount orders with suppliers, and giving them direct, collective access to both regional and export markets for their products. The last outcome is reducing poverty by enhancing the agriculture sector and farmers situation.

### 5.1.3 Case study (3) ICT and employment

Case study	ICT and employment
	Teleworking: Blessing for Malaysian women in the information age?
reference	e-home makers where home and work meet, (2013) Teleworking: Blessing for Malaysian women in the

	<p>information age (online)available from:  <a href="http://www.ehomemakers.net/en/article.php?id=1186">http://www.ehomemakers.net/en/article.php?id=1186</a></p>
<p>What is it interesting</p>	<p>By overcoming the barriers of space and time, teleworking - working from a distance with the support of information and communications technology (ICT) - has been purported to increase the international competitiveness of developing countries in today's information age. In addition, the lower wage rates, the relatively high literacy levels and language skills in some countries, like India, the Philippines and Malaysia, could provide a comparative advantage in terms of the on-line relocation of information processing jobs, or teletrade, from the industrialised countries to the South. It is also believed that with the 'end of geography', teleworking could and would reach the traditionally disadvantaged groups, as well as to those in rural communities, bringing about a more sustainable development in society. Women in the developing world would then be able to partake and benefit from this new and flexible mode of employment, hence increasing their participation rate in the labour force (Mitter and Efendioglu, 1997).</p> <p>The focus is to examine whether Malaysian women, through teleworking, could gain positive entry into the information economy, particularly in the sphere of</p>

	<p>employment. By focusing on the software industry, this explores the possibilities, fears and barriers faced by women in pursuing teleworking as an alternative work arrangement.</p>
The approach	<p>In terms of employment, about 30 percent of IT professionals were women, while at the administrative level, the majority of the employees were women. As for occupational levels, women formed 21 percent of management, 28 percent of executive and 59 percent of non-executive staff. However, only five percent were in the technical section while the overwhelming majorities were administrative and clerical personnel. It should be noted that the concentration of women as data entry clerks was in one firm, which had employed them as contract workers for a particular project.</p>
results	<p>Theresa, a partner as well as a consultant in a joint venture firm, is a full-time teleworker. She was previously a manager of a team of systems analysts and programmers but found it difficult to maintain her position as a manager due to health problems. Moreover, the traffic jam and distance from her home to the office, which took about three to four daily commuting hours became very stressful for her, contributing to her health problems. As a result, Theresa decided to resign from the company in early 1997. However, the managing director gave her the option to telework, an offer she took up</p>

from March 1997. Theresa is paid a consultant's fee (including transport allowance) which, according to her, is very reasonable.

The company provides her with the necessary equipment such as a computer, modem, as well as access to the Internet and e-mail facilities. She has her own fax machine and printer. The company pays for the telephone bill and maintenance of the office equipment.

As a teleworker, she comes into the company office at least two or three days a week. The rest of the week she works the normal working hours from her husband's office. Her husband is a businessman and has his own office that is within walking distance from their home. She found it impossible to work directly from home as she has children who would always disturb her. Hence, she shifted from teleworking at home to her husband's office. Theresa points out that she is fortunate to have a 'support network', as her mother-in-law and a helper take care of her children.

Being an independent consultant, Theresa discloses that she has full authority to discuss prices, negotiate on software details and other technical matters with clients. Theresa points out that she is happy to be given the opportunity to be a teleworker and to continue with her career. She is less stressed, is healthier and her

	<p>productivity has increased considerably. She says she also spends more quality time with her family. In a nutshell, she enjoys working as a teleworker and has achieved greater job satisfaction.</p>
<p>lessons</p>	<p>The present MSC initiative sees strong encouragement from the Malaysian state in the promotion of IT in all sectors of the economy. Despite the numbers of women and men employed in the IT sector, there is still a gap in meeting the skills sought by the industry. In the software, telecommunications and banking and finance industries, there is a limited supply of specialised skills and hence, the sector is 'open' towards employing anyone who possesses those skills, including women. This openness towards the employment of women also coincides with a changing trend in corporate culture. Management practices, such as 'fluid and/or change management', are characterised by a flatter line of authority, decentralised decision-making and a merit-oriented approach towards recruitment and career advancement.</p>

National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.	Encourage employment in the IT sector	a computer, modem, as well as access to the Internet and e-mail facilities. Fax machine and printer.	The company pay for the equipment, office and telephone bill

Teleworking: Blessing for Malaysian women in the information age, is the case study for employment in the ICT sector. According to livelihood framework for poverty reduction a computer, modem, as well as access to the Internet and e-mail facilities. Fax machine and printer represent assets while the employer invest in the equipment office and telephone bill under the rules and regulation that encourage employment in the IT sector and also sustainable development strategy, all that lead to overcoming the barriers of space and time as an intermediate out comes, and poverty reduction as final out comes because Teleworking create job opportunities.

**5.1.4 Case study (4) ICT and health**

Case study	ICT and health
	Women and Health Programs
reference	Global Health through Education, Training and Service (GHETS) Local Knowledge. Global Health.

	<p>(2013) ICT and improving health in underserved communities around the world.</p> <p>(online) available from:  <a href="http://www.ghets.org/content/programs/programming-priorities/women-and-health/">http://www.ghets.org/content/programs/programming-priorities/women-and-health/</a></p>
<p>What is it interesting</p>	<p>Poverty, inequality and limited decision making power have an enormous impact on the health of women and their children.</p> <p>Women account for as much as 70 percent of the world's poor.</p> <p>A woman living in sub-Saharan Africa has a 1 in 16 chance of dying during pregnancy or childbirth – compared with 1 in 3,700 in North America.</p> <p>Violence against women is as serious a cause of death among women of reproductive age as cancer.</p> <p>In the developing world as a whole, one third of all pregnant women receive no health care during pregnancy.</p> <p>Every year, an estimated 4 million women and girls are bought and sold worldwide, through forced prostitution, slavery or forced marriage. These women are particularly at risk for unwanted pregnancy and unsafe abortion, and sexually-transmitted infections, including HIV.</p>

	<p>Recognizing the many links between social and economic inequalities and women’s health challenges, GHETS works with an international network of universities, policy makers and community leaders in developing countries to improve the health of women and their families. Together with our partners, we are working to improve women’s health by reducing barriers to healthcare for women in underserved communities and equipping healthcare providers with the knowledge and skills to respond to the needs of women in their communities.</p>
<p>The approach</p>	<p>With support from GHETS, The Network: TUFH Women and Health Taskforce, a group of women’s health advocates from communities in nearly 20 low-income countries, has developed educational materials for use in medical and nursing schools. These training modules cover topics that include violence against women, gender and health, and adolescent health and are designed by local health advocates to improve healthcare workers’ ability to understand and address difficult issues affecting women and girls. These learning materials are currently in use in Egypt, India, Kenya, Malaysia, Mexico, Pakistan, Sudan and Uganda, and are being distributed free of charge to other universities in developing countries both online and on CD-ROM.</p>



<p>results</p>	<p>GHETS Program partner from Makerere University in Kampala Uganda received a mini-grant for a program designed to increase access to reproductive health information amongst medical students and the women of Kampala. This program came about after a number of single female medical students became pregnant because of a lack of understanding about family planning.</p> <p>Through this mini-grant, Dr. Kiguli set up workshops throughout Kampala with different groups of individuals in order to discuss reproductive health, and address the questions that participants have. These workshops were set up with medical students-one for male students and one for female students, sex workers, and local communities. For each workshop, every effort was made to make the participants feel they were in a safe environment.</p> <p>All workshops started out with an open question session because answering the sexual health questions of participants was the priority. In addition to these workshops, radio talk shows were held in local languages, which also included a call in question and answer session.</p>
<p>lessons</p>	<p>This program demonstrates the success of programs that are designed and implemented by local partners.</p>

	The success of these workshops and radio talk shows has been extremely well received within the community, and will continue in 2009.
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National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.	Improve women's health by reducing barriers to healthcare for women in underserved communities and equipping healthcare providers with the knowledge and skills to respond to the needs of women in their communities.	Internet connectivity CDs	

Global Health through Education, Training and Service (GHETS) invest and works with an international network of universities, policy makers and community leaders in developing countries under the rules and regulation of each country to improve the health of women and their families, using internet connectivity and CDs to developed educational materials for use in medical and nursing schools as an ICT infrastructure with the sustainable development strategy. The intermediate out come for the health area when applied this case study to the livelihood framework is to improve healthcare workers' and give them the ability to understand and address difficult issues affecting women and girls. Poverty reduction is the final out comes because GHETS material improve women's health by reducing barriers to healthcare for women in underserved communities and equipping healthcare providers with the knowledge and skills to respond to the needs of women in their communities.

### 5.1.5 Case study (5) ICT and education

Case study	ICT and education
	ICT to support improvement and transformation of the education sector in Africa
reference	<a href="http://siteresources.worldbank.org/.../Resources/282822.../Education.pdf">siteresources.worldbank.org/.../Resources/282822.../Education.pdf</a>
What is it interesting	While ICT has been used in many parts of the world to improve the quality and increase access to education, most African countries still face the challenge that increased expenditure on education is not necessarily achieving the expected benefits. This chapter examines the potential for the use of ICT to support improvement and transformation of the education sector in Africa, including brief case studies of South Africa, Uganda and Senegal.

	<p>It identifies specific opportunities and challenges, and recommends areas of intervention for governments, development partners and other stakeholders. It looks in particular at the following</p> <p>five areas:</p> <ul style="list-style-type: none"> <li>• teacher professional development;</li> <li>• digital learning resources;</li> <li>• affordable technologies;</li> <li>• education management information systems (EMIS); and</li> <li>• National Research and Education Networks (NRENs).</li> </ul>
the approach	<ul style="list-style-type: none"> <li>➤ Establishing an enabling policy environment</li> <li>➤ Widening access to ICT infrastructure and connectivity</li> <li>➤ Providing increased connectivity to support education and learning</li> <li>➤ Harnessing ICT to improve management and administration</li> <li>➤ Harnessing Open Educational Resources</li> <li>➤ Building human capacity</li> </ul>
Result	<p>The case study contains three African countries (south Africa, Uganda, Senegal). The three African countries adopt ICT policy for education. Because of the high penetration of mobile technology in the country, especially among the young, South Africa is piloting projects that make use of mobile technology for</p>

learning. South African universities are also making use of mobile technologies one of the important features of teacher education in South Africa is the National Framework for Professional Teacher Education and Development (NFPTED), which specifies how ICT can be used to widen access to teacher education, improve teacher-learners' motivation, speed up communication, and provide an enriched environment for learning. ICT professional development has been integrated into pre-service teacher education by some universities, and there are also many opportunities for in-service teacher professional development in ICT. The training by universities in ICT teacher professional development has been complemented by the efforts of School-Net South Africa, which manages three large teacher development programmes: Intel Teach, Microsoft PiL, and the Commonwealth Certificate for ICT Integration to support academic administration and community work.

In the absence of an enabling policy environment in Uganda, it is not surprising that – apart from donor driven projects supplemented by initiatives of the communications regulator, the Uganda Communications Commission – there has been no coordinated effort yet to address access and connectivity for schools. The overwhelming majority of schools in Uganda – primary and secondary – lack access to both the internet and power.

In Senegal, telecommunications operators are the main players in the extension of internet connectivity to schools. There are, in

	<p>addition, a number of externally funded projects aimed at providing access to schools, the largest to date being the USAID Basic Education project (USAID/EDB). All of these were initiated before the adoption of an ICT in education policy. The impact of this policy in directing donor-funded projects remains to be seen.</p> <p>While both Uganda and Senegal have initiatives aimed at building the capacity of teachers, both countries appear to focus on computer literacy among teachers rather than pedagogical issues around ICT in learning. Uganda has remained at the small-scale pilot level, without any visible plan or strategy for national level expansion. Senegal, in addition to participating in international programmes like Microsoft PiL and iEARN, has some national level initiatives that address both pre-service and in-service training.</p>
<p>lessons</p>	<p>Technology is still developing rapidly bringing with it new educational opportunities. Experimentation is important, therefore, to test the potential educational applicability of these new technologies and approaches, examine their total cost of ownership and establish their strengths and weaknesses. Often, it is difficult for governments to fund such experimentation, but it remains an essential part of building a knowledge base of best practice. Development partners have a critical role to play in supporting such activities, not least in ensuring pilot projects are well evaluated and the results widely shared.</p>

National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.	Implement ICT to be use in improving the quality and increase access to education	mobile technology teacher development programmes internet connectivity	

ICT to support improvement and transformation of the education sector in Africa is the case study to reduce poverty through a livelihood framework. Mobile technology, teacher development programmes and internet connectivity are the ICT infrastructure under the rules and regulation of implement ICT to be use in improving the quality and increase access to education with the sustainable development strategy. All these factors led to intermediate outcome which provided connectivity to support education and learning.

### 5.1.6 Case study (6) ICT and social equity

Case study	ICTs and equity
	Telecenter in Rural Asia: Towards a Success Model
reference	Roger Harris, Ph.D. page 71 to 111 <a href="http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UN">http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UN</a>

	<a href="#">PAN006304.pdf</a>
What is the interesting	<p>The uneven global distribution of access to the internet has highlighted a digital divide that separates individuals who are able to gain access to computers and the internet from those who have no opportunity of doing a few statistics serve to highlight the alarming differences at either ends of the digital divide:</p> <ul style="list-style-type: none"> <li>▪ All the developing countries of the world own a mere 4% of the world's computers,</li> <li>▪ 75% of the world's 700 million telephone sets can be found in the nine richest countries,</li> <li>▪ There are more web hosts in New York than in continental Africa; more hosts in Finland than in Latin America and the Caribbean combined,</li> <li>▪ Tokyo alone has more telephones than the entire African continent,</li> <li>▪ There were only 1 million internet subscribers on the entire African continent in 1999 compared with 15 million in the UK (World Bank, 1999).</li> </ul>
The approach	<p>One approach to the problems of the digital divide has been the community Telecenter. Telecenter come with a variety of names, such as telecottages, or information shops, and no single definition serves to satisfy all of them. However, a common characteristic is a physical space that provides public community based access to ICTs for educational, personal, social and economic development. Telecenters are usually designed to provide a combination of ICT services,</p>



	<p>ranging from e- mail to full internet and World Wide Web connectivity (Harris et. al, 2001). Colle (2000) says there is great diversity in what is called a Telecenter.</p>
result	<p>Telecenter provide an alternative to the model of one-to-one individual access to a computer that predominates in the developed world. As community resources, telecentres offer opportunities for development that are predicated on improved access to information for whole communities. Telecenter have been introduced to many communities throughout the developing world. Significant examples include the Acacia project that aims to empower sub- Saharan African communities with the ability to apply information and communication technologies to their own social and economic development. Acacia works in Mozambique, Senegal, South Africa, and Uganda, mainly with rural and disadvantaged communities, which often find themselves isolated from the ICT networks to which their urban counterparts increasingly have access (IDRC,<a href="http://www.idrc.ca/research/xacacia_e.html">http://www.idrc.ca/research/xacacia_e.html</a>). The Pan Asia Networking Program (PAN) focuses on information-poor communities to determine how the least developed countries and communities can best achieve sustainable and adequate national and local connectivity, participate in global network resources (internet), and develop local expertise in computer networking. Activities address community-level access to internet-remote areas in Asia and Latin America and incorporate questions of impact and sustainability of services in the context of communities that have minimal resources. PAN explores how the internet can help empower local</p>

	<p>populations, indigenous groups, and other communities (IDRC,<a href="http://www.idrc.ca/pan/projects_e.htm">http://www.idrc.ca/pan/projects_e.htm</a>)</p> <p>The introduction of a Telecenter into a typical rural community in a developing country represents a substantial innovation for that community. For many rural dwellers, a community Telecenter will be their first encounter with a computer. In one case of a Telecenter introduced into a rural community in Malaysia, of 140 households surveyed, only one contained anybody who had even heard of the internet (Harris et. al, 2001). Moreover, Telecenter that seek to overcome the barriers to access to ICTs in rural areas of developing countries are mostly experimental. Currently, there is very little experience of the impact of such centers in the context of rural and remote areas in developing countries and there are many questions to be answered before embarking on ambitious and costly programmes at a national level (Ernberg, 1998). Given the novelty of access to ICTs and the shortage of guidelines for establishing and operating community Telecenter, many research questions remain open as to how this type of innovation can bring about equitable access to information resources that will lead to sustainable development among the most disadvantaged sections of the world's population.</p>
<p>lessons</p>	<p>Developing country governments should formulate national strategies to narrow knowledge gaps, including those for technology acquisition and distribution, education and training and expanding access to technologies by de-regulation and privatization (World Bank, 1999). The Bank goes on to say that societies require policies and institutions to facilitate the acquisition adaptation and dissemination of</p>

	<p>knowledge, saying that the appropriate course of action for any country will vary depending on the circumstances. Government policies and political leadership will determine the success of such policies. The participation of the major international donor and aid agencies such as the United Nations Development Programme (UNDP) or the Canadian Government’s International research Development Centre (IDRC) can heavily influence Telecenter pilot projects and hence nation-wide roll-out programmes..</p>
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National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.			

Bridging the digital divide between communities is the one of the most important factor in reducing poverty through a livelihood framework. Telecenter is a physical space that provides public community based access to ICTs for educational, personal, social and economic development, under the rules and regulation of each the country because Government policies and political leadership will determine the success of such policies. The participation of the major international donor and aid agencies such as the United Nations Development Programme (UNDP) or the Canadian Government’s International research Development Centre (IDRC) can heavily influence Telecenter pilot projects and hence nation-wide roll-out

programmes. The intermediate outcomes of these case study is to provide an alternative to the model of one-to-one individual access to a computer that predominates in the developed world and finally reduce poverty.

### 5.1.7 Case study (7) ICT and environment

Case study	ICT and environment
	Using ICTs for Poverty Reduction and Environmental Protection in Kenya The “M-vironment” Approach
reference	<a href="http://www.iisd.org/pdf/2005/networks_dev_connection_kenya.pdf">www.iisd.org/pdf/2005/networks_dev_connection_kenya.pdf</a>
What the interesting	To addressing more significant consideration of environmental issues in the regional and national poverty reduction and ICT discussions in Kenya. Specifically, addressing poverty reduction as proposed in the MDGs and resolutions of the WSSD. Opportunities for quick gains for Kenya lie in e-environment and e-agriculture initiatives. An illustration of a potentially beneficial application of new technologies is found in mobile telephony. The author presents the “M-vironment Framework,” a mobile telephony platform which can help enable financial sustainability for environmental protection efforts; facilitate awareness-raising and exchange of information; strengthen early warning systems; raise environmental consciousness among ICT solutions providers; create employment; and protect livelihoods.
The approach	The implementation matrix mentions only one project, the

	<p>Lake Victoria Environmental Management Project (LVEMP), which is a program co-funded by the World Bank and the Global Environment Facility (GEF). According to the World Bank Group, LVEMP is a comprehensive program aimed at maximizing the benefits to communities living around the Lake Victoria basin by using resources within the basin to supply safe water and ensure a disease-free environment; conserving biodiversity and genetic resources; and integrating national and regional management programs to reverse—to the greatest extent possible—environmental degradation of Lake Victoria. The main concern for the lake is pollution and the encroachment by reduced lake wood (hyacinth). The project provides one of the cases linking the use of ICT for poverty reduction and environmental protection</p>
<p>result</p>	<p>The Lake Victoria Environmental Management Project (LVEMP) is a comprehensive program aimed at maximizing the benefits to communities living around the Lake Victoria basin by reversing the environmental degradation of the lake. The main concerns for the lake are pollution and the previously untamed encroachment by water hyacinth. Nyanza province, which is served by the lake, also has the highest incidence of poverty of the eight provinces in Kenya. The project uses ICTs in the form of geographical information systems (GIS) to create and update scientific and socio-economic baseline data on the current status of Lake</p>

	Victoria’s forest growth, land-use practices, pollution and water quality, among others. The government is thus able to make informed decisions on improvement of conditions in and around the lake.
lessons	Significant gain from this has been the 80 per cent reduction in water surface coverage of water hyacinth leading to resumption of fish exports to the European Union. Fish exports from Kenya to the EU had been banned under stringent pollution and processing standards of the European Commission. The ICT-enabled gain in income due to improved environmental protection has resulted in increased consciousness of the direct linkages between the information society and sustainable development. After learning more about the water hyacinth, many enterprising people around the lake have learned to earn a living from the infamous weed by drying it and making mats and baskets for sale. Similar initiatives would have significant benefits for other lakes and dams in Kenya if tax and other incentives were provided for in the ICT policy in order to encourage private sector and civil society to supplement government efforts.

National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable	Addressing more	geographical	

development.	significant consideration of environmental issues in the regional and national poverty reduction and ICT discussions in Kenya. Specifically, addressing poverty reduction as proposed in the MDGs and resolutions of the WSSD.	information systems (GIS)	
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The Lake Victoria Environmental Management Project (LVEMP) is a comprehensive program aimed at maximizing the benefits to communities living around the Lake Victoria basin by reversing the environmental degradation of the lake. The project uses ICTs in the form of geographical information systems (GIS) to create and update scientific and socio-economic baseline data on the current status of Lake Victoria’s forest growth, land-use practices, pollution and water quality, among others. The government is thus able to make informed decisions on improvement of conditions in and around the lake; with the sustainable development strategy and Addressing more significant consideration of environmental issues in the regional and national poverty reduction and ICT

discussions in Kenya. Specifically, addressing poverty reduction as proposed in the MDGs and resolutions of the WSSD as a rules and regulation for this case study, while the intermediate outcomes represent significant gain from this has been the 80 per cent reduction in water surface coverage of water hyacinth leading to resumption of fish exports to the European Union. Fish exports from Kenya to the EU had been banned under stringent pollution and processing standards of the European Commission. The ICT-enabled gain in income due to improved environmental protection has resulted in increased consciousness of the direct linkages between the information society and sustainable development. At the end The project provides one of the cases linking the use of ICT for poverty reduction and environmental protection

### 5.1.8 Case study (8) ICT and grazing

Case study	ICT and grazing
	LITS: tracking Botswana’s livestock using radio waves
reference	Tinus burger. (January 2004) LITS: tracking Botswana’s livestock using radio waves. Issue 15. AJ wageningen: CTA technical center for a agricultural and rural cooperation <a href="http://ictupdate.cta.int/Feature-Articles/LITS-tracking-Botswana-s-livestock-using-radio-waves/%2874%29/1073393271">http://ictupdate.cta.int/Feature-Articles/LITS-tracking-Botswana-s-livestock-using-radio-waves/%2874%29/1073393271</a>
What the interesting	Over the last decade the growing global demand for livestock products has given rise to a real ‘livestock revolution’. In many developing countries the livestock



	<p>industry is expanding faster than any other agricultural sector. In order to address the environmental, health and economic challenges posed by this revolution, governments, NGOs and individual farmers need both comprehensive, up-to-date information resources and clearly defined policies and regulations agreed upon by the international community.</p>
The approach	<p>ICTs are potentially important tools for improving livestock management, and protecting environmental resources such as grazing land and water supplies. The Livestock Identification Trace-back System (LITS) project in Botswana, which has installed radio frequency identification (RFID) technology to identify and monitor millions of beef cattle destined for export to Europe. Focusing on an equally valuable approach in the Pacific region</p>
result	<p>The Livestock Identification Trace-back System (LITS), which aims to ensure that cattle in Botswana can be individually identified and traced throughout their lives. The system has been introduced to enable Botswana to comply with new regulatory procedures required by the European Union, which accounts for 80 to 90% of Botswana's beef exports. The regulations, imposed following the outbreaks of foot and mouth disease in Europe, stipulate that all imports of deboned beef must</p>

	<p>be traceable from the packing plant back to the individual animals and farms in the country of origin. For this, exporting countries must set up and maintain a database on the production, distribution, processing and sale of meat products.</p> <p>LITS employs radio frequency identification (RFID) technology to capture data on individual cattle, which is transmitted directly, error-free, to a central database. The database enables Botswana’s meat export agency to obtain EU certification for its beef exports, and is a key repository of information for livestock farmers, as well as for state veterinary services and health authorities.</p>
<p>lessons</p>	<p>LITS has encouraged everyone involved in livestock management to be more thorough and to be creative in finding new ways of working and monitoring performance. Veterinary officers, for example, can now:</p> <ul style="list-style-type: none"> <li>• rapidly isolate animals for treatment, and update health records at the point of treatment;</li> <li>• track weight gain in selected animals;</li> <li>• correlate feeding programmes with yield;</li> <li>• select specific bulls for breeding programmes; and</li> <li>• track animal family trees.</li> </ul> <p>The LITS initiative has demonstrated the direct and immediate benefits that can be achieved through the application of established and emerging technologies. In Botswana the system is helping to ensure the long-term</p>

	security of its beef export market and offers an additional marketing edge, enabling the country to compete worldwide for new export orders. The same principles are now being used to assist sheep and ostrich farmers in South Africa.
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National strategy for development	Rules and regulation	ICT infrastructure	investment
Sustainable development.	encouraged livestock management and creative in finding new ways of working and monitoring performance	radio frequency identification (RFID) technology	

ICTs are potentially important tools for improving livestock management, and protecting environmental resources such as grazing land and water supplies. The Livestock Identification Trace-back System (LITS) project in Botswana, which has installed radio frequency identification (RFID) technology as an ICT infrastructure to identify and monitor millions of beef cattle destined for export to Europe. The livelihood framework applied to this case study through the five steps, where the RFID technology represents the assets, while the intermediate outcome is to capture data on individual cattle, which is transmitted directly, error-free, to a central database. The database enables Botswana’s meat export agency to obtain EU certification for its beef exports, and is a key repository of information for

livestock farmers, as well as for state veterinary services and health authorities. Also the final outcome is to reduce poverty because The LITS initiative has demonstrated the direct benefits that can be achieved through technologies. In Botswana the system is helping to ensure the long-term security of its beef export market and offers an additional marketing edge, enabling the country to compete worldwide for new export orders.

# **CHAPTER 6**

## **Conclusion and Recommendation for Future Work**

### **6.1 Conclusion**

The main idea of this framework have been the ability to reach out to the poor and improve the lives of the majority of them, because of that there is a need for appropriate strategy to reduce poverty by increased the interaction between the ICT and the national strategy for development.

Although the proposed framework provide for the poverty reduction to show a clear guidelines on the approach that may used in implement of the policy among policy makers, also the government should work with all stakeholders to ensure that the investment in this areas will benefit the society and country especially the poor people.

The case studies will illustrate the role of ICT in the poverty reduction in the selected areas because ICT are becoming a tool for poverty reduction and providing a poor with new working opportunities enabling them to meet their needs and helping them in acquire knowledge, also the use of ICT is not a luxury any more but it insufficient for the development in all sectors. Different technologies from radio, mobile, and computer to internet have different contribution to make poverty reduction, and innovative approaches. Also the government should create and enable environment to address the needs of the poor because the market alone will not bring ICT to the poor also support is needed at all levels, from policymakers to create an enabling environment, to donors' assistance focusing on poverty reduction efforts, and civil society organizations taking up the challenge of using ICTs for poverty reduction. Similarly, research

and evaluations are needed at all stages to understand what works and what does not.

## **6.2 Recommendation for Future Work**

Finally still, there are gaps in our knowledge and understanding of the causes, consequences and strategies to be pursued in poverty reduction the goal of this framework is to coordinate all the efforts from national strategy for development, investment and roles and regulation to built an ICT infrastructure that using to help in reducing poverty through the selected areas.

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