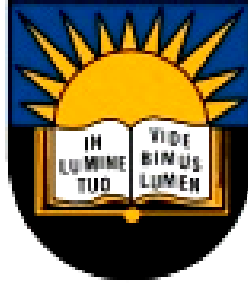


**A FRAMEWORK FOR
IMPLEMENTATION OF ICT4D
INITIATIVES IN THE EASTERN
CAPE PROVINCE OF SOUTH
AFRICA**

BY

GCOTYELWA PHINGILILI



University of Fort Hare
Together in Excellence

**A FRAMEWORK FOR IMPLEMENTATION OF ICT4D INITIATIVES IN
THE EASTERN CAPE PROVINCE OF SOUTH AFRICA**

By

Gcotyelwa Phingilili

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Abstract

South Africa's rural communities have received Information and Communication Technologies services through initiatives such as tele-centres, living labs, Thusong service centres and donations of computer applications. There is need, with little plans in place to ensure that the rural communities will benefit from those initiatives. As a result of this, it is necessary to establish a framework for implementing Information and Communication Technologies for development initiatives in order to ensure successful implementation of these initiatives in rural communities. Literature shows that in order to successfully implement an ICT initiative for rural communities, there should be active engagement with ICT stakeholders, consultation of Information and Communication Technologies policies, presence of ICT infrastructure, ICT services, monitoring, evaluating, training and maintenance. Current literature on ICT developments shows that in order to successfully implement an ICT initiative for rural communities, there should be active engagement with ICT stakeholders, consultation of ICT policies, and presence of ICT infrastructure, ICT services, monitoring, evaluating, training and maintenance. Unstructured interviews were used as a research method to collect primary data that was used as a basis to develop the proposed framework. Findings from the studies carried out indicated that several ICT4D initiatives which were abandoned due to challenges such lack of proper resources, trainings, lack of local content, access, lack of ownership and lack of stakeholders' involvement. This study presents a framework for implementing ICT for development initiatives in rural communities which has been developed in order to reduce the number of initiatives that are abandoned or which end up not serving their intended purpose in rural communities of South Africa.

Keywords: *Information and Communication Technologies, ICT4D, development, rural community, implementation, ICT initiatives*

Publications related to the work reported in this dissertation

Phingilili, G and Wayi, N. 2013. *A framework for implementation of ICT4D initiatives in South Africa*, ICEE-ICIT 2013 Conference, 08-12 December, CPUT, Cape Town, South Africa

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Lastly, I would like to thank my husband, Bonga Gwiliza, and our daughter, Kazimla Gwiliza, for being supportive to me in times when I had to be an absent mother/wife.

You are all winners in my book.

Declaration

I, Gcotyelwa Phingilili hereby declare that:

- The work in this dissertation is my own work.
- All sources used have been recorded and recognised.
- This dissertation has not been previously submitted in full or partial fulfilment of the requirements for an equivalent qualification at any other recognised educational institution.

Gcotyelwa Phingilili

Table of Contents

Abstract.....	i
Publications related to the work reported in this dissertation	ii
Table of Contents	v
1.0. Background	1
1.2 Statement of the problem	2
1.3 Research question:	3
1.3.1 Sub-Questions:.....	3
1.4. Significance of the study.....	4
1.5. Theoretical Background.....	5
a) Modernisation Theory.....	5
b) Rational choice theory	5
c) Actor Network theory	6
1.6. Research Methodology	6
1.6.1 Research Philosophy.....	7
1.6.2 Research Approach	8
1.6.3 Research Strategy.....	8
1.6.4 Data Collection	9
1.6.5 Data analysis	9
1.6.6 Framework validation	10
1.6.7 Delimitation of the study	10
1.7. Ethical considerations.....	11
1.8. Outline of proposed chapters	11
CHAPTER 2: SIGNIFICANCE OF RURAL DEVELOPMENT TOWARDS IMPROVED LIVING STANDARDS.....	12
2.0. Background	13
2.1. Defining rural community.....	14
2.2. Challenges hindering rural development towards improved living standards in South Africa.....	14
2.2.1 Education challenges in rural communities	15
2.2.2 Economic challenges in rural communities	15
2.2.3 ICTs Infrastructure challenges in rural communities.....	16

2.2.4 Health challenges in rural communities	16
2.2.5 Agriculture challenges in rural communities	16
2.3. Development defined	17
2.3.1 Theories of Development	18
2.3.2 Drivers of Development	20
2.3.3 Measuring Development	21
2.4. Conclusion	25
CHAPTER 3: CONTRIBUTION OF ICTs IN DEVELOPMENT OF RURAL COMMUNITIES IN SOUTH AFRICA.....	26
3.0. Background	27
3.1. History of ICTs for development	27
3.2. ICTs in Developed Countries.....	29
3.3. Overview of ICTs initiatives in developed countries.....	30
3.3.1 Internet	30
3.3.2 Mobile telephony	30
3.3.3 E-commerce	31
3.4. ICTs for Development in developing countries.....	31
3.5 Benefits of using ICTs in rural communities	32
3.5.1 Social benefits of using ICTs for rural development	32
3.5.2 Easy access to communication technologies through mobile phones.....	33
3.5.3 Economic benefits of using ICTs for rural development	34
3.5.4 Political benefits of using ICTs for rural development	34
3.6 Challenges hindering implementation of ICT4D initiatives in rural communities	35
3.7 Conclusion	37
Chapter 4: FACTORS CONSIDERED FOR SUCCESSFUL IMPLEMENTATION OF ICT4D INITIATIVES IN RURAL COMMUNITIES	38
4.0 Background	39
4.1 Aspects of ICT4D implementation	39
4.2 Management Structures	40
4.3 ICT4D initiatives in Republic of South Africa	41
4.3.1 Thusong service centres	41
4.3.2 Telecentres	42

4.3.3 Living Labs	42
4.4 Initiatives for addressing specific rural community needs.....	44
4.4.1 ICTs initiatives for addressing health in rural communities in South Africa.....	44
4.5 Stakeholder's Initiatives to Support ICTs for Rural Development in South Africa	51
4.6 Government role to support ICTs initiatives for rural development in South Africa	51
CHAPTER 5: RESEARCH METHODOLOGY	54
5.0 Introduction.....	55
5.1 Research Philosophy	56
5.1.1 Positivist Philosophy.....	57
5.1.2 Interpretive Philosophy	57
5.1.3 Critical Philosophy.....	57
5.2 Research Approach	58
5.3 Research Strategy.....	59
5.3.1 Procedure for conducting case study research	59
5.4 Sampling and population selection process	60
5.5 Data Collection	61
5.6 Data analysis	63
5.6.1 Data analysis activities.....	64
5.6.2 Comparative case study analysis.....	64
5.7 Conclusion	65
CHAPTER 6: EMPIRICAL ANALYSIS AND DISCUSSION.....	66
6.0 Introduction.....	67
6.1 Data presentation: Selected cases	69
6.1.1 Case of Milton Mbekela Senior Secondary School	69
6.1.2 Case of Mpheko Dumrana Tele-centre	73
6.1.3 Case of Qunu Integrated Energy Centre	78
6.1.4 Case of Viedgiesville Telecentre	83
6.2 Comparative analysis of all the cases using the four moments of ANT	85
6.2.1 Presenting problematization for the four cases in this study.....	85
6.2.2 Interesement	89
6.2.3 Enrolment moment.....	90
6.2.4 Mobilization moment.....	92

6.3 Discussion and concluding remarks.....	92
6.4 Evaluation of the Theories used in this study	93
6.4.1 Rational choice theory	93
6.4.2 Modernisation theory	94
6.4.3 Actor network theory for analysis purposes.....	94
6.5 Conclusion	95
CHAPTER 7: FRAMEWORK FOR IMPLEMENTING ICT4D INITIATIVES IN RURAL COMMUNITIES	96
7.0 Introduction.....	97
7.1. Factors to consider when implementing ICT4D initiatives in rural communities	97
7.2. Components of the proposed ICT4D framework.....	98
7.3 The proposed ICT4D implementation framework.....	100
7.3.1 ICT4D Stakeholders.....	102
7.3.2 Identify rural community needs	104
7.3.3 Identify project goals	104
7.3.4 Execute pre-implementation processes	104
7.3.5 Conduct actual implementation Activities	106
7.3.6 Assess operations, support and security.....	107
7.3.7 Assess project impact.....	108
7.4 Conclusion	108
CHAPTER 8: CONCLUSION.....	109
8.0 Introduction.....	110
8.1 Theoretical Framework.....	110
8.2 Summary of Research Findings	111
8.2.1 Research question:	111
8.2.2 Sub-Questions:	111
8.3 Contribution made by this study	113
8.4 Limitations of the Study.....	114
8.5 Directions for future research	114
8.6 Evaluation of the Research Project	114
8.7 Conclusion	115
9.0 REFERENCES	117

Appendices

Appendix A: Research interview questions and responses

Appendix B: Interview Design

Appendix C: List of Acronyms

Appendix D: Consent Form

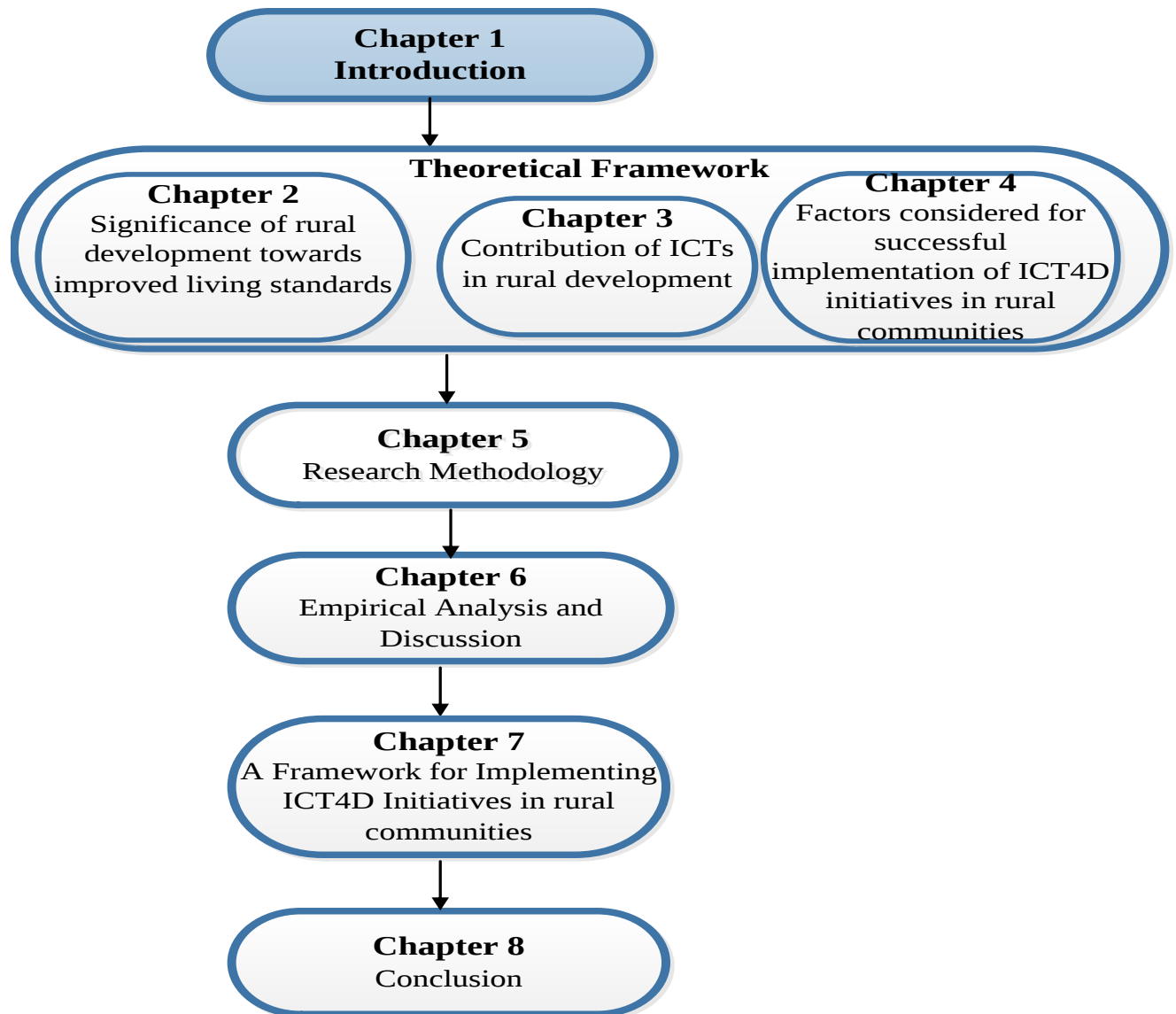
List of Figures

Figure 1.1: The Research ‘Onion’	7
Figure 5.2: Research Design Summary.....	55
Figure 5.3: Philosophical perspective	56
Figure 5.4: Sampling Techniques	60
Figure 5. 5: Map of Eastern Cape Province	63
Figure 7.6: Issues to be considered when implementing ICT4D initiatives in rural.....	99
Figure7.7: Proposed framework for implementing ICT4D initiatives in rural communities.....	101
Figure7.8: Steps for conducting stakeholders' analysis	103

List of Tables

Table 1: The relevance and impact of ICTs to the MDGs	24
Table 2: History of Computer / Technology Trends.....	28
Table 3: Issues in ICTs for development	36
Table 4: Data collection methods	62
Table 5: Research Interview Questions and Answers.....	134
Table 6: Summary of categories of interview questions for community members	68
Table 6: Summary of categories of interview questions for centre managers.....	68
Table 8: Actors and their roles in Milton Mbekela Senior Secondary School.....	87
Table 9: Actors and their roles in Mpeko-Dumrana Telecentre.....	87
Table 10: Actors and their roles in Qunu Integrated Energy Centre.....	88

CHAPTER 1: INTRODUCTION



1.0. Background

Information and Communication Technologies (ICTs) have emerged as an integral part of the technological revolution for rural development and have a remarkable significance for facilitating and accelerating the process of socio-economic development. In the recent years, ICTs also play a role in enhancing communication and information exchange between the government and the rural communities (Chapman & Slaymaker, 2002). Heeks (1999) defines ICTs as an electronic means of capturing, processing, storing and communicating information. These initiatives are said to bring a positive impact to the process of public service delivery and socio-economic structures in rural communities, and thereby overcome the knowledge gaps and information problems (Kelles-Viitanen, 2005).

Many countries have spent considerable amounts of money per year on the implementation of various ICTs for development initiatives in rural communities, commonly known as Information and Communication Technologies for Development (ICT4D). However, this explosive growth in the implementation and use of ICTs for development in rural communities has been met with many obstacles such as access to affordable services and infrastructure (Nethersole, 2013). Other obstacles include new legal and ethical challenges between individual rights and societal needs, invasion of individual and corporate privacy, intellectual property rights, individual and societal rights, as well as accountability for the consequences that emanate from the adoption and use of ICTs for development in rural communities (Edewor, 2011).

There is, thus, a need for a framework to ensure effective implementing Information and Communication Technology for Development (ICT4D) initiatives in rural communities in order to cater for the challenges that stem from their implementation. For this reason, this study proposes to establish a framework to be considered when implementing ICTs for development initiatives in rural communities. Examples from existing ICTs for development initiatives were used to assist in the effective establishment of other initiatives so that these ICTs for development can yield an effective outcome for the rural communities.

This study looks at the establishment and operations within four case studies in the Eastern Cape with the objective of evaluating the extent to which the community benefits from the implemented projects, in accordance with its original objectives. The main focus of this study is

on implementation and social challenges associated with implementing information systems successfully in rural communities. The statement outlining the problem for this study is presented in the next section.

1.2 Statement of the problem

A number of ICT for development initiatives have been implemented in various rural communities, but there is still insufficient evidence of their role in supporting rural development. Lack of community participation, absence of an integrated approach and non-inclusion of traditional knowledge systems in the project designs constitute some of the reasons contributing to failure of these initiatives (Khodamoradi & Abedi, 2011).

The problem addressed by this study is that in many cases ICTs in rural communities are not implemented successfully and therefore they end up not serving the purpose for which they were intended. To support this statement, Ruxwana, Herselman, & Conradie (2010) mentioned that failure of some e-health projects in rural communities was due to issues concerning quality assurance, limited user participation and lack of information about initiatives. These were said to have a negative impact on the success of e-health projects. Furthermore this statement was supported by means of a pilot study that was conducted by the researcher in Milton Mbekela Senior Secondary School (which is a case in this study), revealed a number of computers that were donated to this community for socio-economic development. The students from this school could not use these computers to their full potential as most of them were broken, they also unable to conduct their school research and other computer related activities due to unavailability of Internet connection.

Accessibility to these computers was not possible for the general rural community, and it was difficult for students to have full access to the resources as it was locked in a room for security purposes. This also made it difficult for the students to have access over the weekends and they were forced to use the computers from the library in the nearest town. This later resulted in the school computer laboratory being closed down. To show that the community is still interested in this project one community member was quoted saying: *“We can be very happy if the service provider can increase the number of computers, refurbish the lab, train people from the rural community who will be used to train the community”*.

This study investigated the stated problem in order to provide answers to the following questions:

1.3 Research question:

The main research question addressed in this study is:

How can ICT for development initiatives in rural communities be successfully implemented?

In order to address this research question, the following sub- questions have been constructed:

1.3.1 Sub-Questions:

(a) What is the significance of rural development towards improved living standards?

The purpose of this sub-question is to provide an understanding on the rural community context and challenges that affect rural development towards improved lives. It also creates an understanding of the development context by defining development, providing theories supporting development, outlining drivers of development and explains how development is measured. All this information is important for ICT4D initiators to know as it assists them to get a broader view of what is entailed by rural development.

(b) How do Information and Communication Technologies contribute to development in rural communities?

This sub-question is to identify how ICTs can contribute to rural development by highlighting an overview of ICTs which are used in developed countries comparing them with how ICTs are used in developing countries. This will assist in benchmarking the best practices for ICT4D initiatives from the privileged countries and try to tailor these ICTs to suit the rural context. As a way to motivate the use and adoption of ICT4D initiatives this sub-question highlighted the benefits that can be reaped by rural communities through the use of ICTs. Even though the benefits of using ICTs in rural communities have been highlighted there was also a need to outline ICT4D implementation challenges that are experienced by rural communities when using

the ICTs. The aim of this was to assist in making such challenges known to ICT4D initiators before embarking on projects for ICT development initiatives in rural areas, in order to generate or create successful implementation plans that will overcome these challenges. Hence this study proposed to develop a framework for implementation of ICT4D in rural communities.

(c) What factors must be considered for successful implementation of ICT4D in rural communities?

This question determined some factors to consider towards in order ensuring successful implementation of ICTs for development in rural communities. The discovered factors lay grounds in developing the proposed framework. Discussed next is the significance of the study.

1.4. Significance of the study

People in rural communities face enormous challenges with regard to access and use of ICTs for their own economic development. Some of these challenges include learning, training, affordable access to the technology, information relevant to the rural communities. Therefore a considerable amount of support is needed to create enabling environments. Implementation of ICTs for development initiatives in rural communities involves many stakeholders, such as the project initiators, the developers, the funders, and the beneficiaries (i.e. rural communities). Successful implementation of these ICTs for development initiatives depends on the interaction between these stakeholders.

ICT deployment has received a remarkable attention from a number of people, but lacks plan to measure if the community can reap from those initiatives. Therefore, there is a need to establish a framework ensuring effective implementation of ICT4D.

This in turn will contribute to a possible reduction in the number of ICTs for development initiatives that are abandoned or which end up not serving their intended purpose in rural communities. The findings of this study also contribute to the existing body of knowledge on the implementation in ensuring effective implementation of ICT4D initiatives in rural communities. Literature review is discussed in the following section.

1.5. Theoretical Background

This study made reference to three theories which are Modernisation theory, Rational theory and Actor Network Theory (ANT) as they were found to be appropriate theories for this study. Actor Network theory was used for analysis purposes. Modernisation theory is discussed next.

a) Modernisation Theory

Modernisation theory is defined as a description and explanation of processes of transformation from underdeveloped societies to modern societies (Armer and Katsillis 2001). According to Armer and Katsillis (2001) modernisation advance conditions conducive to democracy, and in turn results in positive change in people's lives. Therefore this theory is of the notion that economic development brings expected changes in the society which can be reversed when there is a severe economic collapse. Economic and technical development result in a set of political and social changes and these are said to be central to modernisation (Inglehart & Welzel, 2009).

b) Rational choice theory

Rational choice theory is an approach used to understand human behaviour particularly in an economic context, which generally considers how the individual's decision making choices interact to produce outcomes. This theory is based on the fundamental premises that the choices made by people are the choices that best help them to achieve their objectives, given all relative factors (Green, 2002). In this theory individuals are seen as motivated by the wants or goals that express their preferences. Therefore rational individuals choose the alternative that is likely to give them the greatest satisfaction, and also the rational choice theorists see social interaction as a process of social exchange (Scott, 2007).

These two theories are believed to be the building blocks for the proposed framework as modernisation theory highlights that economic development brings predictable changes in the society, and rational choice theory highlights that human development encompasses enlarging people's choices, such as to live a long and healthy life, to be educated and to have access to resources needed for a decent standard of living (Jolly, Emmerij, & Weiss, 2009). Following this discussion is a discussion on Actor Network Theory.

c) Actor Network theory

This study made reference to Actor Network Theory (ANT) as it was found to be an appropriate theory for this study for analysis purposes. Hanseth, Annestad, and Berg (2004) highlighted that this theory aims at studying things that are normally taken for granted, such as how relations between objects, people and concepts are formed. According to LaTour, Callon, and Law (2005), the primary opinion of the ANT is the concept of a heterogeneous network, which is a network with various elements. Therefore, ANT attempts to describe the relationship between society and technology comprising of several groups, such that it focuses on the infrastructure of actor-networks, how they are formed, and how they can fall apart (LaTour, Callon, & Law, 2005).

This theory is based on the notion that any actor is equally important to the social network. Therefore as long as there is a smooth running of an actor network, there will be societal order. This order can only break when actors have been removed from the network. When the actors' interests are not aligned and when network procedures defined by the ICT4D initiative are unknown to local people, the network cannot be established. For this reason it is important to align the different goals of the actors in the implementation of ICTs as they would engage in different ways (Andrade & Urquhart, 2010). This can be achieved by first understanding the implementation of ICTs, which will be covered in this study.

The next section addresses the research methodology employed in this study in order to address the research questions.

1.6. Research Methodology

The researcher applied the research method depicted in the onion model below:

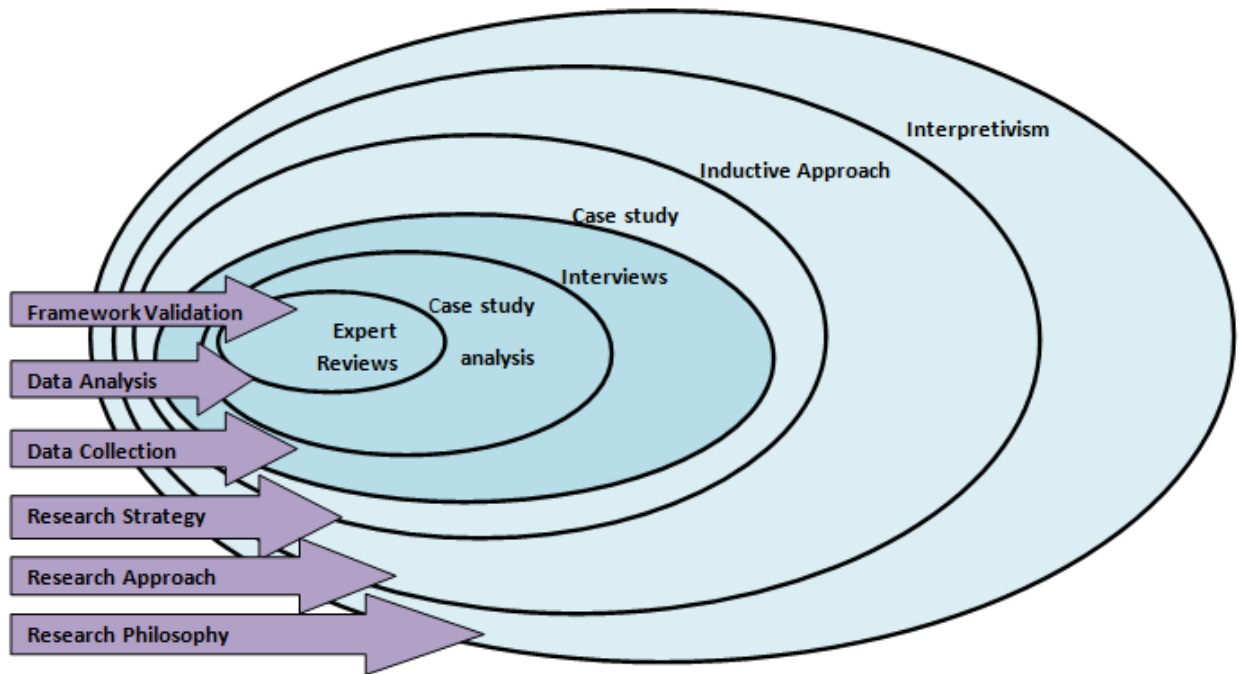


Figure 1.1: The Research ‘Onion’ adapted from Saunders, Lewis, and Thornhill (2007)

The layers of this onion are represented as follows, starting from the outer layer: research philosophy, research approach, research strategy, data collection methods and data analysis. These are further described in detail as follows:

1.6.1 Research Philosophy

This study is interpretive in nature as it is about understanding social human behaviour within the ICT for development in the rural community context. According to Flowers (2009), the social world individuals or groups make sense of situations based on their individual experience. Therefore, meaning is constructed over time and there can be different interpretations.

The purpose of an interpretive study is to find meaning and concepts in the chosen field and interpretation of social actors and to understand the world from the actors’ point of view. According to Walshman (1993) in Ashraf, Swatman, and Hanisch (2008), an interpretive study allows the researcher to become immersed in the community in order to gain a rich understanding of the influences of ICTs for development interventions in rural communities. Meaningful conclusions were drawn as the researcher became immersed within communities of the mentioned cases in this study. This assisted the researcher to gain rich understanding of the

situation and to obtain views and feelings from the people involved about the ICT for development initiatives.

In addressing the research questions in this study, the research approach is discussed in detail in the detail in the next section.

1.6.2 Research Approach

There are two main research approaches that an empirical study can use; qualitative and quantitative. A qualitative research approach is associated more with the interpretive paradigm as well as subjectivity of the concept whereas a quantitative approach emphasizes relatively large scale representative sets of data that are analysed numerically and are associated with objectivity (Hughes, 2006). This research was conducted inductively using a qualitative research approach, as it was seen to be the most appropriate approach. A qualitative approach explores natural settings and its interest is in finding meanings, perspectives, understanding and interpretations of real situations (Hanock, 1998). As mentioned by Hughes (2006), a qualitative research approach is more associated with the interpretive paradigm as well as subjectivity of the concept.

Having selected the research approach, the next section discusses the research strategy for this study as a way to assist in providing answers to the research questions.

1.6.3 Research Strategy

A research strategy is a plan that helps to ensure that resources are adequate and available to complete the study, in order to achieve the study's objective (Ferguson, 2005). There are many research strategies that a study can follow in achieving its objectives; these include: experimentations, survey methods, archival analysis, histories or case studies.

This study adopted a case study as an appropriate research strategy. Yin (2013) defines a case study as a flexible research strategy that allows a researcher to retain holistic characteristics of real-time events where multiple variables exist while investigating empirical events in their natural setting. Yin (2013) further mentions that a case study can either be a single case or a multiple case. A single case involves collection and analysis of data from a single unit; multiple case studies allow collection and analysis of large information from different sources. The type of case study suitable for this study was an exploratory multiple case study, which dealt with

how relationships between objects, people and concepts were formed (Cordella & Shaikh, 2006)..

Therefore, the researcher conducted an exploratory multiple case study of four ICT4D projects which are situated in the Eastern Cape which include: Viedgiesville Tele-centre in Umthatha, Milton Mbekela Senior Secondary School in Qunu, Mpheko Dumrana Tele-centre in Umthatha, and Qunu Integrated Energy Centre in Qunu. The next section discusses data collection for this study.

1.6.4 Data Collection

Data collection is an important aspect of any research. It is the process of collecting and recording data in order to support or oppose the research area, as well as to gain in-depth information on the subject matter (Bartlett, Karlik, & Higgins, 2001). This study used interviews as a means of collecting its primary data. Interviews are the most commonly used research methods for generating data in a qualitative research as they aim at providing in-depth information that is not quantifiable about a specific subject matter (King & Horrocks, 2010). Interviews in this study were unstructured as their aim was to obtain an in-depth view of the person being interviewed; they were used to explore a specific topic where there was no structure or expectation in the way the interview were conducted (Cohen & Gabtree, 2006).

As the services from the initiatives were not used by every community member, purposive sampling was used as it is the acceptable technique in drawing conclusions about populations when the researcher is studying a particular group based on intent (Bartlett, Karlik, & Higgins, 2001). This sample included project initiators and the people who were involved in project development and implementation, as well as rural community members who had gained basic computer literacy training and use of the services from the initiatives. Data analysis is discussed next.

1.6.5 Data analysis

Data analysis is a systematic process of analysing and breaking the collected data into manageable patterns, with the intention of searching for explanation and relationships in order to understand concepts or variables and theories in a specific area of interest. This could involve

data coding, editing, classification and tabulation of collected data (Blaxter, Hughes, & Tight, 2006). Actor Network Theory was chosen as a methodological stance to be used in analysing data obtained from this study, as it had characteristics of notions for translation, generalized symmetry and heterogeneous network. Actor Network Theory is an analytical tool that provides theoretical and methodological underpinning for the study of dynamic interactions between science, technology and humans (Cordella & Shaikh, 2006).

Actor Network Theory helps in exploring how relations between objects, people and concepts are formed; however, it does not explain why the existing relations between actors are formed (LaTour, Callon, & Law, 2005). Therefore, Actor Network Theory was used as a means to explore the situation of Milton Mbekela Senior Secondary School, Mpheko Dumrana Tele-centre, Viedgiesville Tele-centre and Qunu Integrated Energy Centre; with the intention of extracting and analysing patterns that will provide explanation, translations and answers to the research questions presented in this study.

Responses from the project initiators, and the people involved in the project development and implementation were analysed. Findings from the analysis influenced the objective of this study, which was to establish the framework for successful implementation of ICTs for development initiatives in rural communities. The next section explains the process of validating framework that has proposed by this study.

1.6.6 Framework validation

In order to ensure the validity of the framework developed in this study, the researcher sent the outcome of this research to experts in the field of Information Systems and policies in order to validate the framework and to ensure its reliability. This study had some delimitation as described in the next section.

1.6.7 Delimitation of the study

This study focused on the implementation of ICTs for development initiatives in rural communities within the Eastern Cape Region of South Africa and only for the four mentioned cases in this study. It did not consider any non ICTs initiatives. Ethical considerations are highlighted in the following section.

1.7. Ethical considerations

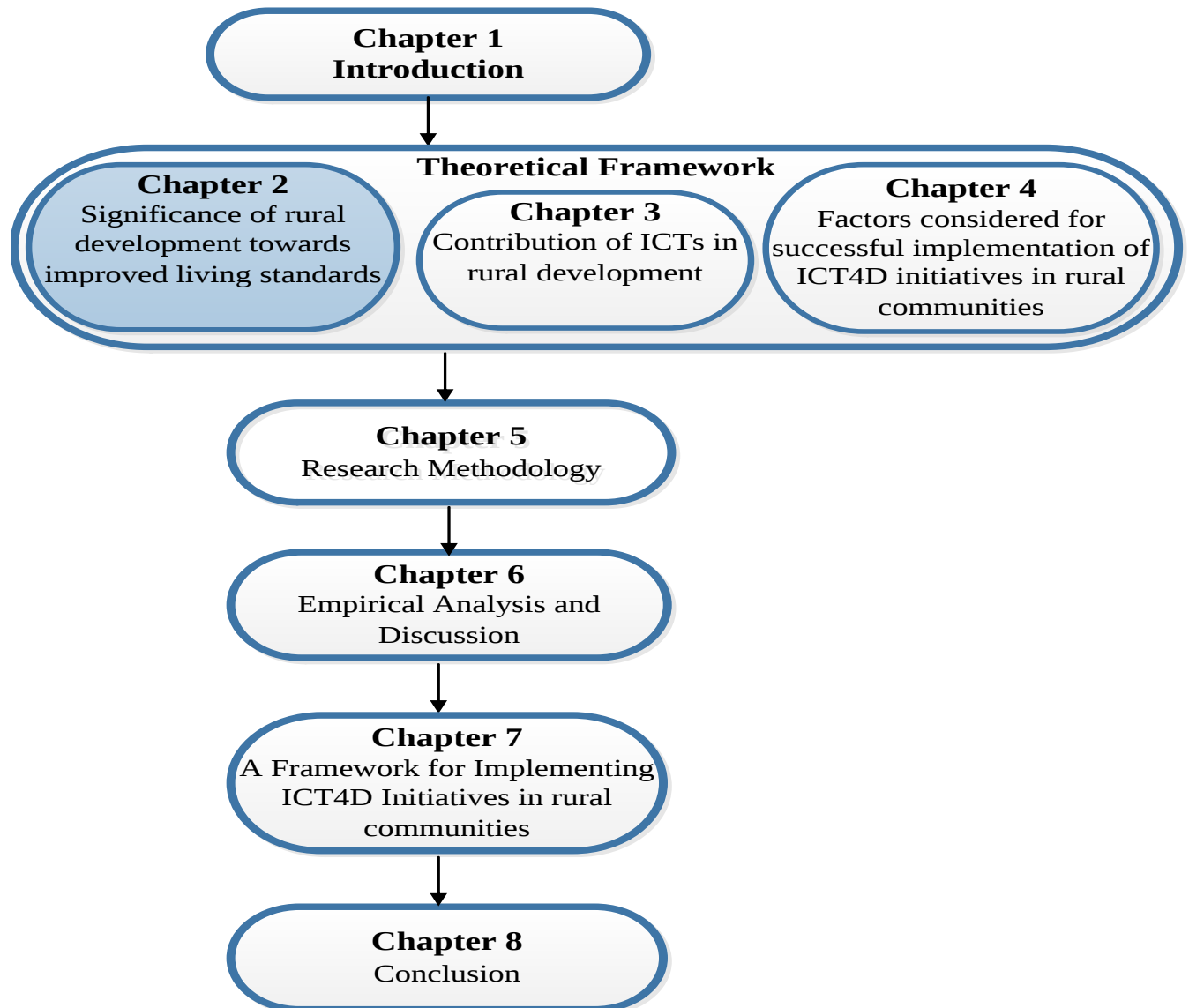
The researcher obtained an ethical clearance from the Faculty of Management and Commerce. The researcher also asked the interviewees to sign a consent form containing information about the study and its purpose. This research was conducted in an honest manner when reporting on data and public status. No data was falsified or misrepresented and no one was deceived during this research. The research was done in an objective manner to avoid biases in data interpretations, integrity was maintained throughout the research process, and care will be applied when dealing with people's data. This research is open to any criticism and any new ideas that may arise. The researcher protected any confidential communications between the participants. The following section presents the outline of chapters proposed for this study.

1.8. Outline of proposed chapters

Chapter 1 of this study provided the research background and the research problem. Chapter 2 highlights significance of rural development towards improved living standards initiatives in rural communities, by first discussing the rural community context, outlining the challenges affecting the development of South African rural communities, explaining meaning of development and theories explaining the development concepts, drivers of development as well as how to measure development. Chapter 3 outlines the contribution of ICTs in rural communities where the discussion included: a brief history on ICTs, overview of ICTs initiatives used in developed and developing countries, benefits of ICTs in rural communities as well as challenges facing the implementation of ICTs in rural communities. Chapter 4 discusses the implementation factors that need to be considered for the success of ICTs in rural communities. These factors will be used to develop the framework proposed by this study. Chapter 5 provides the research methodology employed in this study.

Chapter 6 produces empirical discussion on the data collected which assisted as evidence for the need to develop the proposed ICT4D implementation framework. Chapter 7 of this study presents the proposed framework for implementing ICT4D initiatives in rural communities. Chapter 8 concludes on the entire study and makes recommendations for further research.

CHAPTER 2: SIGNIFICANCE OF RURAL DEVELOPMENT TOWARDS IMPROVED LIVING STANDARDS



2.0. Background

The focus of this chapter is on providing background understanding of development, ICTs and the link between development and ICTs within the rural communities' context. ICT for rural development context and theories from literature review perspective will be presented with the aim to describe, summarize, evaluate and clarify the research. The main purpose of this chapter is to construct an understanding of what is meant by 'development' and what it entails, and also identify and explain challenges faced by rural communities hindering the success of ICT4D initiatives aimed at developing rural communities. This will help towards the development of the proposed framework.

The following premises were used as means to construct a theoretical basis for this research study, outline gaps in previous literature and construct a solid theoretical stance that informed the research problems addressed in this study:

- As highlighted by Hofstee (2006), a theory gives a logical explanation of why something happens as it does. Therefore, this chapter will define development and explain what is really involved in development. There is quite an influence leading to the development and implementation of ICTs initiatives in rural communities, but still insufficient evidence of their role in supporting rural development (Kiptalam & Rodrigues, 2010).
- ICT4D initiatives in rural communities are faced with a problem of poorly implemented ICTs that lead to challenges contributing to the ineffectiveness of ICTs. As a result, a number of these initiatives end up not serving their purpose in rural communities (Hennessy, et al., 2010 and Chapman and Slayman 2002 in Glendenning & Ficarelli, 2012).
- ICTs requirements in rural areas are usually prematurely assessed leading to the service providers dumping the ICTs without the proper plan to deploy and manage these resources (Kiptalam & Rodrigues, 2010).

To better understand the significance of rural development, the researcher saw it important to first give a background on the rural community context, which is discussed next.

2.1. Defining rural community

It is hard to define the meaning of rural community as this concept has attracted a number of definitions and interpretations; and also depending on whether a country is a developed or developing country. As this research was conducted within South Africa (which is a developing country), the rural community concept was defined based on the South African context. Firstly, in defining this concept with greater precision, the researcher defines the term ‘rural’ followed by the meaning of the term ‘community’.

Ashley and Maxwell (2001) in Adisa (2012) defines the term ‘rural’ as a constituting space where human settlement and infrastructure occupy small patches of landscape dominated by fields, pastures, woods, water mountains and deserts. Additionally to this definition, it has been recently highlighted that these areas experience lower income levels and fewer job opportunities (Tourism, 2012). Flora and Arnold (2012) recently defined the term ‘community’ as an interaction among individuals with a common identity for mutual support.

Kormanicki (2012) combines the terms ‘rural’ and ‘community’ together and describes rural community as a way of life for communities with limited transportation access, limited access to a commercial/service hub, and limited infrastructure. This author also pointed out that communities are the bedrock of human development as they ensure transmission of language. Additionally, economic base, culture values and practices, and social structure of rural communities are different for each community. Nowadays, rural communities are faced with challenges with respect to access to basic services within their communities as compared to people who reside in urban communities. These are discussed next.

2.2. Challenges hindering rural development towards improved living standards in South Africa

Rural communities in South Africa experience many gaps and challenges in accessing basic services. Some of these challenges are as a result of inconsistencies in funding levels meant for rural communities (Burgess, 2012). Highlighted below are some of the challenges faced by rural communities in different aspects of life, starting with education challenges.

2.2.1 Education challenges in rural communities

Rural communities are negatively affected by various factors that influence the delivery of quality education. Surty (2012) briefly identified three challenges that affect rural education as follows:

- **Socio-economic realities of rural communities** – socio-economic conditions have a role to play in producing quality educational outcomes. Rural communities lack necessary professional help and there are no government structures, books and learning material in place to support rural education.
- **Rural communities not attractive to teachers** – scarcity of resources to support teaching and learning in rural communities affect the teachers themselves. Therefore many good teachers do not find rural communities attractive and it is also not possible to retain teachers as they are faced with the challenge of finding suitable accommodation in rural communities.
- **Inappropriate teaching methods** – teaching methods used in rural communities are in many instances not suitable for their particular context.

The above mentioned challenges and absence of substantial improvements in learning outcomes compromise the future development in South African education. As a result, this sector is faced with high student dropout rates, uneven quality across the sector, as well as attracting and retaining black academics and managers (Study, 2010).

The next challenges to be discussed are the economic challenges.

2.2.2 Economic challenges in rural communities

According to Traore' (2008), rural communities have poor or no access to connectivity infrastructure as providers of Internet services are located in urban areas. These communities possess limited access to social and economic information. Moreover, there is slow penetration of ICTs in rural communities due to lack of proper application, non-use and integration of ICTs by rural people in their communities. Social and economic services are poorly delivered from public and private sectors to local institutions, and there is lack of access to business opportunities and information services.

Following the economic challenges is the discussion on the ICTs infrastructure challenges in rural communities.

2.2.3 ICTs Infrastructure challenges in rural communities

Infrastructure can be defined as basic structures and facilities necessary for the efficient functioning of a given area. Therefore, ICTs Infrastructure refers to a distributed technical framework which encompasses hidden protocols, networks and middleware in support of user and enterprise computing (Tshephe, 2005). Rural communities often lack good infrastructure as these are offered at a high cost resulting in implementation of unreliable infrastructure that exhibit problems associated with access to information needs and technological services (Gomez, Pather, & Dosono, 2012).

The following section looks at the health challenges in rural communities.

2.2.4 Health challenges in rural communities

Rural people have to travel long distances to access basic health care services, as the health care systems do not support care givers to deliver health care at homes. Local and public health programs do not provide information on relevant health care support to rural people. There is also lack of health care services that are particular to social, cultural and physical factors specific to rural communities (Gumbo, Jere, & Terzoli, 2012).

Among the challenges, Ruxwana, Herselman, and Conradie (2010) highlighted non-existence of uniform health care approaches that can enable the use of technology as another challenge that affects rural health care systems. These authors further mentioned lack of standardisation and integration between health information systems, which limits implementation of e-Health solutions. Lack of proper infrastructure and geographical distribution were also among the mentioned challenges as some of the hospitals were said to have little or no technological resources.

The next discussion is on the agriculture challenges in rural communities.

2.2.5 Agriculture challenges in rural communities

Agriculture plays a significant role in South Africa's economy, as about 70% of Africans and 80% of people who live in the rural communities depend on agriculture as their source of income. This clearly indicates that a greater part of rural communities are directly or indirectly

dependent on agricultural activities which include farming, food processing, forestry, fishing and trade (Nchuchuwe & Adejuwon, 2012).

Muhammed (2007) in Nchuchuwe and Adejuwon (2012) highlighted that even though agriculture forms the backbone of rural development and Africa's share in the world trade, this sector has been neglected. The author further mentions three critical reasons that led to abandoning agriculture and rural development which are: poor commitment and capacities in partner countries, international interest in rural issues and poor commitment and weak past performance in the bank. Another challenge that was pointed out by Kapugana, Lokanathan, and Perera (2011) is the market inefficiencies due to lack of appropriate knowledge amongst farmers. This causes inefficiencies in market and results in mismatch between supply and demand and makes it difficult for farmers to engage effectively in markets.

Having defined and identified what the rural community is and the challenges faced by these communities, it is imperative that the next section discusses development and its benefits in order to show the need to further develop the rural communities, so that they can also experience the benefits of using tailor made ICTs.

2.3. Development defined

The term 'development' is a contested concept and as such there are a number of definitions which include the following:

- Development is an event constituting a new stage in changing situation (Bellù, 2011).
- Development is good change to people's lives (Africa, 2011).
- Development means growth which allows people to make new better choices about their lives and the places in which they live (Clark, 2012).

From the three above mentioned definitions, Bellù (2011) and Africa (2011) agree on the same notion that development constitutes change. Bellù (2011) also highlighted a list of possible dimensions of development which include: economic development, human development, sustainable development and territorial development. To add more on this, the following authors defined these dimensions of development as follows:

- **Economic development:** is the improvement in the capacity to satisfy the demand for goods and services, resulting from increased production scale, and improved productivity (innovations in products and processes) over time (BIS, 2011).
- **Human development:** is a process of enlarging people's choices, such as to live a long and healthy life, to be educated and to have access to resources needed for a decent standard of living (Jolly, Emmerij, & Weiss, 2009).
- **Sustainable development:** is a continuous, guided process of economic, environmental and social change aimed at promoting wellbeing of citizens now and in the future (Macken, 2011).
- **Territorial development:** is the sum of social, cultural and economic approaches in any given territory (metropolitan, urban, rural, municipality and province) and outside market institutions that fuel its economic growth by admitting new concepts and ideas to improve its residents' quality of life (Stoquart & Schubert, 2011).

Common factors that were drawn from all the mentioned definitions of development and its dimensions were continuous change in a variety of human aspects and growth. These development dimensions variables (economic, social, political, legal and institutional structures, technology) can be better developed if there is some change in people's social welfare and growth in the economy (Jolly, Emmerij, & Weiss, 2009). The main objective of development planning is about human development and attaining higher standards of living for people, promotion of social cohesion and social integration (Mohan, 2012).

ICTs are believed to be tools to fast track development. For this reason, this research attempts to address ICTs as an initiative to support development within the rural community context. Hence this study is proposing a framework for the implementation of ICTs for development in rural communities with the aim to improve rural people's lives. To better clarify the concept of development, some theories that underpin development are outlined in the next section.

2.3.1 Theories of Development

The function of a theory is to allow people to understand and predict the behaviour of some aspects of the world. Therefore a theory is constructed to organise and interpret observations of the world and help to identify orderly relationships among many diverse events (Hales, 2009). This study introduces some theories that assisted in the interpretations around the concept of

development. As it has been argued earlier that development is a contested concept, this has resulted in a formulation of a number of theories that aim at making this concept more understandable, but the researcher has chosen to discuss two theories that they are directly linked to this research as they construct a clear link between development, desired change and transformation. These are briefly explained as follows:

a) Modernisation Theory

Armer and Katsillis (2001) define modernisation theory as a description and explanation of processes of transformation from underdeveloped societies to modern societies. According to Armer and Katsillis (2001) modernisation advances conditions conducive to democracy, and in turn results in positive change in people's lives. Therefore this theory is of the notion that economic development does bring predictable changes in the society which can be reversed when there is a severe economic collapse. The central idea of modernisation that has been emphasized is that economic and technical development result in a set of political and social changes (Inglehart & Welzel, 2009). Discussed next is the rationalisation theory.

b) Rational choice theory

Rational choice theory is an approach used to understand human behaviour particularly in an economic context, which generally considers how the individual's decision making choices interact to produce outcomes. This theory is based on the fundamental premises that the choices made by people are the choices that best help them to achieve their objectives, given all relative factors (Green, 2002). In this theory individuals are seen as motivated by the wants or goals that express their preferences. Therefore rational individuals choose the alternative that is likely to give them the greatest satisfaction, and also the rational choice theorists see social interaction as a process of social exchange (Scott, 2007).

The highlights on the above mentioned theories gave the researcher grounds to base the economic development discussion on this research. It has been pointed out that modernisation theory is of the notion that economic development does bring predictable changes in the society. The implementation of the ICT4D initiatives in rural communication is an effort by government and other development agencies to bring about economic development to the rural societies. In order to ensure that the rural communities benefit from these initiatives, there need to be a way to assist in their implementation, as their role seems to diminish. This is a reason enough to propose

a framework for the implementation of ICTs for development initiatives in rural communities. Furthermore, the relevance of rational choice theory in this study is on the fact that it directly links with human development which encompasses enlarging people's choices, such as to live a long and healthy life, to be educated and to have access to resources needed for a decent standard of living (Jolly, Emmerij, & Weiss, 2009).

On these grounds, the next section discusses and creates some basic understanding on drivers of development and how development should be measured and carried out.

2.3.2 Drivers of Development

Some developing countries are reshaping ideas about how to attain human development, and they have been successful in doing so through the use of notable drivers of development, which were recently reported by Clark (2013) as follows:

- **Proactive development state:** includes a range of different approaches that can be taken to support development whereby investing on people's capabilities through health, education and other public services is at the centre of those approaches. This also includes expansion of quality jobs which is said to be a critical feature of growth that promotes development.
- **Tapping of global markets:** Global markets play a vital role in advancing progress and growth. Success results from integration with the world economy followed by investing in people, institutions and infrastructure.
- **Determined social policy innovation:** These policies are there to ensure sectoral balance, especially in the rural sector. Therefore this will ensure that all citizens receive secure access to basic requirements of human development.

Clark's (2013) notions show that growth is a prerequisite for development and for development to occur there should be some innovative ideas that drive growth and productivity in all possible human development dimensions that were mentioned earlier on by Bellù (2011). These innovative ideas will yield fruitful results when a country cultivates the notable drivers of development that were mentioned by Clark (2013) and that will in turn improve people's lives.

Therefore developing countries can grow remarkably and be productive if they follow path of the developed countries. In order for a country to converge better, it has to invest in building

factories, buying equipment, improving education, health care and learning, as well as create environments where there is a free flow of technology and goods between countries (Fata's & Mihov, 2009). Lastly, there should be social policies in place to ensure distribution of equitable developmental requirements to all.

To ensure equitable distribution of these developmental requirements, there should ways to measure a country's level of development that determines evaluate a country's development state. Some of the evaluation measures will be discussed at depth in the next section.

2.3.3 Measuring Development

The reality is that people are the real wealth of nations, but this truth is sometimes forgotten as development is mostly equated to material wealth (Adewole, 2011). Economic development occurs when there is an equitable distribution of development benefits and opportunities, better living environments and empowerment of the poor. Therefore, this simply means that if growth occurs and there is no improvement in the standards of living for the population, then no economic development has taken place (Mohan, 2012). In order to measure the countries' level of development, Human Development Index (HDI) is used which is computed using data on life expectancy, health, education as well as income, each as an indicator of standard of living. Millennium Development Goals (MDGs) are also another leading attempt to define specific goals and also quantified targets that are set up for developing regions and to support human development (Arshia, 2012). The following section briefly discusses these measures of development, starting with HDI.

2.1.3 a) *Human development index (HDI)*

HDI was introduced in 1990 as part of United Nation's Human Development Report with the aim to create a holistic view and standard measure of development. It has proved to be a successful measure of development as is plays a great part in establishing balance in priorities of development (Klugman, Rodrigues, & Choi, 2011). Ravallion (2012) recently highlighted three composite indices or dimensions of development which were:

- **Health Index:** represents extent of life expectancy, which is defined as a measure of longevity, but this is only one of the ingredients of a long and healthy life.

- **Education Index:** this covers two parts: literacy rate in the region and enrolment rate in the region. Literacy rate is defined as the percentage of people of the age of 16 who are literate; meaning they can read and acquire skills necessary for one to be effective and have a productive performance within the society. Enrolment rate is defined as percentage of children who go to school (primary, secondary, tertiary) (Cree, Kay, & Steward, 2012).
- **Standard of living:** this is the most complicated index with three pieces of information that are: income in a region, exchange rate between the region's currency and US dollars, and price level index of the region compared to US price level.

Each of the above mentioned indices is measured using indicators (Ravallion 2012). The health index is measured by life expectancy at birth; education index is measured by the years of schooling for people aged 25 years, as well as expected years of schooling. Lastly, the standard of living index is linked with Gross National Income (GNI) per capita. The most common criteria for evaluating the degree of economic development is Gross Development Product (GDP), level of industrialization, amount of widespread infrastructure and general standards of living (Hong, 2014).

These above mentioned human development components involve four basic elements which are briefly defined by UNDP (2009) as follows:

- **Equality:** equal access to productive assets and knowledge.
- **Productivity:** creation of a conducive environment where people can make use of their capabilities optimally.
- **Sustainability:** to ensure that peoples' choices are sustained in order to accommodate future generations.
- **Empowerment:** provision of adequate social environment in which people can participate for achievement of a better life.

For development to be achieved, all these components need to be taken into consideration. As Mohan (2012) mentioned, the main objective of development is about creating enabling environments for people to enjoy long, healthy and creative lives; this can only happen if people can get equal access to productive assets. Therefore, human productivity is an essential element of economic growth, as people themselves are the only resource for production process. This

implies that human production depends on whether the frameworks for growth allow people to make use of their capabilities to full extent. In principle, people's choices can change over time and can be infinite, since it is vital to ensure sustainability of their choices for future generations (Haq, 2011).

2.1.3 b) Millennium Development Goals (MDGs)

As mentioned by Arshia (2012), MDGs are a widely used example of development goals set to be achieved by each country by 2015, and are directly in line with the components of human development that were mentioned earlier (which were equality, productivity, sustainability, and empowerment). The MDGs have eight goals which are aimed at developing people in all aspects of human development. They are outlined by the authors as follows:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

The common link between HDI and MDGs is that they both set about developing people and sustaining the economic growth in a country. ICTs have won global recognition as they provide dynamic changes in transforming education systems, which is exactly in-line with attaining 8 MDG goals by year 2015 (Mikre, 2011). According to ITU (2010) in Kabanda 2013, ICTs have a great impact on the attainment of MDGs as shown in the following table:

Table 1: The relevance and impact of ICTs to the MDGs (Kabanda, 2013)

MDGs	Impact of ICTs
MDG1: Eradicate extreme poverty and hunger	- ICTs provide increased access to market information and reduce transaction costs for poor farmers and traders. - ICTs create employment opportunities and increases wealth, as people can also do tele-work which allows them to work from home. - ICTs increase skills and productivity resulting in increased incomes.
MDG2: Achieve universal primary education	- Teachers are trained on how to deliver ICTs-enhanced learning and also the use of distance learning helps in educational and literacy programmes in rural and remote areas.
MDG3: Promote gender equality and empower women	- ICTs deliver educational and literacy programmes to poor girls and women and also empowers them to work and study from home through the use of e-learning programmes.
MDG 4,5,6: Health (Reduce child mortality, Improve maternal health & Combat HIV/AIDS, malaria etc)	- ICTs enhance delivery of basic and in- service training for health workers. - ICTs increase monitoring and information sharing on diseases and famine.
MDG7: Ensure environmental sustainability	- Remote sensing technologies and communication networks permit more effective monitoring, resources management and mitigation of environmental risks.
MDG8: Develop a global partnership for development	- ICTs are used in communication and nurturing of collaborative partnerships. - ICTs enhances the following regional collaboration strategies: - o Multimedia mail - o Shared applications - o Emails - o Software oriented technologies - o Hardware oriented technologies - o Human/ social issues

The above table outlines the impact of ICTs on all the MDGs in different ways. Many people may disagree on the fact that ICTs can help to alleviate poverty. To address this, Heeks (1999) and Kekana (2002) in Kabanda (2013) uncovered this uncertainty by highlighting that advances in communication technologies has improved the way in which many countries live their lives through improved health, education and public service systems and economies. ICTs serve as a

key enabler for generating and disseminating knowledge, and thereby accelerate the achievement of the MDGs (ITU, 2012).

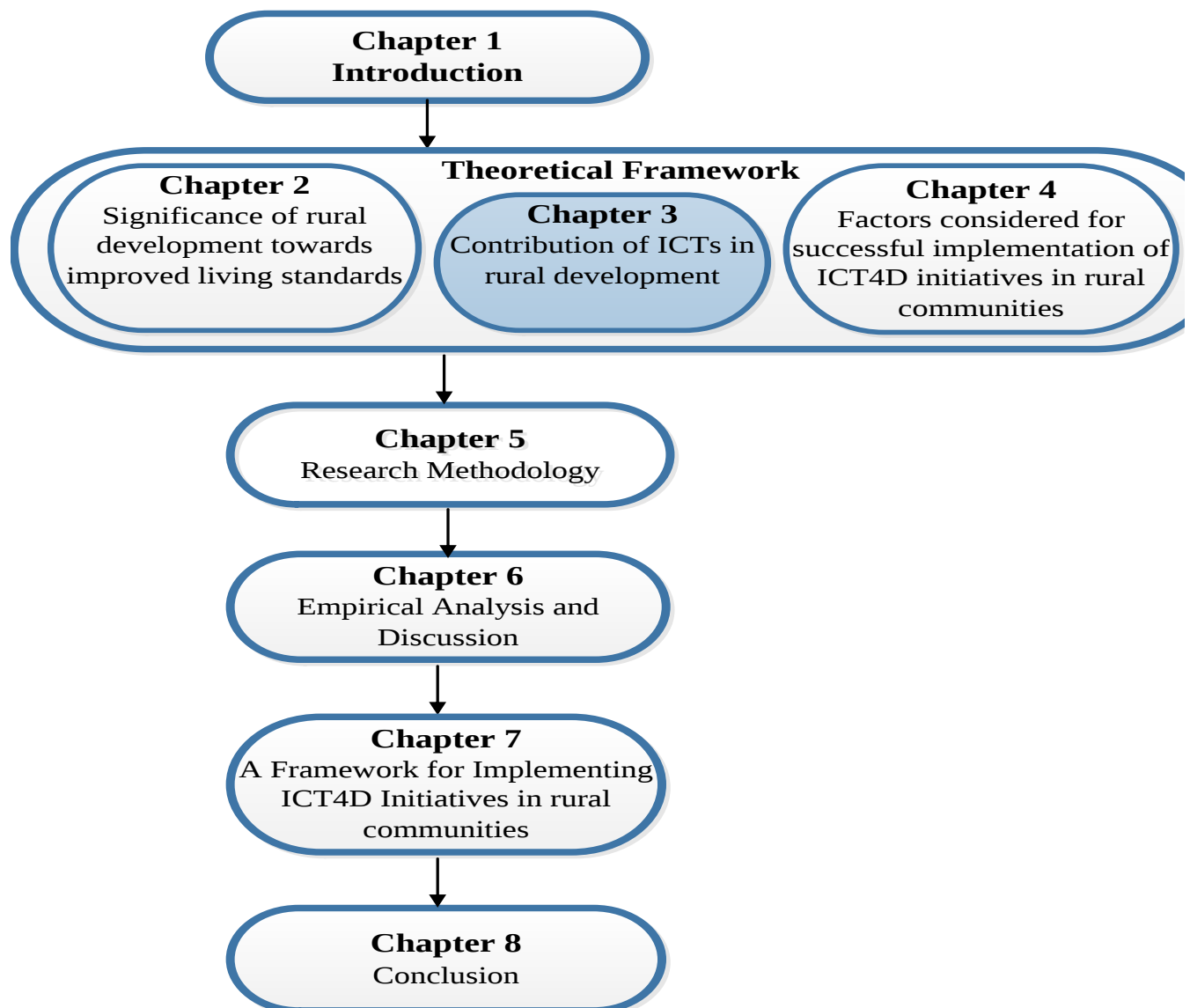
In light of this, for human development to occur, there must be some access to helpful social environments, productive assets and knowledge that allow people to engage socially in activities that can be sustained over time, and also allow them to participate towards the betterment of their lives. Unfortunately, development does not happen as it should as some people have higher standards of living than others; hence today we talk of the rural and urban areas, developed and developing countries, rich and poor. The concluding remarks on this chapter are highlighted in the next section.

2.4. Conclusion

The literature has highlighted that rural communities are often left behind when it comes to development. This is due to the fact that these communities are situated in hard to reach places which make them less attractive to other people. People who reside in these areas are faced with the challenge of receiving basic services as mentioned in this chapter. Attempts have been made by governments in different parts of the world and other stakeholders who have interest in development to rectify this unfortunate situation.

Recent development strategies have employed ICTs initiatives to improve the living standards of the rural people to overcome the digital divide. The next chapter addresses the contribution of ICTs to support development in rural communities. Harindranath and Sein (2007) propose that there should be a strong link that is established between direct ICT interventions and national development, because in this modern world, almost every single activity is more dependent on the application and use of ICTs (Okyere & Mekonnen, 2012).

CHAPTER 3: CONTRIBUTION OF ICTs IN DEVELOPMENT OF RURAL COMMUNITIES IN SOUTH AFRICA



3.0. Background

The aim of this chapter is to highlight contribution made by ICTs in support of rural development. The role of ICTs as a tool for development has attracted the attention of both developed and developing countries. This has been evident through the interest shown by government, NGO's, private sectors and other stakeholders who invest a vast amount of money each year to support the development and implementation of ICTs initiatives (Harindranath & Sein, 2007). The key characteristics of ICTs include transforming the world, enabling innovation and productivity, connecting people and communities, and improving standards of living and opportunities across the world. In a simple form, ICTs have the capability to transform the way we live, interact and work and thereby bring overall productivity gains (Welsun, 2008 and Okyere & Mekonnen, 2012).

There is just no doubt that ICTS have penetrated all activities of human life and are now widely accepted to have an important role in national development. There are many ways in which ICTs have been applied in support of the above statement, and these are shown examples of the ICTs initiatives in different parts of the world. Claudio, Doran, Lopez, and Taylor (2011) support Harindranath and Sein (2007) by highlighting that the impact of initiatives demonstrating the value of ICTs to achieving key global aspirations, such as the MDGs, are multiplying daily.

In an attempt to provide in-depth knowledge and an extensive overview on ICTs, examples on past and present and future ICTs trends that are adopted by other countries and a comparison of how these ICTs have impact on human development will be discussed in the next section.

3.1. History of ICTs for development

In the olden days there were no computers; people had to use traditional methods and technologies to establish a sense of community and human empathy. In creation of civilization, other methods that were used included: drums, torches, signal fires, flags, writing on stones and other forms of earliest technologies (Alberts & Papp, 2007). Technological developments have been considered to bring about economic and social advancements, and as result, technological trends have evolved over years (Thahn, 2008). The following table attempts to show the computer trends as they have been developed over the years.

Table 1: History of Computer / Technology Trends (Young, 2012)

Computer / Technology Trends	Developers	Periods
First Generation Computers		
Typewriter	Christopher Sholes	1868-1969
Z1Computer	Konrad Zuse	
ABC Computer	Atanasoff and Clifford Berry	
Havard Mark I Computer	Howard Aiken and Grace Hopper	
UNIVAC Computer	John Presper Eckert & John Mauchley	
ARPAnet	Charles Herzfeld	
Second Generation Computers		
Early Consumer Computers	IBM & Apple	1974-1999
Apple I	Steve Woznak	
IBM Personal Computer	IBM	
Apple Macintosh	Apple	
IBM PC Convertible	IBM	
The World Wide Web	Tim-Bernes-Lee	
Wi-Fi	Vic Hayes	
Third Generation Computing Devices		
3G Apple iPods Personal Computers Apple iPhone & Apple iPad	International Technology Union (ITU) Apple Apple	2001 – 2009
Fourth Generation Computing Devices		
Ultra book devices Notebooks Tablets Smart phones, PDA	Intel IBM Apple Apple	2010-Present

The above table lists the computer generations that were highlighted by Onifade (2004) which clearly indicates that the computer has evolved over time. These can be classified in many ways depending on their functions and descriptions that are highlighted in this table (Young, 2012). The first generation computer was invented in the 1950's, replacing traditional methods of accounting and record keeping. It was only used as an electronic calculator that used electronic switch instead of electromechanical relays (Mahoney, 2000).

In the 1970's computers were solely used for number crunching and printing out long streams of green and white paper. It was never imagined that a simple computer could be used to write and send emails and be as portable as it is today. The new advancements in communications and technology have resulted in the invention of a television, telephone, cell phones and a computer (Cowhey, Aronson, and Abelson, 2009). The success of computer evolution has resulted in advanced microprocessor speed and creation of software and hardware which makes the computer a focal point of business, education and social life.

Technology continues to surprise, as today we witness how the computers influence social life and communication more than it is a computational tool (Dodgson, Gann, Wladawsky-Berger, & George, 2013). Despite the mentioned technological advancements, there is still a continuous need to further develop these information and communications methods and technologies as technology itself keeps changing; there are still limitations of network, location, and other key factors. Developed countries are said to be investing largely on telecommunications and as such they are always abreast in technological advancements (ITU 2011). The following section highlights ICTs which are used in developed countries; this will assist to benchmark ways in which the developing countries can use ICTs to improve their lives

3.2. ICTs in Developed Countries

A developed country is a country which is said to be in a state achieving high levels human development, economy and good technological infrastructure relative to other nations (Nielson, 2011). Such a country should also have a population of at least 30,000 with 60 % of houses located in main built up areas, and 60 % of the population should engage themselves in urban types of business (Dhar & Sen, 2006). According to Panitchpakdi (2008), a large chunk of global income, as expressed by the world GDP, remains in the hands of the developed countries. Developed countries have experienced a continuous growth in ICTs services uptake over the past

years. This has been evident through the saturation levels that have been reached by mobile cellular telephony, which has penetration rates of about 100%, as well as fixed broadband penetration which is also close to reaching its saturation levels, which is said to be at 72% (Sanou, 2011). Discussed in the next section is an overview of ICTs initiatives which are used by developed countries.

3.3. Overview of ICTs initiatives in developed countries

Developed countries are at a better advantage to exploit ICTs than developing countries. This is evident through the use of some initiatives which provide developed countries with opportunities for economic growth and job creation. A few of these initiatives are briefly discussed as follows:

3.3.1 Internet

Internet usage is far more common in developed countries than in developing, and it has opened doors to opportunities such as e-business initiatives which include the expansion of intranets and intranets. Developed countries have already reached the expected level of Internet penetration, and as such, these countries consider moving online as a way to protect their market share (Wallsten, 2003). This author further highlights that developed countries also make use of the Internet to facilitate dissemination of information and to reach a larger number of audiences to connect to different radio stations via the Internet. In this way people can always be informed of the latest news.

Another initiative which has received attention is the mobile telephony, and this is explained next.

3.3.2 Mobile telephony

Mobile Telephony has penetrated successfully in the 21st century as it has attracted a number of subscriptions worldwide with its unlimited use being more significant in the developed countries. Reports show that the developed countries have witnessed an influx in the adoption and use of mobile data services through the use of smart phones, dongles and tablets. This has transformed the way people connect and work, and has resulted in a positive impact on economic development (William, Solomon, & Pepper, 2012).

The two mentioned ICTs initiatives are followed by the use of E-commerce which will be discussed in the following section.

3.3.3 E-commerce

E-commerce is defined as the buying and selling of goods or services conducted over Internet by methods specifically designed for the purpose of receiving or placing of orders (Fredriksson, 2013). As developed countries have reached a saturation level on the adoption and use of Internet, this has influenced the way they conduct their business. Today, e-commerce is one of the most important applications on the Internet which allows people to tap into business at their comfort zones. Individuals and organisations are able to conduct their online business within a short space of time without having to worry about distance to be travelled, as they are just a mouse click away from their business activities. Even though one may worry about security, there are measures that are taken to overcome the security issues when using e-commerce through the use of digital signatures, authentication technologies and other secure payment services (Diacon & Donici, 2011). The next section discusses ICTs for development in developing countries.

3.4. ICTs for Development in developing countries

Over the past years, the evolutions in ICTs have been recognized for their ability to transform social interactions, political relations and developmental issues (Hesselbarth, D'Ansembourg, & Tambo, 2005). Developing countries have experienced these transformations throughout their business activities and social interactions. Moreover, it cannot be denied that these emerging ICTs have not been able to reach their mature level in developing countries (Thahn, 2008). As today's society is faced with the challenge to fit in with globalization and other trends in order to meet the challenges of time and distance (both in private life and working life), ICTs are trying to address these challenges as they are about transforming the world, enabling innovation and productivity, connecting people and communities, and improving standards of living and opportunities across the world.

The interest shown by government, NGO's, private sectors and other stakeholders to support the development and implementation of ICTs initiatives clearly indicates that ICTS are now widely accepted to have an important role in national development (Harindranath & Sein, 2007). Hesselbarth, D'Ansembourg, and Tambo (2005) also support this as they mentioned in their report that the pace at which ICTs revolution is taking place is very remarkable.

As shown in the order in which MDGs are listed in the previous section, poverty is at the top of this list, which means it is a priority that has to be addressed in order to achieve the other MDGs. Additionally, McNamara (2007) mentioned the fact that none of these goals can work in isolation. Therefore, even though poverty is the priority, health is at the heart of the MDGs, in recognition of the fact that health is central to the global agenda of reducing poverty as well as an important measure of human development. Different ICTs stakeholders have joined forces in a call to work towards achieving these MDGs by extending their forces to accommodate rural development through a number of initiatives which include the use of ICTs. When ICTs are implemented to address rural development, they are referred to as ICT4D, and they offer the following benefits:

3.5 Benefits of using ICTs in rural communities

ICTs generally refer to expanding technologies that are used to handle information and assist in communication. Its importance in development was also highlighted in the MDGs. Viewpoints on the role of ICTs in rural development are grouped into four categories: political, economic easy access to communication through mobile phones and social benefits (Okyere & Mekonnen, 2012). The following sections will highlight these benefits in each area in detail. The first benefit that will be addressed is the social benefit of using ICT for rural development.

3.5.1 Social benefits of using ICTs for rural development

Social benefits of using ICTs cannot be easily listed, but social benefits that include social interactions are easy to mention. Social interaction involves collaborating with others making use of Internet services such as Email, chat, real-time video and audio communications. This also involves online access to press in digital formats, authored information sources, educational and research purposes, as well as accessing local government services and information (Anie, 2011). According to ITU (2010), social interactions are made possible by ICTs that facilitate social networks, which support interactive communication, conversation and network; as opposed to traditional one-way media such as television, radio and newspaper. A good example of how ICTs can facilitate social interactions in a positive way is through use of living labs and Reconstructed living labs (RLabs).

RLabs offer social innovators with incubation programmes on how to turn the original ideas into reality. In Cape Town, RLabs are successfully used as a support centre for drug abusers and

support for their families. The success of the Siyakhula Living Lab which operates in deep rural communities in the Eastern Cape is another way of promoting social interaction within rural communities, whereby rural communities are provided with innovative methods to access information and thereby allowing rural people to expand their interactive social capabilities for socio-economic benefits. This social capital can also be maintained through the use of existing affordable mobile technologies which will be discussed in the next section.

3.5.2 Easy access to communication technologies through mobile phones

Use of mobile technology has dramatically expanded worldwide, and has huge impact on people's daily lives, offering many positive benefits in all aspects of life (West, 2012). The use of mobile technologies has also expanded to rural communities and as such this has demonstrated a massive social change within these communities through the use of mobile phones and mobile applications. Mobile phones play a significant role in improving social interactions by enhancing ways to deliver timely information and support on health care, education, government and family and relatives (Mehta, 2013). This is seen as an affordable means of communication through the use of readily installed applications in mobile phones (Mhila, et al., 2009).

The penetration of mobile phones in rural communities has even motivated the banking institutions to adopt mobile banking services as a method of bringing financial services closer to the poor (Comminos, Esselaar, Ndiwalana, & Stork, 2009). Kenya's M-PESA is a famous example of mobile-based initiative that was developed by a public sector to assist rural people with affordable means of transferring, depositing and making withdrawals using a mobile phone without having to open or qualify for a bank account (Leibfried, 2011).

Mhila, et al., (2009) highlighted a few of the well-known social networks such as Facebook, Twitter, Mixit, SMS, MMS, Whatsapp, and other applications and networks, which help to improve quality of social life for all South Africans, especially in rural communities. These social networks are also used to improve transparency in democracy, good governance, and social stability through the use of ICTs (Bertot, Munson, & Glaisyer, 2010). Discussed next is a brief summary of benefits that are experienced by rural people who make use of ICTs.

3.5.3 Economic benefits of using ICTs for rural development

The economic category focuses on science and technology infrastructure. Rural people have experienced economic benefits through the use of ICTs. The most important benefit comes with the use of the Internet, which has made their lives more economical, as Internet saves time, travelling and money. Internet has improved rural people's lives because farmers can participate in new farming activities that are supported by ICTs, allowing them to market their products and know about the weather forecasts and commodity prices (Hoorik & Mweetwa, 2007).

Hoorik and Mweetwa (2007) further highlight that the Internet has been used to enhance the delivery of education outputs with the aim to improve education through the use of e-learning, which is said to have potential to bridge the educational gaps experienced by rural communities. Additionally, doctors in a rural community would be able to get up-to-date information on outbreak of diseases and be able to treat and warn the rural community (Okyere & Mekonnen, 2012). The political benefits of using ICTs for rural development are discussed next.

3.5.4 Political benefits of using ICTs for rural development

ICTs can be used to help people engage in democratic processes through the use of web-based public information kiosks, electronic citizens' forums and electronic voting. During the 2009 elections, South African political parties made use of social networking forums to stay in touch with their wards. They also made use of new media technologies to announce their meetings, publicise their manifestos, and communicate with party members. Prospective voters participated in online discussions with political parties to voice out their views (Marishane & Shackleton, 2009).

This type of an application is referred to as e-Government. Mutula (2008) highlighted the following benefits that were experienced with the use of this application:

- enhancing the free and fair democratic process in South Africa;
- promoting transparency of the electoral process;
- setting up an enduring infrastructure for future elections, e.g. the WAN;
- allowing 18 million voters to freely exercise their democratic rights;
- constructing an efficient electoral process to manage 18 million voters from 15,000 polling stations;

- effectively drawing up over 400 district boundaries, and
- increased efficiency of the voter registration and polling processes.

Despite the benefits that are offered by ICT4D in rural communities there are challenges that hinder the implementation of these technologies in rural communities. The next section discusses these challenges in detail.

3.6 Challenges hindering implementation of ICT4D initiatives in rural communities

Along with the roles and benefits that are experienced with the implementation of ICTs for development in rural communities, there are some challenges that affect the success of these ICT4D; some of these are as follows (Heeks, 1999):

- Telecommunications infrastructure that provides network access – some rural communities do not have telecommunications infrastructure in place to help with network access.
- Electrical infrastructure to make ICTs work – there are still rural communities with no electricity access and this makes it impossible to implement ICTs in order to develop such communities.
- Usage skills and skills to keep all technology working – most people from rural communities have no adequate skills to use the technology as some of them are unfamiliar with technology resources and the Internet.
- Literacy– some people in rural communities are unable to read the content written in English.

Heeks (2008) also discovered that other ICTs for development challenges were due to developers delivering systems that work but fail to make a developmental contribution. Heeks (2008) further highlighted four ICTs for development issues that contribute to the failure of the ICT4D initiatives in rural communities. These are listed as shown in Table 4:

Table 2: Issues in ICTs for development (Heeks, 2008)

ICTs Issues	Description
Readiness	Policies and infrastructure to make ICT availability possible
Availability	Rolling out ICTs to the poor to help them become users
Uptake	Implementing ICTs to improve usefulness
Impact	Using ICTs for developmental impact

As stated by Heeks (2008), the table lists some issues that influence the effectiveness of ICTs for development in rural communities. Readiness, availability and uptake will remain continually relevant as new technologies are developed.

Amongst all the mentioned challenges, Sullivan (2009) discovered that rural leaders did not have a vision about how to improve their local economy or quality of life and this was a challenge for the success of ICTs. Sullivan (2009) also stated that the failure of these rural ICTs for development initiatives was due to technology plans that were not aligned with strategies for economic and rural community development, lack of skills needed to deploy advanced ICTs infrastructure, as well as a lack of opportunities for rural leaders to educate themselves.

Kamel, Rateb, and El-Tawil (2009) also discovered vital elements that are a challenge in development of ICTs in rural communities. These elements include provision of a regulatory environment supporting ICT, availability of required human resource capacities and skills, and sufficient local and foreign investment. Other challenges included schemes of innovation, social awareness of ICTs importance and effective deployment of ICTs across the community.

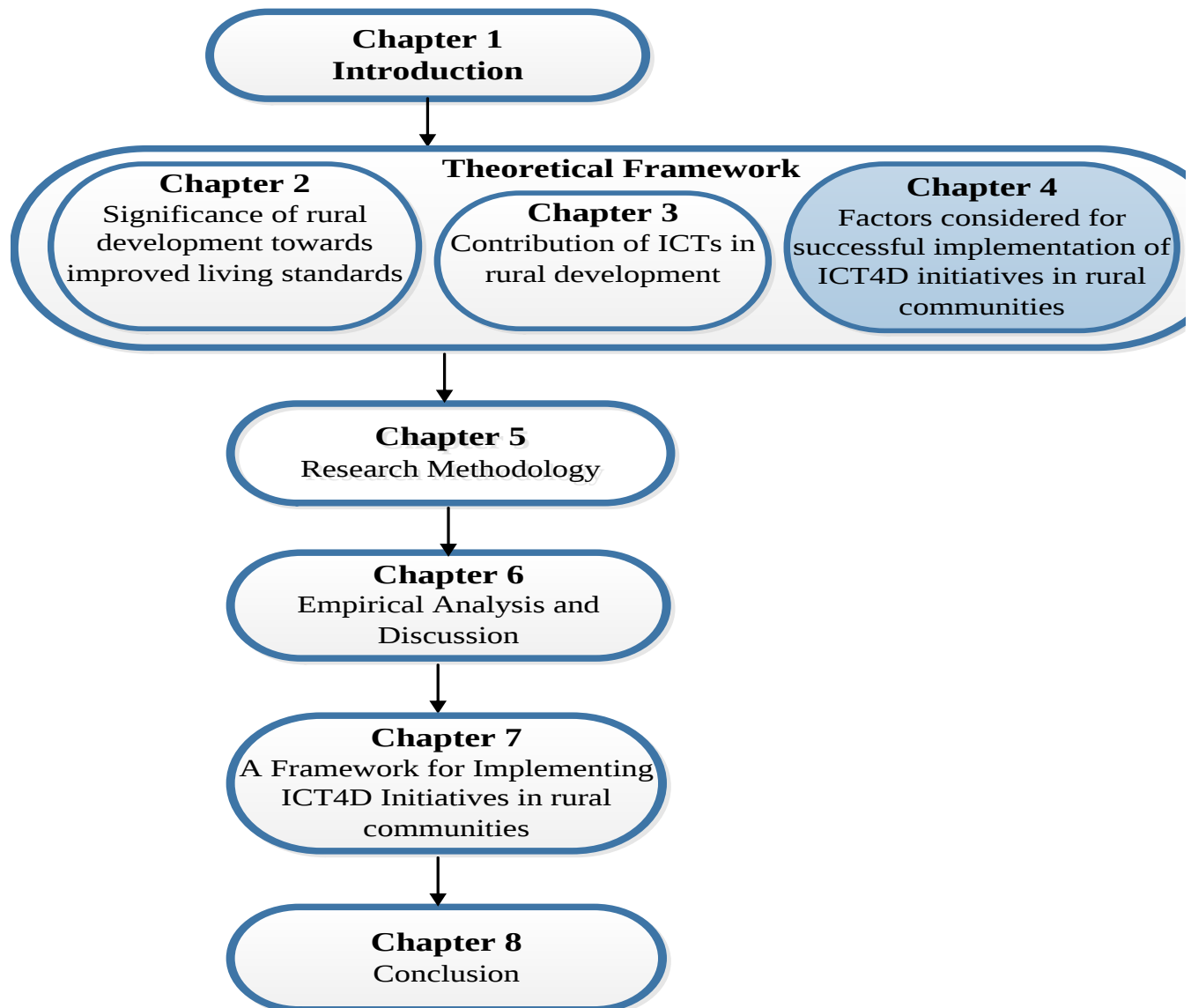
The challenges in the implementation of ICT4D initiatives in rural communities also affected the operations of the ICT4D initiative. As discovered by Reijswoud (2009), some of these disputes included: insufficient local capacity, failure of a support organisation in supporting all stakeholders (taking into consideration gender, issues, age, level of skills), unavailability of spare parts and software maintenance skills. To add more, Yonazi, (2012); Finnegan & Lisa, (2012) and Abdoukarim & Rugege, (2013) agreed on the mentioned ICT4D challenges as they also highlighted similar challenges which included inadequate connectivity and content quality, unsupportive organisational issues as well as people related issues. The following section presents concluding remarks on this chapter.

3.7 Conclusion

ICTs are not new as the first ICTs trended in the form of a typewriter in 1868. The developments in ICTs have resulted in the invention of the television, telephone, cell phone, computer and other mobile devices which make life a whole lot easier than before. These ICTs advancements have been witnessed mostly in developed countries and they now creeping slowly into the developed countries. They are said to be bridging the digital divide as they have proven themselves to be wheels that accelerate development initiatives, through the benefits that they offer.

Even though these ICTs offer benefits to rural communities, they are faced with implementation challenges; but their existence has been supported by different stakeholders and government through the establishment of different structures trying their best to provide innovative ICTs initiatives. This means that there is an effort that needs to be made in order to identify factors that could contribute to address the implementation challenges leading to the successful implementation and continuous running of these ICTs in rural communities. The next chapter discusses of the discovered factors.

Chapter 4: FACTORS CONSIDERED FOR SUCCESSFUL IMPLEMENTATION OF ICT4D INITIATIVES IN RURAL COMMUNITIES



4.0 Background

The aim of this chapter is to highlight factors considered for successful implementation of ICT4D initiatives as well as examples of ICT4D initiatives which can be applicable to South African rural communities. Fixsen, Naoom, Friedman, Blase, and Wallace (2005) define implementation as a specified set of activities that are designed to put into practise an activity or program of known dimensions. These activities should be well defined and evaluated with regards to its intended beneficiaries. In the case of ICT4D, the implementation activities should not only focus on the practical implementation of activities outlined for the program, but should also talk to the planning, management coordination, monitoring and evaluation of the initiative. Therefore, this requires the establishment of understanding of underlying implementation issues and factors which involve issues such as: economical, technological, and rural society (Pade, Mallison and Sewry 2008). These will be discussed in Chapter 7 when presenting the proposed framework for implementing the ICT4D initiatives in rural communities. The next section will discuss implementation aspects of ICT4D.

4.1 Aspects of ICT4D implementation

Along with the ICT4D implementation issues highlighted in the previous section which will be further discussed in Chapter 7, ICT4D strategic planning was found to be one of the critical feasible factors. Strategic plan is defined as a comprehensive process for determining what a business should become and how it can best achieve that goal (Rigby, 2012). In addition to this definition, Gates (2010) defines strategic plan as a process of defining an organisation's plans for achieving its mission. Strategic planning assists to obtain objectives and goals through informed decisions and projections about the environment realities; spelling out the cost, duration, priority order and accountability for each strategy and tactic (Mittenthal, 2004). Therefore, a well-planned ICT4D initiative should be implemented in such a way that it achieves its objectives as outlined in the strategic plan.

A number of ICT4D initiatives tend to be focussed more on the technological issues and ignoring the non-technical issues and environmental realities, thus resulting in negative implementation of these initiatives in rural communities. In this regard, strategic planning can be used as a guiding tool to examine the current rural environment abilities by conducting a baseline study, which

should be carried out as part of needs assessment exercise as it will help by highlighting all the key needs and priorities of a rural community. This will assist to highlight and cater for the issues which were highlighted by Pade, Mallison, and Sewry (2008), as they are the critical factors for the success of the implementation of ICT4D initiatives; measuring them against the desired future and intentions of changing the current situation. To achieve all this, there should be management structures set up to assist in the ICT4D implementation process. The next section will cover this aspect.

4.2 Management Structures

After the review of the strategic documents and plans, the prerequisite for successful ICT4D implementation is to appoint appropriate oversight and management structures. These bodies should be able to engage the high level political and administrative leadership of the parliament that will bring together support from stakeholders from the respective institutional areas (Bikha, 2010). For ICT4D initiatives, an ICT4D steering committee is an appropriate management structure that can be set up to ensure that ICT4D activities are carried out effectively. By definition, ICT4D steering committee is a key body that is organized to ensure that ICT strategies that are practised by an ICT4D initiative are aligned with its strategic and corporate objectives (Livesly 2011).

The primary roles of an ICT4D steering committee are highlighted by Godfrey (2012) as follows:

- Develop corporate level ICT strategies and plans that ensure effective management and use of ICT resources;
- Review existing and future technologies to identify opportunities to increase the efficiency of ICT resources;
- Monitor and evaluate ICT initiatives and achievements against the ICT Strategic Plan. This committee will also support, where possible, logical coordination and collaboration between the ICT4D initiative and governing bodies with regard to exchanging experiences and best practices.

Amongst the mentioned tasks, ICT4D steering committee will also facilitate the sharing of services and resources in implementing and managing ICTs and better alignment and

development of the entire ICT infrastructure as one integral asset ensured by compatibility and interoperability standards (Sayi, 2010). Therefore, ICT4D steering committee stakeholders should include rural community champions, rural community members with basic computer literacy, project initiators, donors, as well as local and national government representatives. The inclusion of the rural people in ICT4D management structures will make them feel part of the initiative and thereby create a sense of ownership, rather than seeing the initiative as being owned by the project initiators.

The following section will show examples of ICT4D initiatives which are used to develop rural people's lives in South Africa and how these ICTs have been used in different aspects of life in support of the MDGs.

4.3 ICT4D initiatives in Republic of South Africa

The political conflicts and socio-political divisions of the past have affected South Africa's economy as this can be witnessed in various sectors of the country's economy till today (Oludolapho, 2010). Even though this is the case, RSA is known to be committed to finding innovative practical solutions to bridge the digital divide and social challenges. This has been shown by the dedication through ideas; research and strong fellowship that seek to understand and enhance human capital in order to close the gap between today's reality and people's hopes for a better world (Dodgson, Gann, Wladawsky-Berger, & George, 2013).

Some of these innovative ideas that assist in supporting its socio-economic development in the Republic of South Africa includes the following initiatives:

4.3.1 Thusong service centres

As an attempt to bridge the gaps in provision of services to all people, the South African government introduced Multi-Purpose Community centres (MPCCs) which are now known as Thusong Service Centres. Reitzes (2009) defined Thusong Service centres as structures which provide a range of quality government and civil services and information to the rural communities under one roof. Green & Agrue (2012) define Thusong Service centres as hubs within a rural community which provides information and services in an integrated way. From these definitions it is clear that the main purpose of the Thusong service centres is to assist people with little or no access to basic services by providing rural communities with these

structures in order to improve quality of life for through access to appropriate services, information and training facilities, as well as to shorten the long distances they have to travel in order to access basic services in urban areas.

As a result, Sydpless (2009) describes the design of Thusong service centres as centres that are able to offer five blocks of services which are:

- Government, social and administrative services
- Offices services
- Education and skills development services
- Business services and community opportunities
- Information and communication activities

Another form ICT4D initiative that has been widely used for rural development purposes is through the implementation of telecentres, these are discussed next.

4.3.2 Telecentres

Telecentres emerged as one of many attempts by government to provide ICTs in rural communities. By definition, a telecentre is a common point of access for multiple users (often an entire community), providing a range of ICT services including internet, fax, word processing, and even specialised information retrieval or applications (e.g. distance education) (Caspary & O'connor, 2003). Attwood and Braathen (2010) refer to telecentres as a place providing connectivity and access to information through a range of information and communication technologies including phone, fax, computers and the Internet. These authors pointed out that there are several types of telecentres and they vary in their service provision and means of funding, and some of these telecentres have proved more successful than others. Some can be run commercially as a small business or they can be run by community organisations for the benefit of the community.

To add on the mentioned ICT4D initiatives, discussed next are living labs which are other methods that can used to accelerate the wheel for development in rural communities.

4.3.3 Living Labs

Living Labs have emerged through the process of ICTs innovations as user involvement trends to ensure innovation and development processes in the networked environment. By definition,

Living Labs are systematic initiatives focusing on promoting open, user-driven innovation in rural ICT services and applications (James, 2010). Herselman (2011) highlighted three set-up environments of Living Labs that can be used for innovative purposes and these are described as follows:

- **Rural Living Labs:** initiatives focusing on addressing rural communication challenges, providing technical support and training, as well as implementing new business models with the aim to improve and change the rural innovation system.
- **Peri-urban or Suburban Living Labs:** initiatives that are implemented in slightly urban-rural cities.
- **Urban Living Labs:** initiatives that are meant for smart cities.

Mulvenna (2012) supports the definition of a Living Lab by James (2010) highlighting that a Living Lab should offer open innovation network supporting development activities and processes based on the environment, thus allowing users to be actively involved in the use of new ICT services and applications.

Leminen, Westerlund, and Nystrom (2012) further mentioned four different types of living labs which were in line with what was highlighted by Folstad and Karahasanovic (2013), stating that a living lb should have innovative networks supporting development. These four types of living labs are described as follows:

- **utilizer-driven living labs networks:** used to collect user information and data relating to the products and services they use through research and development to support business development.
- **enabler-driven living lab networks:** developed by development stakeholders through public sector projects to pursue societal improvements.
- **provider-driven living lab networks:** structures developed to focus on improving users' everyday lives in a way that all participants in this network benefit from the innovation results.
- **user-driven living lab networks:** structures which enable users to take an active part in the research, development and innovation process.

Each type of a network is important to understand as it is the one that identifies actors driving the innovation process. Therefore, in the case of a rural community, the provider-driven living lab network is an appropriate network as it allows providers to improve lives of the people who live in communities through the use of development projects that are ICT enabled. As it has been highlighted by Thieren, et al., (2005) the key development sectors in South Africa are health, education, agriculture and SMEs. Rural communities have needs that are specific to each community; therefore ICT4D initiatives need to be implemented in a way that will address those specific needs. According to Thieren, et al., (2005) health is at the heart of the MDGs and is also central to the global agenda of reducing poverty. For this reason the next section will highlight some of the ICT4D initiatives which can be used to address specific rural community needs in honour of the MDGs, health sector will be addressed first that.

4.4 Initiatives for addressing specific rural community needs

Introduction of ICTs for development in rural communities has helped to reduce the effects of distance and time travelled by rural people in order to access their basic needs. ICTs provide rural people with relevant information on issues such as family planning, prenatal and maternal care through the use of information kiosks, mobile phones, radios and televisions. The following section will briefly discuss few ICT initiatives that are used specifically to improve the health sector in rural communities of South Africa.

4.4.1 ICTs initiatives for addressing health in rural communities in South Africa

ICTs have the potential to improve quality of rural people's lives by providing affordable and accessible health care services. This involves improvement to public health and medical programs designed to provide elective, emergency, and long-term clinical care; educating people; improving nutrition and hygiene, and providing more sanitary living conditions (McNamara, 2007). People living in rural areas are always far from the sources of basic health care services such as clinics and hospitals, as they always have to travel long distances to obtain health care services and information.

A number of efforts have been made to improve the standard of health sectors through the use of ICTs. According to Elder and Clarke (2006): Rashid and Elder (2009), there has been great enthusiasm about the role of ICTs in this sector and this has been evident in the delivery of health care services through mobile devices which has expanded and diversified into the field

that is now called mobile health (m-Health). Khan (2012) added that the mobile telecommunication and multimedia technologies used for m-Health initiatives include: mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices. Rashid and Elder (2009) earlier highlighted some of the reasons why mobile phones have been chosen as a development tool in this sector. Amongst those reasons the following were mentioned:

- Beyond just basic connectivity, mobile phones offer mobility and security to owners.
- Mobile phones do not need to have a physical infrastructure; it only needs a radio spectrum.
- Mobile phones are accessible to a large population because they require basic literacy.
- Technical advantages make mobile phones attractive for development as they offer voice communication, transfer of data which can be used for purposes of health, education and governance.
- The payment methods such as pre-paid methods make it possible for rural people to afford mobile phones.

With all these reasons, it has been easy for the health care sectors to introduce the use of ICTs as a means to improve the standard of health care services in rural communities. South Africa is one of the countries that are benefiting from the use of ICTs initiatives to improve its health care services, as the context of mobile health has also made its way into this country. There are a number of examples of ICTs trends that have been developed for use to improve South African health services and some of these are briefly discussed as follows:

- **SMS reminders for TB treatment in Cape Town**

This ICTs trend sends SMS messages to patients via mobile telephones, reminding them to take their tuberculosis (TB) medication at pre-determined times. The aim of this trend is to provide an affordable solution to improve patient adherence to TB treatment and reduce the associated costs of the directly observed therapy system for both patients and clinics (Ducut, Liu, Quion, & Fontelo, 2009).

- **Tsilitwa Tele-health project in the Eastern Cape Province**

Tsilitwa is a rural community located in Qumbu in the Eastern Cape Province and has a population of about 2000 people. Like many other rural communities, Tsilitwa is experiencing the challenges of high unemployment and poor public services, and long distances to other nearby villages with poorly developed roads which make it difficult to access the area. Although this village has a clinic, the clinic sisters only have limited knowledge to treat anything other than the basic health needs (Ruxwana, Herselman, & Conradie, 2010).

Tsilitwa Tele-health project came as innovative initiative that connects the rural clinic in Tsilitwa by means of a wireless network to the Nessie Knight Hospital in Sulenkama, thus enabling a clinic sister to interact with doctors in the nearest hospital which is about 15 km away from the village of Sulenkama. This wireless network makes it possible for the nurses to communicate with specialist physicians, and get some advice about the course of treatment or possible referral of the patients. This saves time and money as the interaction with the doctors is done wirelessly through data, video and voice (Makitla, Makana, & Roux, 2004).

- **Tygerberg Children's Hospital & Rotary Telemedicine Project**

This initiative was launched in the Western Cape Province of South Africa in 1996, with the aim of linking Tygerberg Children's Hospital medical experts to three hospitals in underprivileged districts to provide specialist support to those outlying district hospitals. It utilises a provincial network which connects all district hospitals to Tygerberg hospital for email. Doctors at district hospitals can email electrocardiograms and X-rays to Tygerberg hospital. In this project, one person scans all incoming queries and directs them to the relevant specialists at Tygerberg. Responses are then sent by the specialist to the sender in order to provide remote advice and consultation (Chetty, 2005).

Having mentioned all the benefits of ICTs for development trends in South African rural health sectors, the following section will look at ICTs trends within the South African education sectors.

4.4.2 ICTs initiatives for addressing education in rural communities in South Africa

The education sector is crucial for developing the human capital of countries to innovate and find solutions for sustained and equitable growth. As it is also at the top of the MDGs, it receives special attention. It focuses on enhancing primary education whereby quality and access to

education are taken into consideration (Neuman, 2007). In addition, the Education for All (EFA) principles developed by UNESCO provides a more specific set of objectives for the education sector. Coopers (2010) highlighted that despite many continued efforts of the different governments on globalizing the primary and elementary education, through a wide range of programmes and schemes, access to quality education continues to be an obstacle in the achievement of the education goals.

Neuman (2007) supported Coopers' (2010) notion by mentioning that developing countries are generally characterised with a rapidly growing young population with high illiteracy rates that are due to high drop-outs in schools. He pointed out that sometimes this illiteracy and drop-out problem is because of the high cost of education whereby children cannot afford to continue with their studies.

To help eliminate problems that are faced by developing countries when it comes to education and also achieve the MDGs in enhancing education standards, ICTs have proven to be useful tools. White (2008) reported that the use of technology in the education sector is a new phenomenon that emerged in the 1980s with varied success. The main goal of applying technology in education is to address implications of cyberspace as a collaborative and cognitively supportive learning space (Woolf, 2010). This author further highlighted that technological revolutions in ICTs have reduced national boundaries to meaningless lines drawn on maps, as today we have witnessed how ICTs have reduced national boundaries in order to support education.

As it was mentioned by Reddi (2007), there are distance education universities and programmes that include learning material that is delivered through broadcast audio and video such as radio and television programmes, audio and video tapes delivered to students as part of a learning kit, and in more recent times, multimedia content such as lessons which are delivered offline, i.e. on CDs. This is also sometimes called multimedia education where multiple media are used to support learning.

- **E-Learning**

E-learning is defined as the use of flexible ICTs to enhance and support teaching and learning process (Oye, Salleh, & Iahad, 2011). South African such as University of the Western Cape (UWC) and University of South Africa (UNISA) has adopted this mode of course delivery

through the use of e-learning for some of their courses. This trend has assisted part-time learners as some of the learners are full-time employees (Glancy & Isenberg, 2011).

- **Open source & open education resources**

Open source is a practice of making a program source code freely available to the acquirer and can be used to address the technical problems in providing optimal delivery of online learning, as well as be used to create online communities through which curriculum materials and teaching and learning methods can be created, tested, discussed and revised (Lakhan & Jhunhunwala, 2008). This practice can be utilised to distribute free learning resources such as course materials, journals to support the learning process.

- **Collaboration**

Collaboration is a recursive process where two or more people work together towards a common goal by sharing knowledge, learning and building consensus. As this process involves more than one person who may happen to be in different locations, there need to be some ICT enabled tools that will enable remote collaboration. These include: Skype, Twitter, Flickr, Face book, Wikipedia, Blackboard, WebCT and others (Lomas, Burke, & Page, 2008).

- **Mobile Technology education services**

Mobile technologies are being increasingly used in education settings as they open up new possibilities for on-the-go and just-in-time learning. This emerging educational paradigm is referred to as mobile learning (M-learning). M-learning is defined as learning conducted through wireless technological devices that can be utilized wherever a learner's device can receive transmission signals (Ismail, Bokhare, Azizan, & Azman, 2013). These technologies are said to facilitate the extension of peer based learning outside the classroom setting, and also create learning possibilities for learners who live in underserved hard-to-reach areas (Anderson, 2007). Amongst these devices, PDAs, smart phones, ebooks, iPads and personal media players allow learners to engage in communication, teaching and learning activities far better than in traditional forms of learning. ICTs have been witnessed to have a positive influence on agriculture and this will be discussed in detail in the following section.

4.4.4 ICT initiatives for agricultural sectors in South Africa

Agriculture is the foundation of developing economies and it serves as an important wheel for economic development. Development of ICTs has created a new agricultural paradigm that transforms performance in the agricultural sector as farmers can easily connect to markets through the use of mobile phones (Taembo & Maumbe, 2013). Mobile phones are one of the ICTs that are cheaper for rural people and it allows them to overcome the distance and time at no major cost. Mobile phones also facilitate access to information and communication at a reasonable price, and as such, the agricultural sector makes use of mobile phone applications which provide updated information on weather, transportation and agricultural techniques via SMS, Email, GPS, Mxit, radio and the Internet (Aker, 2011). Farmers can also make use of SMS, Email, Mxit, Internet and radio from their mobile phones to participate in agricultural forums on different topics and innovative agricultural programs.

Leibfried (2011) highlighted that mobile phones are increasingly used to improve agricultural activities. He mentioned some benefits of using mobile phones in the agricultural sector as follows:

- **Access:** mobile wireless networks are expanding as technical and financial innovations widen coverage to more areas including rural communities.
- **Affordability:** offers a prepaid connectivity which is inexpensive.
- **Appliances:** offers ICTs that are sophisticated and easy to use like cameras, scanners etc.
- **Applications:** services range from SMS to advanced applications.

This author further stipulated that there is also another ICT trend that is known as mobile banking which allows rural people to transfer money through mobile phones without registering or qualifying for a bank account. An initiative called M-PESA, which is a result of mobile banking, can also be useful to rural farmers as they will be able to save and transfer their money without having to go to the bank. Other initiatives that can assist rural farmers include Nokia's Ovi Life Tools (OLT) and Reuters Market Light (RML) services for market information that is relevant to their needs (Qiang, Keuk, Dymond, & Esselaar, 2011). Additionally, Brugger (2011) highlighted that farmers are able to make sound decisions as they are able receive up-to-date information on daily weather updates and agriculture news and tips from these initiatives at a reasonable price. ICTs initiatives supporting SMMEs will be discussed next.

4.4.5 ICTs initiatives for supporting small, medium and micro-enterprises (SMMEs) in rural communities

The rate of unemployment in South Africa is the driving force behind the creation of SMMEs, which act as a catalyst in addressing challenges of job creation, economic growth and equity (Achemfour, 2012). Alert (2009) described SMEEs as diverse small businesses which operate in the formal or informal economies with some business owners lacking skills while others may be experienced. These business structures are also common in rural communities as people engage in SMMEs activities in order to make a living.

Various key role players in South Africa's economy, such as government, NGOs, donors, public and private sectors, have set programmes and funds to support SMMEs in rural communities as they are known to play a vital role in reducing the unemployment and poverty rate; and also serving as access points to all government services and information needed by people in rural communities through the use of ICTs (Dlodlo, Krause, Mathaba, Mvelase, & Kabanda, 2009).

To finance SMMEs, the South African government established initiatives facilitated by the Department of Trade and Industry (DTI), which offer financial access and wide range of products and services for small businesses through the following structures that were highlighted by Media Wiki (2011):

- **South African Micro-Finance Apex Fund:** provides access to micro-loans and support to the social capital mobilisation.
- **Khula Enterprise Finance Limited:** facilitates access to finance for small businesses seeking finance.
- **National Empowerment Fund (NEF):** assists small business growth and rural community upliftment focusing on black economic empowerment transactions.
- **Ntsika:** offers business advice, government tenders and technology support to small businesses.
- **Umsobomvu Youth Fund:** provides financial and non-financial support to youth businesses.

All these mentioned structures work together to support South Africa's socio-economic development. The existence of these structures and the initiatives they support is through the help of different stakeholders, which will be covered in the next section.

4.5 Stakeholder's Initiatives to Support ICTs for Rural Development in South Africa

Recent research reveals that various ICT4D initiatives play a significant role that ICTs play in support of rural development, as ICTs have been employed in information management and governance of development (Ghosh, 2012). Different stakeholders such as government, non-profit organisation (NGOs), public and private sectors have shown enthusiastic dedication in support of ICTs initiatives for rural development. As a result of this, South Africa is in possession of initiatives such as living labs, telecentres, computer infrastructure and mobile services that support service delivery. These initiatives exist because of the collaborations between institutions of higher learning and research champions who are dedicated in research and development (Unisa, 2013).

All these initiatives are an indication that in order for rural development to successfully take place, there must be participation from different stakeholders so as to support the socio-economic and rural development. These ICTs for development initiatives get support from the government, non-profit organisation (NGOs), and public and private sectors. NGOs are organisations that are legally constituted by private persons or organisations with no participation from any government (Catling, 2008). Their role is to pioneer new development ideas. Private organisations also play a significant role in achieving sustained and equitable economic growth and development which include the following roles as reported by UNCTAD (2011):

- Extending ICT infrastructure and services
- Enhancing ICT usage in enterprises
- Promoting ICT sector itself

The South African government also supports development through a number of initiatives and structures for purposes which are discussed next.

4.6 Government role to support ICTs initiatives for rural development in South Africa

Many governments' agendas have ICTs as their top priority; rural development has been a continuing concern of national governments. In his State of the Nation Address, President of the Republic of South Africa, Mr Jacob Zuma, stated that: "Our rural development will improve rural productivity and the lives of the people living in rural areas" (Celeste, 2011). This

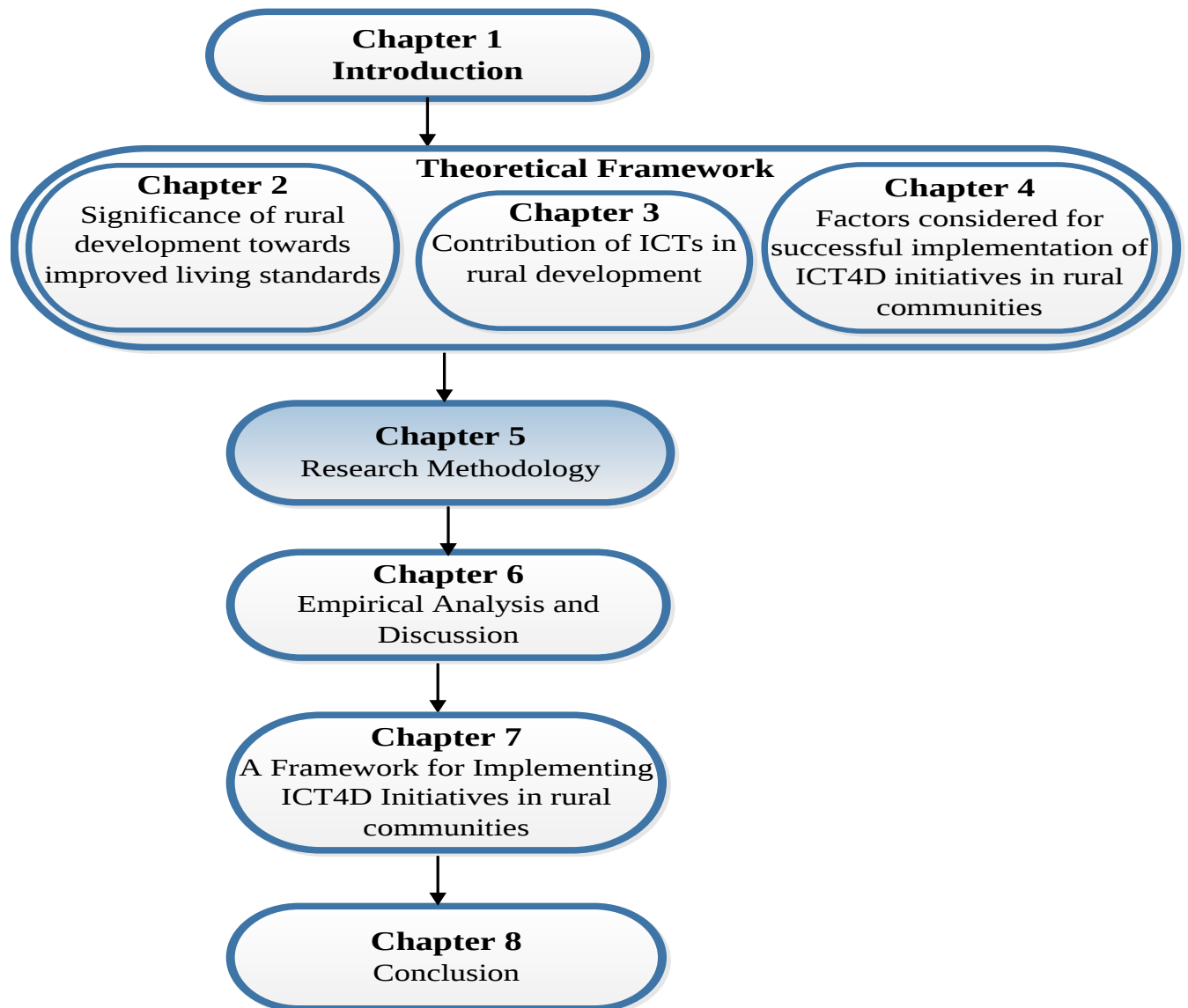
statement clearly shows that government has a greater part to play in the process of rural development, and there are some initiatives which are supported by government. Among the available ICTs initiatives, Isaacs (2007) and Celeste (2011) highlighted some of government ICTs initiatives supporting rural development which include the following:

- **State Information Technology Agency (SITA):** This is a South African government initiative which was formed in 1999 which serves as a public sector ICT - company providing technology standards setups in public education institutions. ICT has its own dedicated SETA known as the Information Systems Electronics, Telecommunications Technologies (ISETT) SETA, which encourages people to develop skills that will contribute to economic growth.
- **Universal Services Access Agency of South Africa (USAASA):** This is a government initiative that is taken to come up with innovative ways to bridge the digital divide. This initiative has resulted in a vast number of access points in communities which include the concepts of telecentre, school cyber labs, public pay phones, and public information terminals such as the Batho Pele Portal and Thusong centres.
- **Independent Communications Authority of South Africa (ICASA):** This is another government initiative to address the participation of SMMEs in ICTs markets whilst addressing the goal of universal access to services for all, especially the rural communities.
- **New Partnership for Africa's Development (NEPAD):** This is South Africa's programme which requires individual countries to develop strategies on deployment of ICT infrastructure.
- **Presidential National Commission (PNC) on Information Society and Development (ISAD):** This commission was established to pace up the extent of addressing South Africa's development challenges and global competitiveness, with its focus on empowering youth through participation and prioritizing on interventions to support development.
- **The Meraka institute:** Operating unit of Council for Scientific and Industrial Research's (CSIR) aim is on enhancing quality of life through on Information and Communication technology. Its primary focus is on promoting three strategic axes which

are human capital development, application innovation and advanced technology research.

Having highlighted the contribution of ICTs in different areas of human development through the support from different stakeholders, the following section highlights the research methodology followed in this study as a means to address the research questions which aim to lay grounds for the framework proposed in this study.

CHAPTER 5: RESEARCH METHODOLOGY



5.0 Introduction

Chapter 1 of this research highlighted a brief background and the objectives that were to be addressed for the accomplishment of this research. The purpose of this chapter is to discover the fundamental philosophical assumptions underlying this research. According to Hofstee (2006), a research methodology should provide a clear and understandable roadmap of how the researcher arrived at conclusions. Therefore, this chapter discusses in detail research design, research methods, population sampling, data collection methods, data analysis methods, as well as validity of the results of which are be produced in this study. The following diagram portrays a summary of the research design that was applied in this study:

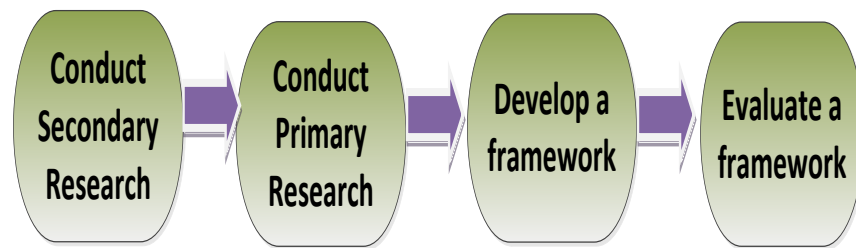


Figure 5.2: Research Design Summary

Secondary research was conducted as a means to support the identified research problem and to find a possible solution to the stated problem through the investigations on existing ICT4D frameworks. Primary research was also conducted through unstructured interviews which were conducted with ICT4D initiatives to discover factors that can help to improve the successful use and sustainability of ICT4D initiatives in rural communities. The findings of the data collected from secondary research and primary research influenced the development of a framework that was proposed as a solution to the stated research problem.

The objective of this research was to develop a framework for use by ICT4D stakeholders when implementing ICT4D initiatives. To obtain this objective, the researcher applied the research method as depicted in the onion model adapted from Saunders, Lewis and Thornhill (2007) which has been depicted in Chapter one of this study.

The layers of this onion represented research philosophy, research approach, research strategy, data collection methods and the data analysis. These are further described below in the next section.

5.1 Research Philosophy

Research philosophy is sometimes referred to as research paradigm (belief system / theory that guides the way we do things) (Hathaway, 1995). According to Holden and Lynch (2010) research philosophy refers to the development of knowledge and the nature of that knowledge, and how it can be obtained. These authors further highlight that all research (whether qualitative or quantitative) is based on some underlying assumptions of what constitutes valid research and which methods are appropriate. This means that before embarking on a research, it is vital to know the philosophical assumptions relating to the epistemology which guides the research.

Epistemology is defined as the study of knowledge and justified belief, which is created through social constructions such as documents, shared meanings, language and other artefacts (Matthius, 2005). Thomas (2011) suggested three philosophical perspectives which are popular paradigms in contemporary social, organisation and management research. Figure 4 depicts these perspectives for a clear description:

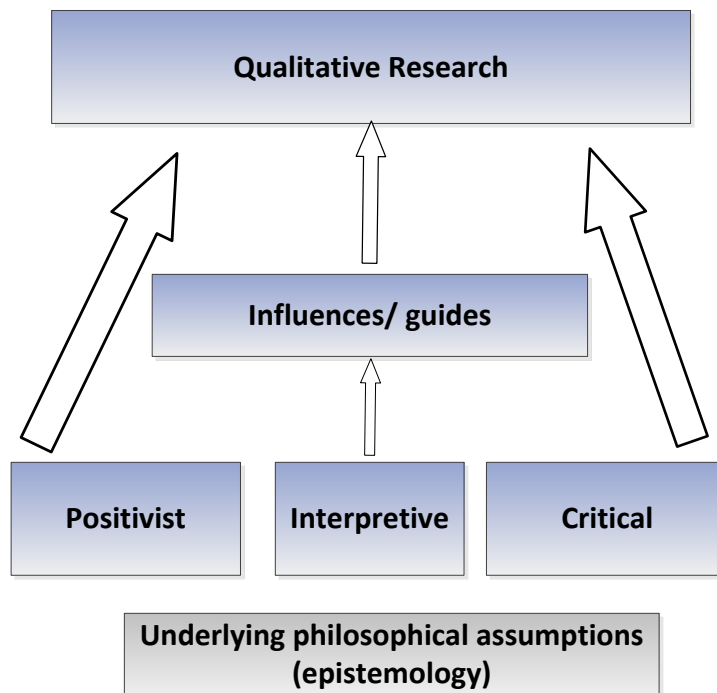


Figure 5.3: Philosophical perspective (Myers, 2008)

The three philosophical perspectives on which assumptions are based on are expanded as follows:

5.1.1 Positivist Philosophy

Positivist philosophy is a research paradigm that has a physical science origin and it researches using a systematic scientific approach. Positivists are of the view that the world is stable and everything within it can be explained by knowledge of universal laws (Hales, 2009). Thomas (2011) further highlighted that this paradigm is derived from natural science and it composes of a tested hypothesis developed from existing theory. The positivist's assumptions are of the opinion that social reality is objectively given and can be obtained through measurements of observation of social realities.

5.1.2 Interpretive Philosophy

Interpretive philosophy is a research paradigm that follows a belief that reality is based on people's experiences of the external world. In this paradigm, it is believed that meaning is constructed over time and is reconstructed through experience which results in different interpretations (Flowers, 2009). Therefore this paradigm is underpinned by observations which allow the collection of facts about events and interpretations which try to give meaning to the collected information.

5.1.3 Critical Philosophy

Critical philosophy is a paradigm that is based on the idea of inequality and ideology oriented inquiry and its belief is social reality can be obtained through the world's transformation. Critical researchers are of the notion that social reality is historically constituted and is produced by people (Konsolaki, 2012). Therefore, critical philosophy is about questioning the answers as opposed to the interpretive philosophy which is about answering the questions.

The above discussion on the distinction between the three philosophies guided the selection of the appropriate philosophy for this study which is interpretive philosophy. Interpretive philosophical paradigm forms the basis of this study as it is about understanding social human behaviour within the ICT for development in the rural community context. In interpretive research it is assumed that knowledge of reality is socially constructed. The researcher's interpretation of the situation plays an important role as it highlights the subject with quality arguments aiming to reveal the reality (Andrade, 2009). According to Flowers (2009), it is argued that in the social world individuals or groups make sense of situations based on their

individual experience. Therefore, meaning is constructed over time and there can be different interpretations.

Therefore, this research was supported by extensive literature review as various literature resources were used to provide guidance in carrying out the entire research process (Holden & Lynch, 2010). The purpose of an interpretive study is to find meaning and concepts in the chosen field, interpretation of social actors and to understand the world from the actors' point of view. According to Walsham (1993), an interpretive study allows the researcher to become immersed in the community in order to gain a rich understanding of the influences of ICTs for development interventions in rural communities. As such, the researcher managed to come up with meaningful conclusions which were drawn during the time when the researcher became immersed within communities of the mentioned cases in this study. This assisted the researcher to gain rich understanding of the interviewed ICT4D initiatives situation and obtain views and feelings from the people about the ICT for development initiatives.

In addressing the research questions in this study, the research approach to be used in this study is discussed in the next section.

5.2 Research Approach

Myers (1997) defines research method as an approach of inquiry which moves from the underlying philosophical assumptions to research design and data collection. The author further highlights that the way in which the researcher collects data is influenced by the selected research method, as specific research methods also imply different skills, assumptions and research practices. There are two main research approaches that an empirical study can evaluate for use; qualitative and quantitative. A qualitative research approach is associated more with the interpretive paradigm as well as subjectivity of the concept, whereas a quantitative approach emphasizes relatively large scale and representative sets of data that are analysed numerically and are associated with objectivity (Hughes, 2006).

This research was conducted inductively using a qualitative research approach, as it is seen to be the most appropriate approach. A qualitative approach explores natural settings and its interest is in finding meanings, perspectives, understanding and interpretations of real situations (Hanock, 1998). As mentioned by Hughes (2006), a qualitative research approach is associated more with

the interpretive paradigm as well as subjectivity of the concept. Therefore the qualitative approach relates to understanding some aspects of social life rather than numbers.

Having selected the research approach, the next section discusses the research strategy for this study as a way to assist in providing answers to the research questions in this study.

5.3 Research Strategy

A research strategy is a plan that helps to ensure that resources are adequate and available to complete the study in order to achieve the study's objective (Ferguson, 2005). There are many research strategies that a study can follow in achieving its objectives; these include: experimentations, survey methods, archival analysis, histories or case studies. These strategies were developed in the social sciences to enable researchers to gain in-depth knowledge on social and cultural phenomena.

This study chose to employ a case study as its research strategy. As defined by Yin (2013) a case study is a flexible research strategy which allows a researcher to retain holistic characteristics of real-time events where multiple variables exist while investigating empirical events in their natural setting. According to Sage (2006) case studies are either single case or a multiple case whereby a single case involves collection and analysis of data from a single unit, as opposed to multiple case studies which allow collection and analysis of large information from different sources. The procedure for conducting case study is discussed in the following section.

5.3.1 Procedure for conducting case study research

There are several procedures that can be followed when conducting a case study research. Runesan and Host (2008) discovered five major steps that are crucial when conducting a case study, and these were found to be:

1. Case study design: define objectives and plan the case study
2. Preparation for data collection: define protocols and procedures for data collection
3. Collection of evidence: implement actions on data collected on the studied cases
4. Analysis of collected data
5. Reporting

The above steps assisted in conducting the case studies for this research. The most suitable for this study was an exploratory multiple case study which deals with how relationships between

objects, people and concepts are formed as highlighted earlier on by Hanseth, Annestad, and Berg (2004). These stages by Runesan and Host (2008) were followed in conducting this study in four projects located in Umthatha in the Eastern Cape: Milton Mbekela Senior Secondary School, Mpheko Dumrana Tele-centre, Qunu Integrated Energy Development, and Viedgiesville Telecentre. Discussed next is the explanation of the process that was followed to select the sample of mentioned cases and how the participants were selected, followed by the data collection.

5.4 Sampling and population selection process

As it is unlikely for the researcher to survey the entire population due to time and budget constraints, research sample is always used to represent the population. By definition, a sample is a subset of the population that is selected for the process of obtaining information for a study about an entire population (Haq, 2011). The two categories of sampling from Haq (2011) are depicted in the following diagram and described further below:

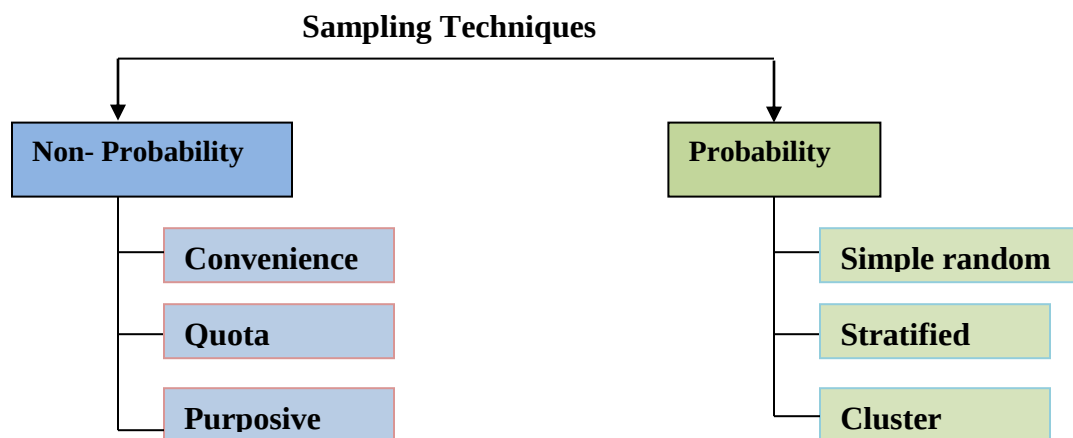


Figure 5.4: Sampling Techniques (Haq, 2011)

5.4.1 Probability sampling: This is a universe from which the sample is drawn which should be known to the researcher. There are three types of probability sampling:

- **Simple random sampling:** all the agents of this universe should be included in the sampling to avoid biases.
- **Stratified sampling:** population is divided into different heterogeneous groups which may be based on the criterion, e.g. male or female.
- **Cluster sampling:** population is divided into groups.

5.4.2 Non probability sampling: Selection of elements from a population using non-random methods. This type of sampling has three types which are as follows:

- **Convenience sampling:** non-random selection of subjects based on their availability.
- **Quota:** non-random selection of elements based on identified characteristics of representativeness.
- **Purposive sampling:** non-random selection of elements based on the researcher's judgements and knowledge about the population. This type of sampling is useful when pre-testing a newly developed instrument or when experts want to validate research information.

For the purpose of this study, because not every community member used the services from the initiatives, the author chose to use a non-probability purposive sampling as it is the most acceptable technique in drawing conclusions about populations when the researcher is studying a particular group based on intent (Bartlett, Katrlik, & Higgins, 2001). This sample included project initiators, the people who were involved in project development and implementation, and rural community members who have gained basic computer literacy training and use of the services from the initiatives. Discussed next is the data collection method followed in this research.

5.5 Data Collection

Regardless of the field of study, data collection is an important aspect in maintaining the integrity of any research. It is the process of collecting and recording data in order to support or oppose the research area, as well as to gain in-depth information on the subject matter (Thomas, 2011). There are different data collection methods that qualitative researchers rely on which are highlighted in the following table:

Table 5.3: Data collection methods (Mulhalla, 2003)

Data collection method	Description
Observations	Part of qualitative research which deals with selection and recording of behaviours of people within their social environments
Interviews	Conversations about a specific subject matter with a purpose to gain in depth knowledge
Audio-Visual Material	Computerised textual material in a form of video, sound, image, art
Document Reviews	Archival method which is rich in portraying the values and beliefs of participants in the setting of data

The above descriptions guided the selection of an appropriate data collection method for this study, and as such, interviews were chosen for collecting primary data. Interviews are the most commonly used research methods for generating data in a qualitative research as they provide in-depth information that is not quantifiable about a specific subject matter (King & Horrocks, 2010). Interviews for this study were unstructured as their aim was to obtain an in-depth view of the person being interviewed; they were used to explore about a specific topic where there was no structure or expectation in the way the interview was conducted (Cohen & Gabbtree, 2006). Five people were interviewed from each case study. The following map shows the Eastern Cape Province with the sites that were used as cases in this research:



Figure 5. 5: Map of Eastern Cape Province (Google, 2013)

5.6 Data analysis

All field work concludes by analysis and interpretation of some set of data collected, be it qualitative or quantitative. Data analysis is a systematic process of analysing and breaking the collected data into manageable patterns, with the intention of searching for explanation and relationships in order to understand concepts or variables and theories in a specific area of interest. This involves data coding, editing, classification and tabulation of collected data (Blaxter, Hughes, & Tight, 2006). As this research is qualitative in nature, the data collected was transformed into findings with no formula being followed for this transformation. According to Levine (1997), qualitative analysts understand text as a method to know participants' feelings and actions about a situation at a particular time. This text assists to gauge the richness of real social experience. Outlined next are the common activities that are carried out when performing data analysis exercise.

5.6.1 Data analysis activities

There are many overlapping activities that may be carried out when performing data analysis. Below is a fair set of activities which are arranged in the general order of sequence as discovered by Taylor-Powel and Renner (2010):

- **Get to know your data:** Data collected and transformed into text (field notes, transcripts, voice recordings) should be read and listened to in order to understand their meaning.
- **Focus on the analysis:** Identify key questions you want your analysis to answer and focus on how the individuals responded to each questions.
- **Categorise information:** Identify similar themes or patterns and organize them into coherent categories.
- **Identify patterns and connections within and between categories:** Assess the importance of different themes.
- **Bring it all together:** Interpretation and generalizations are established and explanation on findings it presented.

For analysis purposes for this study, all the collected data was documented and arranged into a database using a table as shown in Appendix A, following the point that was highlighted by Yin (2003) that database increases consistency of a case study research. The key question were identified and categorised into four categories (A,B,C& D) and were organized into whether the questions were for the user (denoted by U) or they were for the managers (denoted by M). Different themes were assessed according to their importance. Interpretations and generalizations were established, findings and analysis were presented in Chapter 6 of this study. Comparative case study analysis for the four cases in this study is presented next.

5.6.2 Comparative case study analysis

Actor Network Theory was chosen as a methodological stance for comparing and analysing data obtained from case studies used in this study, as it has characteristics of four notions for translation, generalized symmetry and heterogeneous network. These four notions of translation were briefly explained by Stanforth (2007) as follows:

- **Problematization:** moment whereby actors define problem to other actors in the network.

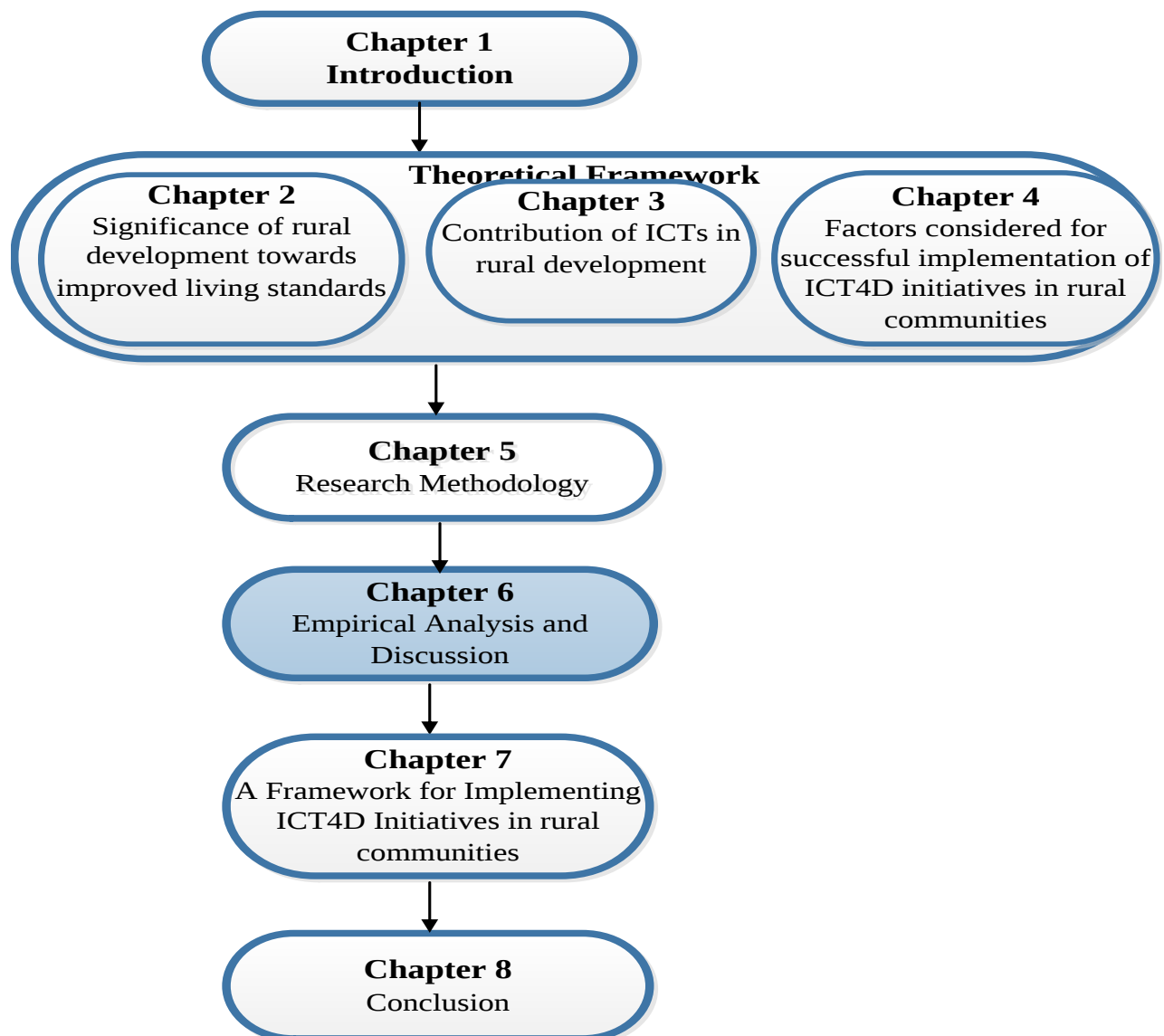
- **Interessment:** defines how actors are assigned into the roles proposed to them.
- **Enrolment:** successful outcome of problematisation and interessement whereby all actors are allocated roles.
- **Mobilization:** maintaining the network by convincing actors that they share the same interest with the translator. This is a set of methods used by main actors to ensure that the relevant actors are able to represent the masses.

To successfully apply these notions for analysing the findings in this study, it is important to first identify the actors and roles for all the cases that will be analysed. In applying ANT the term ‘actor’ was used to represent every element in the network, be it human or non-human. The next section concludes on this chapter.

5.7 Conclusion

In this chapter three philosophical perspectives which were positivist, interpretive and critical philosophy, that underlie all research were reviewed. An interpretive philosophical assumption was chosen as an appropriate philosophy for this study. Case study was chosen as a research strategy to be used in this study. Additionally, a discussion of the research methodology was provided as it assisted in drawing relevant conclusions to the questions. The next chapter which is Chapter 6 will present analysis of responses from the project initiators, and the people involved in the project development and implementation. Findings on the analysis data collected in order to achieve the objective of this study which was used to establish the framework for successful implementation of ICTs for development initiatives in rural communities, will be also be discussed in detail in the next chapter.

CHAPTER 6: EMPIRICAL ANALYSIS AND DISCUSSION



6.0 Introduction

This chapter discusses the findings, analysis and interpretation of the data obtained from the unstructured interviews that were conducted for this study. Data analysis and interpretation aim to give meaningful information from the data collected in order to address the sub-research questions. This exercise also plays a role in determining the activities that should exist during the implementation of ICT4D projects by developing a framework that can be applied to overcome ICT4D implementation challenges. The comparison and evaluation of the findings from this study and the reviewed literature was done so as to draw conclusions about the similarities and/or differences between the case studies in this study and to improve the proposed framework for this study.

Interviews served as the main primary data collection instrument for this study. Prior to conducting the interviews, the importance, basis and intention of the study were explained to the respondents. Furthermore, the respondents were given assurance that their responses were solely used for the purpose of this study, and that their identity will be kept confidential at all times. Two sets of interview questions were prepared, with twelve interview questions for project initiators and nine questions for rural community members. The questions for project initiators comprised of information about the stakeholders of the project its objectives, the implementation steps that were used for the project, ICT services offered and their value to the community. These questions were generated from the findings of the literature which highlighted the problems that are currently being faced by ICT4D initiatives with regard to their implementation and sustenance in rural communities.

The interview questions targeted project initiators and rural community members who have used services from the ICT4D projects implemented in their communities. The secondary data that was used in this study has provided a green light on different theories and strategies around this concept. The interview questions that were asked to the respondents in this study are aimed at gaining in-depth information on ICT4D project implementation strategies in South Africa, and understanding of the value of these projects in rural communities.

To give meaning and clear understanding to the interview questions, the researcher categorised these questions according to what each question aimed to address. The two sets of questions which were used in this study comprised of questions for rural community members and

questions for the project initiators. To give clarity to the research questions, the researcher provided categorisation for these sets, starting by providing four categories of the questions for community members. Below is a table which shows these questions where ‘U’ stands for user and ‘M’ stands for Managers. Full list of the questions is appended.

Table 6.1: Summary of categories of interview questions for community members

Category	Interview Question
U-A: ICTs benefits	Three questions [1,4,5] focus on contributions and benefits of having ICTs implemented in rural communities
U-B: ICT Skills support	One question [6] aims to assess if there were any ICTs skills to support the rural community by the service provider
U-C: Rural Community needs	Another set of three questions [2,3,7] attempt to assess the community needs from the respondents, as these will help make them enjoy the ICT4D projects with less problems
U-D: Community’s view about the project	The last two questions seek to find out how the rural community feel about the project’s existence within their community

The next table illustrates four categories of questions that were meant for project initiators:

Table 6.2: Summary of categories for interview questions for centre managers

Category	Interview Question
M-A: Project Implementation	Question [1]: Role of implemented ICT project in the interviewed rural communities Four questions [8-10,12] aim to check what steps were used in implementing the ICT4D projects, and if there were any ideas and recommendations on steps that could be used for implementing ICT4D projects in South Africa
M-B: Project overview	Three questions [2,6,7] are used to gain an overview of the interviewed ICT4D projects’ stakeholders and project goals
M-C: Services offered	One question [3] assesses services that were offered by the service provider in the interviewed rural communities
M-D: ICT4D Challenges	The last questions [4,5] aim at gaining information on community challenges and checking needs that were addressed by the ICT4D project in terms of economic, social and technical needs

The next section presents background of each site that was interviewed together with the findings that were gathered from each case. Following these findings will be a comparative analysis of all the cases using Actor Network Theory (ANT) moments as discussed in Chapter 4, as notions for translating the feedback on the collected data.

6.1 Data presentation: Selected cases

For the purpose of this research a brief background of four selected ICT4D initiatives, which were Milton Mbekela Senior Secondary School, Mpheko Dumrana Tele-centre, Qunu Integrated Energy Centre, and Viedgiesville Telecentre which are all situated in Umthatha, were discussed. Initially project initiators were to be part of respondents for this study. Unfortunately, it was established that most of these initiatives resulted from donations from overseas companies that were not easy to maintain contact with.

It was also established that some of the people with interest in rural development tend to lose touch with the rural communities after the ICT4D initiatives are implemented. Therefore, from the implementation questions only two project managers' responses from two different initiatives (*Mpheko Dumrana Telecentre and Qunu Integrated Energy Centre*) were used. These respondents had background information on the implementation of the mentioned initiatives, and their responses are recorded as Respondent 5 under the section labelled Manager's responses in Appendix A. The first case that will be presented will be that of Milton Mbekela Senior Secondary School initiative.

6.1.1 Case of Milton Mbekela Senior Secondary School

Milton Mbekela Senior Secondary School is a school that specialises in ordinary teaching and learning; and is based in Qunu administrative area which is situated in Umthatha in the Eastern Cape region of South Africa. This school was built by Caltex in partnership with the Department of Education with the aim to upgrade the Qunu community, as well as the level of education for the learners from Qunu and surroundings who wanted to attend a secondary education level. As such, this school has received stationery and calculators from Caltex and in 2007 and MTN donated about 13 computers to assist the learners in this school. This led to the introduction of Computer Applications as one of the subjects being taught to the learners, which unfortunately did not take effect for long as the subject adviser turned this subject down. In 2010, Caltex in partnership with the Department of Education donated 30 computers to this community.

All these computers are locked away in a computer laboratory, and are currently not in a fully functional state as they were not networked. Additionally, the absence of Internet access made it difficult for the students to perform their research activities within the school, especially during the weekends.

Five rural community members who have used services from the initiatives were interviewed. The project initiators for this initiative could not be reached as the documents which contained their contacts were not found; therefore no one was available to address the questions which were meant for the project initiators.

6.1.1.1 Findings on Milton Mbekela Senior Secondary School

To shed light on the broader study research questions for this study, the researcher created categories around specific items in the data for all the sites that were interviewed so as to see any differences and deviations from the categories. The first case that categories in Table 5 were applied to was that of Milton Mbekela SSS and under each category the following was revealed:

- **Category U-A: Benefits of ICTs in rural communities**

When asked about how the community benefits from the project, some of the respondents stated that they are not benefiting from the project, as it was not functioning and also not accessible to the community at large. However, some saw the project as beneficial to the rural community and supported this by mentioning that it was helpful to the students as they had a chance of exposure to computers which they did not have before. On income generation for the project, the respondents stated that there is no income being generated by the project as it is run by the school.

In assessing individual benefits on the use of ICTs, respondents stated that the use of Internet would benefit them by enabling them to do activities like sending emails and looking for online job opportunities. Some respondents mentioned individual benefits which included: learning how to fix computers, getting advanced training on computer applications, and using available resources to equip themselves.

The responses from question 5 which was about the contribution of ICTs in rural communities indicate that the rural communities do realise the benefits that are experienced through the use of ICTs even though rural communities do not benefit from these initiatives. Respondent 1

answered this question by saying: *“I would make sure I benefit from ICTs by getting advanced training on computer applications.”*

- **Category U-B: ICTs skills support to the rural community by the service provider**

When asked the question about support on ICT skills from the service provider, some respondents mentioned that there was a once-off training that was offered on how to use applications, whereas some stated that they did not receive any training from the service provider.

This means that there was a lack of ICTs skills support from the service provider as most of the respondents complained that they still wanted training.

- **Category U-C: Rural community needs assessment and ICTs challenges**

An open-ended question was asked to assess the views of the community on service providers and the services that they wanted. The replies showed respondents' complaints were about limited resources and the absence of the Internet, which were said to be making the project not fully beneficial to the students as they are the ones that can access the project since it's within the school premises. One of the respondents stated that: *“If only the provider could ask us what we want then we would enjoy and benefit from this project”*. Some respondents complained that the service providers did an incomplete job as some of the computers were not functioning and there was no Internet. Other respondents mentioned that some services that were provided by the service provider were relevant, but the problem lay with maintenance of the equipment.

This showed that the respondents did not have any problem with the service provider, but their problem was with the services that were offered to them. According to them, these services were not negotiated and communicated to the community before delivery and were also said to be limited. A follow-up question was asked to understand expectations and needs of the community from the service provider in improving the service delivery in their community. The responses showed respondents who mentioned increasing the number of computers in the site, maintenance and upgrading of the software, as well as servicing of the computers as an action that could assist to improve the implementation of these initiatives.

Another respondent suggested that *“Service providers should upgrade the software and service these computers, make regular visits to the sites to check if their equipment is still working*

properly as this is meant to benefit the community". Some respondents suggested that getting affordable Internet access could also improve the service delivery in their community, whereas others highlighted that training of people on how to use these computers could also assist to improve service delivery.

The responses for this question indicate that this initiative does not offer the services that are expected and needed by the rural communities as they have suggested on affordable Internet connectivity that they do not currently have in their community. Another thing that has been highlighted in the responses is the provision of the up-to-date software by making regular upgrades, as well as servicing and maintaining the computers as they sometimes become faulty with no one to fix them. There were some people who still need training on how to use these computers which could also help to improve service delivery as people would be able to use the computers for their own benefit.

When asked about expected services in order to improve benefits from ICT, some respondents mentioned trainings and workshops for rural community members who in turn will be used to train other community members, whereas the others advised on getting Internet access for job opportunities and the other respondent who did not have any advice as they were not benefiting from it. From these responses it can be concluded that people in rural communities do want to make use of these computers they get from the donors, but they lack skills on how to operate them. A reply was recorded as follows: *"We can be very happy if the service provider can increase the number of computers, refurbish the lab, train people from the rural community who will be used to train the community"*.

According to Beavogui (2009), needs assessment helps to identify gaps between the services that are to be provided to a rural community against those that are actually accessible to them. During this process, communities get a chance to voice out their priorities of gaps and suggest the needs that might have been overlooked by available services. Community needs assessment is a participatory process which requires stakeholders input, therefore the main stakeholders to be involved should be decided upon. These may include government, NGOs, rural community private and public sectors financial bodies and international institutions (McCewlay, 2009).

Therefore, it is vital for the project initiators to involve the community members by conducting community needs assessment prior to the commencement of the implementation process. This

will assist in giving the community members an opportunity to have a say in the outcome of the project by voicing out their goals and priorities. This in turn will develop a sense of ownership through involvement as their needs will be integrated in the project implementation.

- **Category U-D: Community's view on the project existence**

Respondents are in agreement that the entire community supported the project even though it is not yet accessible for use by the entire community. The support statement for this was: *"Yes, students sometimes get to use the computers even though the lab is always not accessible especially during the weekends. If the community members want to use services from the project they ask students to assist them by accessing the services on their behalf. For an example, if you want to make a copy of your ID, you give it to the student as he/she is the one who can access the school premises to make the copy for you. Even though this not easy but that's how we manage to access the services so far."*

The last question was to check if the community still wanted the project to continue. The responses showed some respondents appreciated the project even though they expressed their wishes on the extension of services offered to them and for monitoring of the project for a sustained use, whereas some were not sure and the reason was due to the respondents not being involved in the project. The next section will discuss the case of Mpheko Dumrana Tele-centre.

6.1.2 Case of Mpheko Dumrana Tele-centre

Mpheko Dumrana is a non-organisational centre based in the rural communities of Umthatha. This ICT4D initiative came into being as a project from the Anglican Church Dioceses of St John's, which became effective in 17 November 2004. On the year it was formed (2004), this centre received 6 touch screen computers which were not so difficult for the rural people to use. This was made possible by the funding assistance from NTCS which is a company based in USA. The high rate of HIV and AIDS and fear of this epidemic in this community led to the implementation of this initiative, whose objective was to raise awareness and educate rural people from the Mpheko community about HIV and AIDS through the use of touch screen computers. This centre also offers encyclopaedia for rural educators. USSASA also donated to about 10 computers which were networked, servers, photocopiers, a printer digital camera, projector, air conditioner, and a satellite dish with unlimited connection.

No computers were present at the time of site visit as the centre manager reported that there was a recent burglary at the centre and some of computers were stolen. The remaining computers and other ICT equipment had to be removed from the site and were kept in a safer place as the centre was not safe anymore.

Data collection for this initiative was obtained through the interviews from five people who are rural community members who have used services from the initiatives and one of them being the centre manager who managed to answer some of the questions that were meant for the project initiators. Therefore there are two sets of responses for this initiative; responses of the four rural community members and responses from one respondent which was a centre manager who managed to answer some of the questions that were meant for the project initiators. The following section will provide responses of the four rural community members for each interview question, followed by the responses from one respondent which was a centre manager who managed to answer some of the questions that were meant for the project initiators.

6.1.2.1 Findings from rural community using Mpheko Dumrana Tele-centre

This site was analysed by applying summary of categories for interview questions that were meant for community members as shown in Appendix A:

- **Category U-A: Benefits of ICTs in rural communities**

Photocopying and typing of documents, training and computer practise are some of the benefits from the ICT project. From these responses it is evident that people appreciate the fact that they can access some ICT related services from this project, at the same time they would appreciate it more if they could get training and more practise on how to use the computers for their own benefit.

The respondents mentioned that this project did not generate any income for them, as some were highlighted saying: *“The community depends on social grants and therefore it is not easy for them to pay above the minimum fee for the services.”* When asked about individual benefits on the use of ICTs, respondents mentioned training on typing and getting certification as things that they would do in order to benefit from ICTs, while others mentioned that the use of the Internet would benefit them by enabling them to send Emails and look for online job opportunities. One

statement said: *“I would first like access for the needs of the community before getting anything for myself, as this is a poor community.”*

These responses show that people want training more than anything, and they believe that this would benefit them as they will be able to get skills and look for job opportunities.

- **Category U-B: ICTs skills support to the rural community by the service provider**

The question on service provider’s ICT skills support revealed that the service provider once offered training on computer skills such as typing and how to use computer applications. Some respondents stated that students were also given a chance to do their school research for free, whilst educators were also given a chance to access online encyclopaedia. Therefore the responses indicated that the service provider was doing a bit to support the community on the ICT they need in order to make use of the services from the project.

- **Category U-C: Rural community needs assessment and ICTs challenges**

The respondents were asked an open-ended question on service providers and the services that they want in their community because the researcher wanted to know if they were happy with these services. The responses mentioned bringing government services closer to the community, and adding other government services to the community as the community only had Home Affairs Department closer to the ICTs project premises. Support for this was highlighted in a statement as follows: *“The service provider did meet the community needs as this project was communicated through the meetings with the chief, who normally spread the word to the entire community”*.

The respondents made it clear that they wanted more government services to be added and brought closer to the community as they could only access services from one government department that was placed closer to the ICT project premises. This was seen as a plan to overcome challenges of distance that rural people have with regards to travelling long distances to town in order to access government services and basic ICT services. A follow-up question which was asked with the aim to establish what the community needed to be improved from service delivery in their community showed that respondents wanted more training to be provided as this would improve the service delivery. Others suggested on the provision of

regular communication between the provider and the community, while another mentioned bringing research facilities within the project.

The responses for this question indicate that there is a lot of improvement that needs to be done by the service providers. More emphasis was on the provision of training as this will assist in developing the skills of the community members and thereby improve the service delivery. Another important thing was the mentioning of research facilities which would also assist the community to research on new information and ways of doing things from other communities, and thereby improve the service delivery in the community.

The views on the project were that the service provider should include government representatives in order to get financial support as this rural project is within their local municipality. Regular visits by the service provider for monitoring and evaluation of the status of the project were also suggestions made by the respondents. Another respondent suggested providing incentives for the people hired in the project as this will make them not look for other jobs. It was also suggested that the installation of security features like alarm systems to avoid break-ins would make the project to be usable.

The fact that the respondents had different answers to this question is an indication that people do have an idea of what they want from the service providers, as well as what will work for their community. Therefore they need to be given a chance to voice out their needs and not be offered what the service provider thinks will work for them.

- **Category U-D: Community's view of the project existence**

The responses on the rural community support of the ICT project indicated that the all community members were in full support of the project. A statement highlighted that: *“Yes, the community is always told about the developments that take place through the meetings with the chief”*. The respondents showed appreciation for the project and they also suggested that the service provider should bring more services, fix the site and replace the broken computers, and install security measures as the break-in have as ruined the project services for the community. The respondents mentioned that if the project could be secured against the break-ins, this would make it sustainable as there will be no need to go to town to access ICT services, as these are offered within the project.

From these responses it can be concluded that people from this community appreciate the project as its role is felt by the entire community, and as such they suggested on things that could make it continue functioning.

As it was highlighted beforehand that there were two sets of responses for this project, which were the community members' responses and project initiators' responses, the following section will illustrate the second set of interview questions and responses from centre manager of Mpheko Dumrana Tele-centre on behalf of the initiators. The next section represents the second set of questions to get findings from the centre manager of Mpheko-Dumrana Telecentre, as this site had two sets of questions.

6.1.2.2 Findings from centre manager of Mpheko-Dumrana Telecentre

This site was analysed using the summary of categories for interview questions that were meant for project initiators as shown in Appendix A, as these were applied for extracting findings from the project initiators of this site. The findings for this centre were as follows:

- **Category M-A: ICT4D implementation**

Amongst the roles that were mentioned by the respondent who was a project initiator on the role played by ICTs in rural developments was the improvement of service delivery for rural communities, and accessible and affordable projects that would be able to meet the needs of the rural community were highlighted. When the respondent was asked about the steps that were used to implement the ICT4D project, the respondent mentioned that she was not sure of those steps as she was not there when the project was implemented. The respondent would not recommend the implementation steps that were used for this project, but did suggest key ideas for implementing ICT4D projects.

Communication between the stakeholder, proper implementation framework to follow, and maintenance of equipment monitoring provision of funds were the key suggestions that were made by the respondent for successful ICT4D projects. The respondent also mentioned some actions which included involvement of government stakeholders and rural community members as this was hoped to create sense of ownership for the ICT4D project.

- **Category M-B: ICT4D Project overview**

The respondent mentioned that the project started in 2005 as an NGO with the assistance of the following stakeholders: Walter Sisulu University (WSU), National Centre for Supercomputing Applications (NCSA), Universal Service and Access Agency of South Africa (USSASA), University of Fort Hare (UFH), SENTECH, and the Anglican Church of St James and this project was said to target Mpeko rural community. The respondent mentioned that the long-term objectives of the project were to create awareness to the community on the issues of HIV and Aids and to train people to become computer literate. Short-term objectives were said to focus on conduction of trainings and workshops when needed.

- **Category M-C: Rural ICTs services**

The respondent concurred with the users that faxing, photocopy and printing, public phones and Internet as services that were offered to this community. These services were said to be helpful to the community members as they do not have to travel to town to access basic ICT services.

- **Category M-D: Rural community needs addressed**

The respondent highlighted social needs which were addressed through access to public phones, Internet and the existence of Home Affairs Department within the centre. Economic needs were said to be addressed through the fax, photocopy and printing, public phones and Internet which were offered at an affordable price and sometimes typing was offered for free. The respondent mentioned that technical needs were addressed through the installation of a satellite dish which allowed the community to have Internet access. The respondent stated that *“Social needs are addressed most as there is a Home Affairs department closer to the project’s premises and provision of Faxing, photocopy and printing, public phones and Internet services”*.

6.1.3 Case of Qunu Integrated Energy Centre

Qunu Integrated Energy Centre is a co-operative situated in Sasol garage based in Qunu rural community, which was donated by Department of Energy with the intention to bring service closer to this community. This initiative started in 2009 with 11 computers which are networked and have Internet connection. It serves approximately about 18 communities which surround the Qunu area. There are about 10 shareholders for this initiative of which most of them are Qunu rural community members.

Data collection for this initiative was obtained through the interviews of five people, of which four were rural community members who have used services from the initiatives and one of them being the centre manager who also responded to some of the questions which were meant for the project initiators. The responses of the four rural community members as well as those of the centre manager of this initiative were recorded for each interview question asked as shown in Appendix A.

6.1.3.1 Findings from rural community members using Qunu Integrated Energy Centre

Five respondents were interviewed to get responses about the ICT4D project called Qunu Integrated Energy Centre. Out of the five respondents, four were used to answer questions related to the ICT project on behalf of the community. Only one respondent was used to answer questions that related to projected initiators. The responses from the community members were also categorised using categories in Table 6 as follows:

- **Category U-A: Benefits of ICTs in rural communities**

The question asked on benefits that were brought by the ICT project in this community revealed benefits such as training and ICT services such as fax, photocopy and typing of documents, which were brought closer to the community which were said to be developing the rural community. This project did not generate any income for the rural community as it only offered access to ICT services. Even though that is the case, people in this community were happy to be beneficiaries of the project, as one statement was: *“ICT Resources and services are brought closer to our community”*.

When asked about individual benefits on the use of ICTs, respondents mentioned acquiring more training on computer skills and obtaining A+ and N+ certification as these would open chances for job opportunities. A statement in support of this said: *“I would use ICTs to benefit more socially through the use of email and economic benefit would be accessing these at a lower price.”*

These responses show that people want training more than anything, and they believe that this will socially and economically benefit them as they will be able to get skills and be able to look for job opportunities.

- **Category U-B: ICTs skills support to the rural community by the service provider**

The responses from this question mentioned that the service provider rents out the lab and ICT equipment to an accredited institution to offer ICT training to the community, which was said to be for the community members as they had interest on ICT trainings. Another way of support from the service provider was by teaching people how to type documents such as CVs and provide them with minimum usage of Internet for research purposes at no cost. Therefore the responses indicated that the service provider was trying to support the community on the ICT skills they need in order to make use of the services from the project.

- **Category U-C: Rural community needs assessment and ICTs challenges**

This open-ended question aimed to hear how the community feels about their service providers with regard to the services that they want in their community. Responses showed that respondents appreciated the service provider for bringing ICT services into their community, but they still wanted more training, more ICT services to the project and certification showing that they have got computer training. This was believed to open more job opportunities for the rural community. A statement to support this stated that: *“The project is helpful to the community but we want more ICT services from it”*; *“There are some ICT services that we hoped the project would offer which are not offered by the project.”*

Therefore, the ICT services that were offered by the service provider were not enough to meet the community needs as the respondents wanted more services. This means the service provider should have assessed the community needs by asking the community members what they expected from the project so as to meet their needs. One statement said: *“Appoint someone qualified technician staying closer to the site to maintain the ICTs equipment.”*

The responses for this question indicated that people are interested in getting computer training on how to use these services that are implemented in their communities. It can also be concluded that people want the ICT equipment to be functional at all times as they suggested on hiring people who do not live far from the site for maintenance purposes.

When asked on advice that they would give to the service provider, respondents suggested that the service provider should include academics and researchers as stakeholders of the project said they would bring innovative ideas on how to keep the project sustained for longer. It was also suggested that the service provider should consider hiring qualified people from the community

for training purposes instead of using an accredited institution which becomes costly, while some did not have any advice.

This means that the rural people have an idea of what would work for their community and these can only be known when they have been asked about their needs.

- **Category U-D: Community's view of the project existence**

The responses indicated that the community members fully supported the project. A highlighted statement said: *"Yes, most of the board members are from our community"*. All the respondents had different views about the project in their community. One respondent said: *"There needs to be a proper plan or a framework in place that can be followed when implementing these projects to avoid them from failing as they assist the rural community"*. Another view was that the community development should be a continuing effort; hence these projects need to be maintained. A highlighted statement said: *"The project is a success so far, we expect it to continue running"*. The respondents showed appreciation for the project and they also suggested that the service provider should bring more services.

From these views it is evident that people from this community appreciated the project as its role is seen by the entire community, and as such they suggested things that could make it continue functioning. Therefore, this project needs to be kept running as the rural people enjoy the benefit it brings to their community. The next section will address the questions from the project initiators point of view.

6.1.3.2 Findings from centre manager of Qunu Integrated Energy Centre

Questions to the centre manager of Qunu Integrated Energy Centre were categorised as shown in Table 5.5.29 and the findings were as follows:

- **Category M-A: ICT4D implementation**

The respondent was not sure of the steps that were followed to implement the project as these were not explained. The opinions that were shared by the respondent highlighted that the implementation of ICT projects in rural communities allow rural people to benefit from the ICTs services such as use of the Internet, phone fax and E-mail as these are brought closer to their communities through these projects. Therefore the success of these projects uplifts the standard

of living as ICTs are now used in every aspect of life. The respondent also suggested on communication, developing a framework to be followed when implementing these projects, as well as maintenance and monitoring and allocation of funds were highlighted to be the key elements for the sustenance of the ICT4D initiatives.

- **Category M-B: ICT4D project overview**

A question that was asked to give an overview of the ICT4D project and its goals indicated that the project was initiated by Sasol in 2009 with the aim to provide ICT services to about 18 communities surrounding the Qunu community. Stakeholders for this project included the Department of Energy, Sasol and KSD Municipality. This project was said to have long-term objectives which were to offer updated ICT equipment and services to the Qunu community as the Department of Energy sends a qualified service provider for the repairs. The short-term objectives, as explained by the respondent, were said to be the conduction of training and workshops when needed.

In explaining the stakeholders' involvement in the project, the respondent mentioned that the government was represented by the Department Energy, development agencies that were involved included Sasol, and the telecommunications operator for this project was Telkom. The respondent indicated that there were neither academics nor academic institutions that were represented in this project, and there were approximately 10 shareholders who represented the Qunu rural community. The respondents suggested adding academia to be involved in this project as it will assist to research on current ways of doing things that will keep the initiative alive.

- **Category M-C: Rural ICTs services**

The respondent mentioned that the social needs were addressed mostly through the provision of services such as faxing, typing photocopy, printing and Internet facilities.

- **Category M-D: Rural community needs addressed**

Services such faxing, typing, photocopy and printing, and as Internet facilities were mentioned by the respondent. As explained by the respondent, these services were said to have a positive impact on the community as the community members did not have to travel to town to access

basic ICT services. The respondent also mentioned that the use of public phones and Internet addressed the social needs of the community, and the fact that these were offered to the community at low and affordable prices assisted them economically. The technical gains were said to be experienced through the installed satellite dish which allowed the community to have Internet access even though there were limits due to connectivity costs.

6.1.4 Case of Viedgiesville Telecentre

Viedgiesville Telecentre is an ICT4D initiative based in the Viedgiesville rural area in Umthatha. This initiative was implemented in 2004 with the assistance of donations of 21 computers from Telkom with the aim to develop rural youth and women. According to the new centre manager, this initiative did not receive complete equipment from Telkom as it was not easy to do anything with the computers to develop the rural community. As a result, at the time of site visit the centre was not functional at all as most of the computers were broken and stripped off. Data collection for this initiative was obtained through the interviews of five people - all being the rural community members who have used services from the initiatives. These responses are shown in the categories of findings as shown below:

6.1.4.1 Findings from community members using Viedgiesville Telecentre

The findings in this site also were produced by making use of the categories in Table 5.5.30, which were addressed as follows:

- **Category U-A: Benefits of ICTs in rural communities**

All the respondents mentioned that there were no benefits experienced from the project due to the fact that there were no activities that were taking place and the project was not functional at all. Therefore the community was not developed at all, as one respondent said: *“The service provider donated incomplete and outdated equipment, hence there is no development brought by this project in our community”*. As such, this project did not generate any income for them.

When asked about individual benefits from the use of ICTs, the respondents mentioned training on typing and computer skills getting certification as things that they would do in order to benefit from ICTs. Amongst these mentioned benefits, access to Internet was said to benefit the community by enabling them to be connected to the outside world and be able to see quality services used in urban and request them to be implemented in their community.

These responses show that people want training and Internet access more than anything, and they believe that this would benefit them as they will be able to get skills and be able to look for job opportunities.

- **Category U-B: ICTs skills support to the rural community by service provider**

The question on service provider's ICTs skills support revealed that there was no training that was provided to this community. Therefore the responses indicated that the service provider needs to provide more support to the community with ICTs and provide the training they need in order to make use of the services from the project.

- **Category U-C: Rural community needs assessment and ICTs challenges**

The respondents' views agreed on the same view that the service provider did not meet the needs of the community as their needs and expectation of the project were not communicated to them. Additionally, some of the community members were not aware of this project and the services it claims to offer to their community. Hence the project failed as no one cared what happened to it since they do not own it. One respondent said: *"The service provider did not take into consideration needs of our community"*. It was also highlighted that the service provider failed to provide training on the services they offer as few people were trained, whereas the entire community was interested to be trained.

In this regard, the respondents advised on regular communication between the community and the stakeholders so as to inform the community about their intention and create awareness of the project and get to know their needs. Engagement of rural community members was also suggested as they are the ones that will receive these projects and this could help create sense of ownership for these projects amongst the community members. More emphasis was placed on the creation of awareness programmes to introduce these projects as rural community members are not aware of these projects. Conducting more training provision of Internet connection and ICT services such as printers and faxes photocopiers, were also highlighted as these would help to cut the distance to be travelled by the rural people to access these basic services.

- **Category U-D: Rural community's view on the project existence**

The community members did not support the project at all as it was not functional, even though some indicated that they were interested in having the project in a functional state.

The views of the community on the project continuity showed that the community was interested to use the computers and they would like the project to be serviced and upgraded. One respondent said: *"We feel that these computers were just dumped in our community, no one cared to know what happened after they were implemented. People from this community are interested in using the services from the project but it's not functional"*.

From these responses it can be concluded that people from this community would appreciate having the project up and running as its role is seen by the entire community for they suggested on making it to be functional again. The next section presents analysis of the findings using the four moments of ANT as discussed in the previous chapter (Chapter 4) of this study.

6.2 Comparative analysis of all the cases using the four moments of ANT

In analysing the four cases in this study, four moments of ANT are applied in the project implementation and this starts with identification of actors in ICT4D associations between actors for the projects which were interviewed. According to Silva (2004), information systems can be viewed as OPPs, therefore the OPPs for all these cases in this research were the ICT4D projects which were implemented in the rural communities as a solution bringing for socio-economic development opportunities.

6.2.1 Presenting problematization for the four cases in this study

The first moment of translation, problematization, begins by a focal actor which is an originator or initiator presenting a solution to a problem. Actors negotiate the obligatory passage point (OPP) with the focal actor. OPP is defined as a situation presenting a solution to problems by making use of the resources owned by the initiating agent (Naidoo, 2009).

According to Salamat and Hassan (2011), problematization is when a focal actor negotiates a solution to an identified problem that is experienced by others, and convinces them that the problem could only be resolved by passing through a passage point. For this study the OPPs were identified as the ICT4D initiatives which were implemented to develop the rural

communities in which they were based. These were the three telecentres (Qunu Integrated Centre, Mpeko-Dumrana Telecentre and Viedgiesville Telecentre) which were implemented to bring services closer to the rural people in the identified rural communities, as well as a school's ICT project to assist rural students from Milton Mbekela SSS in Qunu with computer exposure and to support research activities.

Before analysing the networks for these projects, it is important to identify the actors which formed part of these initiatives. For an ICT4D project network to be effective, Whyte (2006) and Heeks (2009) identified the following possible actors with their highlighted roles:

1. **Development agencies:** initiators that assist to accelerate the wheel of development through ICTs initiatives
2. **Telecommunications operator:** to provide telecoms infrastructure
3. **Rural community members:** to be beneficiaries and users of the ICT4D initiatives
4. **Government:** for ICTs policy formulation
5. **Local municipality:** for policy integration and financial support
6. **Public and private entities:** to bring different relations and interests to the user community
7. **International and national development organizations:** assist with funds by donating to the selected needy user community
8. **Academia:** to track future trends in ICT4D which will also help to strengthen competitiveness in tackling societal challenges
9. **Technology:** platform supporting operations of the initiative
10. **Centre managers:** manage the operations of the initiative

In the case of the four ICT4D initiatives which have been used in this study, it has been revealed Vidgiesville Telecentre had several problematization problems. This project was initiated by Telkom, and the key actors were unreachable and unknown to the centre manager as she reported that it was not too long that she has been working for the centre, meaning there was less communication between the stakeholders and the rural community. This caused the difficulties in tracing who was responsible for what in this project, hence there is no table showing the list of actors and the roles they played in the project. During the interviews it was also picked up from the responses that not all of the stakeholders were presented in this project, as the centre manager

reported that several attempts were made to involve government to intervene on the state of the telecentre. The centre manager said: *“The municipality just helps when they can, but they ended up saying they do not own this project so it can’t be their responsibility”*.

With the other three ICT4D initiatives (Mpheko-Dumrana, Milton Mbekela and Qunu Integrated Energy Centre) the actors involved a fair representation of possible ICT4D actors which was highlighted by Whyte (2006) and Heeks (2009) in the previous section. The key actors for each of the three remaining initiatives are highlighted in the tables below. The first table illustrates the actors and their roles in Milton:

Table 6.3: Actors and their roles in Milton Mbekela Senior Secondary School

Actors	Roles
MTN	Originator of the project to accelerate wheel of development through ICT4D projects and ICTs donations
Department of Education	Integrate technology into teaching and learning
Rural Community (students)	Beneficiary
Technology	To support the operations of rural community participation process
Principal (Centre manager)	Oversees the operations of the initiative

The following table demonstrates the actor and their roles for Mpheko-Dumrana telecentre:

Table 6. 4: Actors and their roles in Mpeko-Dumrana Telecentre

Actors	Roles
Anglican Church of St James	Rural community church
Northern Territory Christian Schools of South Africa (NTCSA)	Originator of the project to accelerate wheel of development through ICT4D projects and ICTs donations promoting quality Christian education
Technology	To support the operations of rural community participation process
USSASA	Development Agency
University of Fort Hare & Walter Sisulu University	Academia representatives
SENTECH	Telecommunications operator
Mpeko rural community	Beneficiaries

The table below shows the actors and their roles for Qunu Integrated Energy Centre:

Table 6.5: Actors and their roles for Qunu Integrated Energy Centre

Actors	Roles
Qunu rural community	Beneficiaries
Sasol	Originator of the project
Technology	To support the operations of rural community participation process
Department of Energy	Originator of the project
King Sabata Dalindyebo Municipality	Local municipality for policy integration
Qunu rural community	Beneficiary

From all these initiatives, only Qunu Integrated Energy Centre had a local municipality representative. According to Perret (2004) local municipalities should form part of the implementation process for ICT4D initiatives, due to the fact that rural development happens in municipal spaces. The author further mentions that the role played by local governments should be central in order to oversee the project identification, planning, implementation and management. This will assist in promoting Integrated Development Plan (IDP) with community based goals.

The problematization for the four ICT4D initiatives included negotiations by the development agencies with the communities on their interests to bring ICT based development services closer to the rural communities. These were offered in the form of school ICT projects which offered computer laboratory for the integration of ICTs to education and telecentres which provided fax, photocopiers, printers and Internet services. Even though some of these ICT4D initiatives were not fully operational, they acted as an obligatory passage point for the rural communities in which they were implemented. To support the problematization discovered in the four sites in this study, the following statements were recorded:

- A respondent from Mpeko-Dumrana Telecentre said: *“The project needs to be sustained as there is no need for use to go to town to access the ICT services because they are now offered within our community.”*

- Respondent from Milton Mbekela SSS commented: *“People in our community can now benefit socially through the use of Internet, fax, phone and email and these are offered at a lower. We no longer have to travel long distances to access these services.”*
- Respondent from Qunu Integrated Energy Centre said: *“ICT services and resources are now brought closer to our community.”*
- Respondent from Viedgiesville Telecentre stated: *“Service the computers and provide a trainer because our community is interested in using these computers and other ICT services that would be offered within the centre.”*

Even though the focal actors convinced the rural communities that implementation of these ICT4D initiatives (which were OPPs) in their communities would be a solution to overcome the development and information gaps through the use of ICTs, they failed to keep these networks held together by making the suggested OPPs to be sustained and effective. This has left the rural communities with a feeling that these initiatives were just dumped in their communities as no one seemed to take responsibility of their maintenance and existence. The respondent from Viedgiesville Telecentre commented: *“The service provider just donated incomplete equipment; therefore it is not easy to do anything that can generate income and develop the community.”*

6.2.2 Interessement

Interessement is a process of negotiation whereby actors which were identified during problematization are persuaded into identify with their roles into the OPP (Callon, 1986). At the present moment the interviews revealed that these four ICT4D initiatives were partially implemented as there were problems with the resources that were provided by the initiators in supporting the socio-economic development. Viedgiesville Telecentre, Mpeko-Dumrana Telecentre and Milton Mbekela SSS were discovered to have incomplete interessement as one respondent from Viedgiesville commented: *“The service provider donated incomplete equipment hence there is just no development”*. A respondent from Mpeko-Dumrana Telecentre mentioned that the site was unusable after a break-in said: *“The service provider should put in place security measure such as alarms as the project was broken into; we are no longer able to use the service from this project.”*

This was also found to be the case with Milton Mbekela SSS where the project was said to be a success at first and the students were excited as they had access to Internet connectivity to

perform their school work and research. However, after some time there was no Internet access, the computers broke and they needed to be fixed and the lab ended being closed as it became unusable. A respondent from Milton Mbekela SSS said: *“Lab is there but it’s not in a good state”*. Additionally to this another respondent commented: *“The project can only offer limited services which sometimes become insufficient for the learners as they still have to go to town to access a wide range of ICT services.”* This clearly shows that no interest was achieved in these three sites because they were completely not functioning, and people still had problems with access to basic services which this project was implemented to overcome.

These cases are a clear indication that there is no proper method followed in managing these ICT4D initiatives, and the actors which were assigned into roles for this initiative did not honour their proposed role which has threatened the success of these initiatives. The service providers needed to attend to this situation as it is their role to assign someone for maintaining these projects.

6.2.3 Enrolment moment

Bain (2009) defined enrolment as a moment whereby the initiators convince other actors to act in their roles by enrolling in the suggested initiative. Motivating others is a central activity to this moment; therefore this requires the managers and ICT professionals to have relevant skills that will assist in enrolling other actors. The analysis of the enrolment moment in the four cases in this study revealed that the initiators did an incomplete enrolment, as some of the members of the community mentioned that they were not aware of the project that was being run in their communities; while others commented that they were not involved in the implementation process of these ICT4D projects. This was also accompanied by communication challenges that existed between the community and the initiators, as some initiators were just unreachable.

Viedgiesville Telecentre was found to have uncontrolled enrolment as it was highlighted from this site that the community was not made aware of the project, and the negotiations about the existence of this project were not recognised by most of rural community members. Therefore this led to the rural community needs not being met as the community did not even know the type of services that were meant to be offered by the project. Even though some rural community members still had hope that the project would one day be reinstated, some members had loss of interest in this project as it was in an unusable state. For that reason, at the present

moment no development was achieved by implementation of this project since there were problems with enrolment leading to loss of motivation.

Milton Mbekela SSS also had challenges with enrolment in a different way. Through negotiations with rural community members, the initiators managed to convince the community that this project in the form of a computer laboratory would support learners' education by making use of ICTs. In this case the community was motivated and moved by the implementation of this project, hence they enrolled by allowing this project to be run within the school for the benefit of their students, as it was said not to be open for use by the entire community. As highlighted earlier, students were motivated by this project as they got exposure to computers, something they never experienced before the project implementation. As time went by the intersement challenges which included the lack of proper resources, maintenance of the equipment and unavailability of the services that were of interest to the students affected this site to a stage that it was not functional at all. Students had no choice but to use money and travel long distances to access the ICTs services which were offered in town, and their motivation and that of their parents was negatively affected by the state of the laboratory. A comment supporting this challenge stated: *"The project could only offer limited services which sometimes become unavailable and students still have to travel to town to access a wide range of ICTs services."*

In the case of Mpeko-Dumrana Telecentre, the chief and the community members were continuously involved in the negotiations about the intent of this project. Proper resources were employed to support the operation of this project, such that the entire community spoke fondly about this telecentre because they were made to feel part of the project as different rural community actors were enrolled in the initiative. This telecentre was working out perfectly and some more services, such as Home Affairs Department services, were brought closer to this centre, which was an added advantage accommodating the needs of the rural community as they did not have to travel to town to access such services. A respondent from this telecentre supported this by commenting: *"The service provider did meet our needs because this project was communicated through the meetings with the chief who spread the word to the entire community."*

The smooth running of this project was affected by the break-in which led to the stealing of the equipment that supported the processes and services that were offered by the project. This break-in was reported to have happened a few days before the appointment of the interviews with the centre manager. Therefore impact of this unfortunate situation was explicitly explained by the community members as they were still in shock. The community members that could to comment on this situation expressed their hopes for quick replacement of the lost equipment and reconditioning of the telecentre, as this was their only project in the community which they said was addressing their needs and offering them many relevant services and benefits. The following section will analyse the last moment of translation for these sites.

6.2.4 Mobilization moment

Mobilization is defined as the justification for actors representing their constituents which includes employment of strategies by focal actors to ensure participation of the representatives in support of the initiator's interest (Gunawong & Gao, 2013). To create stability in an actor network it is vital for the focal actor to first stabilize the actors in that particular network. In the cases discussed in this study, the stability of actors and that of the projects were not completed as it was revealed that the representatives did not have any active communications established amongst them. Some of the projects like Viedgiesville Telecentre failed completely as none of the four moments of ANT were achieved, while the other three projects failed partly owing to achieving the OPP that initiated the existence of the projects which posed a threat in the projects future. The next section presents concluding remarks on this chapter.

6.3 Discussion and concluding remarks

In summary, this chapter presented the analysis of data that was collected during the interviews. Based on the structure of the interview questions, the content of the questions that were meant for rural community members were categorised into four: benefits of ICTs in rural communities (Category U-A), ICTs skills support to the rural community by service provider (Category U-B), rural community needs assessment and ICTs challenges (Category U-C), and rural community's view on the project existence (Category U-D). Another set of questions was for the project managers which was also categorised into project implementation (M-A), project overview (M-B), services offered (M-C) and ICT4D challenges (M-D). The results of findings were analysed using the four moments of ANT which were discussed in Chapter 4 of this study.

According to the ANT the ICT4D networks are said to be heterogeneous as they consist of human (people) and nonhuman (technology, culture, etc) actors, which both involve negotiations. Social groups vote for representatives to voice out the interests through these negotiations, whereas technology speaks through experiment. Translations of these negotiations on interests happen through four moments of ANT which are: problematization, interessement, enrolment and mobilization (Rhodes, 2009). The analysis of the four projects which were discussed revealed that the implementation of ICT4D projects in rural communities still lack evidence of the role they play in socio-economic development. The analysis results indicated flaws in problematization by failing to achieve the negotiated OPP, incomplete interessement, uncontrolled enrolment as well as mobilizations which were not achieved. The fact that it was difficult to trace connections between the actors in these networks was an indication for the lack communication and enrolment of the stakeholders involved which represented their constituents.

6.4 Evaluation of the Theories used in this study

This section aims at comparing what was revealed in the literature reviewed to the findings of the primary data collected in this study. This is achieved by incorporating inductive logic allowing the researcher to make comparisons between the findings in this study and the theoretical explanations with the aim to establish whether the findings support or oppose the theory used. This was aimed at developing the framework by making use of the results of the study.

6.4.1 Rational choice theory

Rational choice theory was used to support development context as this theory it is linked human development which encompasses enlarging people's choices, such as to live a long and healthy life, to be educated and to have access to resources needed for a decent standard of living, which is in the case was said to be achievable through the use of ICTs. According to rational theory, rural communities have a choice to decide on the type of ICTs that they assume will give them greatest satisfaction. The way in which implementation of ICT4D initiatives has been done in the four cases which were analysed in this study is against the rational choice theory. The analysis of the results revealed that most of respondents complained about not being aware of the ICT4D initiatives which were in their communities, meaning they were not given a choice to choose their preferred choice of ICTs. This means that donors just decided to donate what they

thought would work for the chosen rural communities in the name of development, without checking the needs of each rural community.

6.4.2 Modernisation theory

Modernisation theory has been chosen as an appropriate theory for this study as it is of the notion that economic development brings predictable changes in the society. These predictable changes can be achieved by integration ICTs into people choices in order to modernize their lives. This is reason enough to propose a framework for the implementation of ICTs for development initiatives in rural communities, as the benefits of using these ICTs modernise the way in which economic, social, and political aspects of people's lives are addressed world-wide.

6.4.3 Actor network theory for analysis purposes

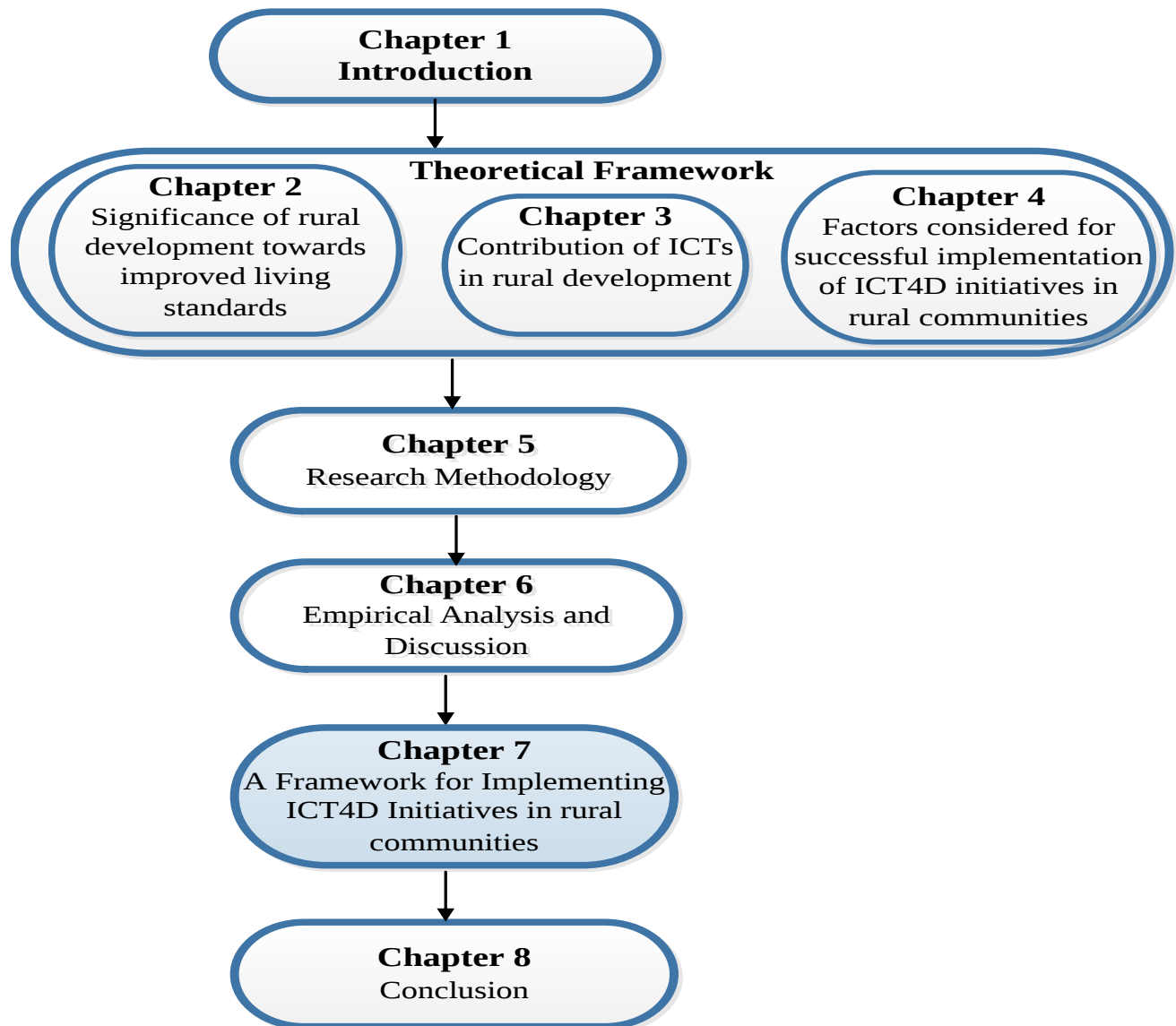
This chapter presented the analysis of data that was collected during the interviews. Based on the structure of the interview questions, the content for the questions that were meant for rural community members was categorised into four categories which were: benefits of ICTs in rural communities (Category A), ICTs skills support to the rural community by service provider (Category B), rural community needs assessment and ICTs challenges (Category C), and rural community's view on the project existence (Category D). The results of the findings were analysed using the four moments of ANT which were discussed in Chapter 4 of this study.

An intense literature review was conducted to establish similarities and differences from the four cases that were presented in the study, as well as get evidence pertaining to the respondents' experiences with the use the ICT4D initiative implemented in their rural communities. Even though some of the actors in these initiatives have tried to maintain their networks, the analysis of the results indicated flaws in problematization, indicating failures in achieving the negotiated OPP, incomplete intersement as there were challenges with resources provided by the initiators, uncontrolled enrolment where actors were not stabilized, as well as mobilizations which reflected failures in the spokesman's role of representing other actors in the network. The difficulties to trace connections between the actors in these networks indicated lack communication and enrolment of the stakeholders involved which represented their constituents. This indicates that most people still do not see the benefits and the role played by ICT4D projects in their communities as some of the sites are not functioning and not accessible to the entire rural community.

6.5 Conclusion

This chapter presented a process of developing the proposed framework for this research. This process carried out four various cases which the researcher investigated to get to in-depth scrutiny of ICT4D experience for rural communities. ANT was engaged for comparative analysis through the use of its four translation moments which assisted to deduce and interpret data. The findings of this research necessitated the ICT infrastructure framework proposed by this research. Thus, the evidence will be used to build the ICT infrastructure framework proposed by this research. The next chapter presents a proposed framework as a recommendation on the revealed analysis results from the four moments on ANT on the implementation of the ICT4D initiatives, as well as to address the research questions that were posed in Chapter 1 of this study.

CHAPTER 7: FRAMEWORK FOR IMPLEMENTING ICT4D INITIATIVES IN RURAL COMMUNITIES



7.0 Introduction

Chapters 2, 3 and 4 focused on the literature review which forms the basis for the main objective of this study which is to develop a proposed ICT4D framework for implementing ICT4D initiatives in rural communities. Rural development is one of the agendas that are given high priority by government, and this has been approached through the use of ICT4D initiatives which aim to uplift livelihood of rural communities. However, the four cases that were used to collect primary data in this study were confirmation for the problem stated in this study which is: ‘A number of ICT4D initiatives have been implemented in various rural communities, but there is still insufficient evidence of their role in supporting rural development’.

Chapter 5 provided a research methodology followed in this study, and chapter 6 applied ANT’s four notions of translation to compare and analyse the results of the four case studies which were the main research strategy for data collected through interviews. The analysis from ANT’s moments of translation highlighted flaws in problematization, challenges with incomplete interressement, uncontrolled enrolment and mobilization that did not happen. The results of the analysed data were then used as premises to build the ICT4D implementation framework which aimed at addressing the relative research sub-questions that were posed in this study.

The aim this chapter is to present the proposed ICT4D framework starting by revealing factors that can be considered when implementing the ICT4D initiatives in rural communities. These factors are believed to be the reasons for the failure of the ICT4D initiatives, and they are discussed in the following section.

7.1. Factors to consider when implementing ICT4D initiatives in rural communities

Given the background on the rural development in rural communities as discussed in sections 2.1 and 2.2 of Chapter Two, there is great need for consideration of underlying factors that should be catered for when implementing ICT4D initiatives in these areas. These factors include: *poor quality in education, poor access to connectivity, lack of ICT infrastructure, lack of health care services, agricultural challenges, and lack of access to business opportunities and information services*. Some of the challenges that were identified during the empirical research included: lack of awareness of the ICT4D initiatives, lack of communication between ICT4D stakeholders, poor ICTs integration into local content to meet community needs, lack of trainings. Additionally to

these challenges lack of resources, lack of trainings as well as lack of maintenance and ownership were also highlighted during the empirical research. It cannot be denied that these emerging ICTs have not been able to reach their maturity level in developing countries, especially in the rural communities, as the above mentioned challenges hamper the effectiveness of ICTs in rural communities.

There are different ICT stakeholders that target rural communities by providing them with ICTs services to support rural development initiatives. However, these ICT initiatives often neglect the needs of the people that they are meant to serve. This negatively affects the operations of the ICT4D initiatives in rural communities as some of these initiatives are left abandoned (Chapman & Slaymaker, 2013). This has been evident from the cases that were used in this study, where the same challenges and more were experienced. The results of this study demonstrated that two out of four interviewed ICT4D initiatives were left abandoned as they were unusable due to the mentioned challenges. The next section therefore provides a solution to this situation in the form a proposed ICT4D framework.

7.2. Components of the proposed ICT4D framework

Implementing ICT initiatives in a rural context becomes a challenging and complex activity as these initiatives need to cater for human and non-human factors. In order to achieve this, strategic planning has been highlighted to be the most critical factor which serves as a guide that reinforces accountability to all the relevant actors in services delivery, allocation of appropriate resources and report on performance (Flora & Arnold, 2012). In the case of ICT strategic planning, the relevant actors are required to ensure that the use and application of ICTs are consistent with government policies and priorities. These actors therefore need to develop strategies that will produce measureable and achievable outcomes, which could be attained by monitoring the progress of implemented ICT projects.

ICT strategic planning requires an exclusive understanding of underlying issues that will assist in making the ICTs initiatives to be responsive to the rural environments in which they are implemented (Flora & Arnold, 2012; Kormanicki, 2012). Amongst other feasibility factors that were discovered, the following issues shown in the figure below also need to be taken into account:

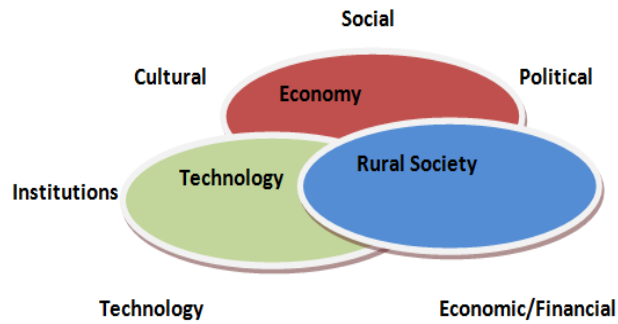


Figure 7.6: Issues to be considered when implementing ICT4D initiatives in rural (Pade, Mallison, & Sewry, 2008)

The following are the issues that are highlighted in the above diagram:

- **Economic issues:** problems related to the production, management and use of resources for rural development to meet the communities' needs.
- **Technological issues:** refers to the choice of technology for rural environment which should support specific ICT initiatives and consider factors that may negatively influence its implementation.
- **Rural Society issues:** includes social, cultural and political issues that shape a rural community (Tourism, 2012).

In an attempt to link the above mentioned issues it has been highlighted that the implementation of ICT4D initiatives tends to focus more on addressing technological issues but ignore the non-technical issues, thus resulting in negative implementation of these initiatives in rural communities (Pade, Mallison, & Sewry, 2008; Tourism, 2012). This was not in line with the ANT concept which viewed the ICT4D initiatives as consisting of heterogeneous networks, which included human and non-human actors. Consequently, these actors (be it human or non-humans) should all be given equal consideration due to the value they bring in the stability of the network.

Despite the technical issues that were discovered in the four mentioned cases in this study, the researcher also revealed non-technical underlying issues that are often undermined when implementing the ICT4D initiatives. These issues included: *economic, social, cultural and political issues*, which were considered to be the underlying issues that shape a rural community. The importance of these non-technical issues was also highlighted by the two theories of

development which are linked to this study, which are modernisation theory and rational choice theory. Modernisation theory is of the notion that economic development results to change in the society, and the change collapses if there is economic collapse. This theory also highlights that the economic and technical development results in political and social change. On the other hand, the rational theory is of the notion that economic development results to choices which lead to desired objectives and goals whereby people express their preferred alternatives that give them satisfaction. These two theories agree on the common grounds that the social interaction results to social change. Therefore consideration of factors such as the integration of rural community contexts and community participation is vital towards successful implementation of ICTs in rural communities.

The mentioned issues that were discovered from the literature review were also evident in the primary data, where economic challenges were due to lack of funds to maintain the ICTs, technological challenges where technology for the rural environment was poorly implemented with incomplete resources, social challenges and lack of local content. The results from the interviews revealed that these challenges had a negative impact on the success of the ICT4D initiatives as these are often left abandoned.

These issues and challenges together with the analysis from the primary data in the previous chapter and literature review chapters set premises for this paper to propose a framework that can be used for implementing ICTs for development initiatives in rural communities. The proposed framework is discussed next.

7. 3 The proposed ICT4D implementation framework

The framework in Figure 7.2 has been developed to accomplish the research objectives for this study. The literature confirms that seven key components outlined in the framework result in stabilized ICT4D networks (Burgess, 2012; Gomez, Pather, & Dosono, 2012; Surty, 2012; Ronelle, 2011). As findings of this study supported the explanations on implementation of ICT4D initiatives and theory used to construct the proposed framework, all the factors of the proposed framework remained constant.

From primary data, lack of trainings, lack of resources, lack of local content and lack of stakeholders' involvement were found to be more significant factors compared to other challenges. These were discovered to be the driving forces which led to the ICT4D initiatives

being left abandoned. Therefore, this study argues that these factors should be given highest priority when implementing ICT4D initiatives, hence they also form part of the proposed ICT4D implementation framework.

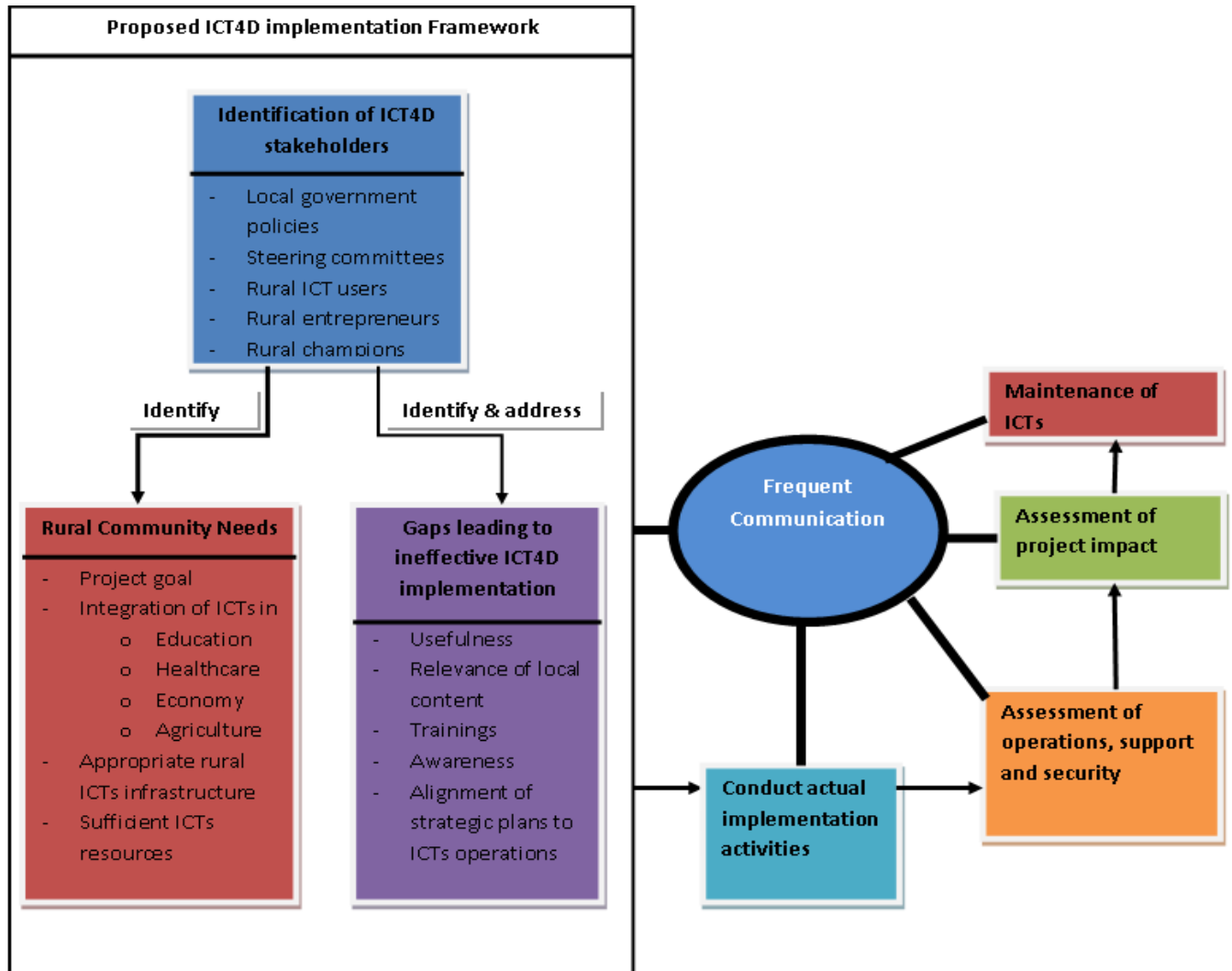


Figure7.7: Proposed framework for implementing ICT4D initiatives in rural communities

The key components of a proposed framework start by identification of key ICT4D stakeholders which will Some of the relevant ICT4D stakeholders include local government, rural ICT users, rural entrepreneurs, and rural champions These stakeholders will then assist to identify and execute the pre-implementation processes which include identification of rural community needs, starting by establishing project goals, integrating ICTs into rural context, identification of appropriate and supply sufficient rural ICTs infrastructure and resources. After the execution of pre-implementation activities follows the actual implementation activities as discussed in 7.3.1,

followed by assessing the operations through monitoring and evaluation, and lastly assessment of the project impact. These should be addressed in the order they are listed as the accomplishment of one component leads to the execution of the next component. The first component, which is ICT4D stakeholders has been given much attention compared to other components because all the activities that are carried out during the implementation process are made possible by the stakeholders. These components are discussed in detail in the following section.

7.3.1 ICT4D Stakeholders

ICT planning requires establishment of appropriate governance arrangements in the form of management structures that will assist to ensure that the ICT activities are in line with government policies and priorities, as well as the objectives of the ICT initiatives (Traore', 2008; Tourism, 2012). In ICT4D initiatives, an ICT4D steering committee is an appropriate management structure that can be set up to ensure that ICT4D activities are carried out effectively.

ICT4D steering committee is defined as a key body that is organized to ensure that ICT strategies that are practised by an ICT4D initiative are aligned with its strategic and corporate objectives (Burgess, 2012). The role of this committee is to ensure that the ICT resources are used and managed effectively and that the initiative is implemented according to the objectives that are outlined in the development plan and ICT policies. The effectiveness of this committee and other stakeholders involvement in the project depends on careful selection of stakeholders which can be done through the process called stakeholders analysis. This process is defined as systematic gathering and analysis of qualitative information to establish the priorities on the interests of other actors involved in the implementation of a project (Bryson, 2004). The following figure shows steps that should be carried out when conducting stakeholders' analysis process:

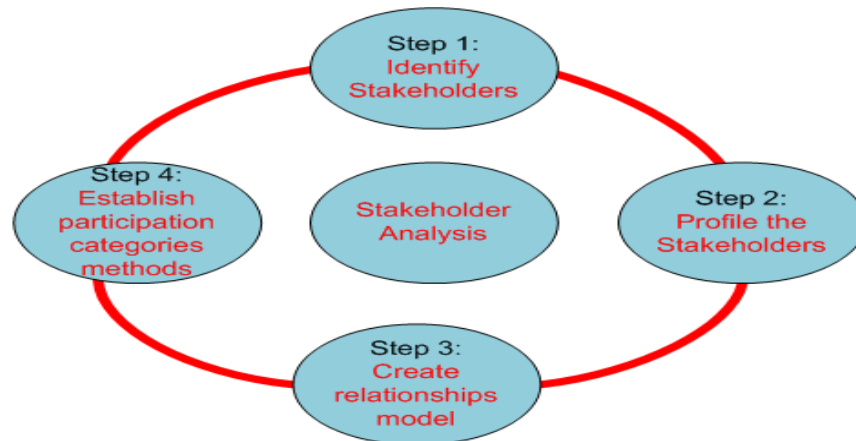


Figure7.8: Steps for conducting stakeholders' analysis (Bayugo, 2011)

This figure illustrates steps that can be helpful for achieving a successful stakeholders' analysis process. These start with the identification of stakeholders in an initiative. In any initiative concerning the public there is no doubt that should there be a problem that arises, it will surely affect every member of the public whether positively or negatively. Should this be the case, no one is fully in charge; instead each member of the public is expected to act a partial responsibility in problem solving. Therefore this requires the problem to be identified and known to all the stakeholders and possible solutions should also be determined. This necessitates the recognition of stakeholders with relevant skills as they were identified during the stakeholders' analysis process is recognised for addressing the problem (Schmeer, 2001).

In the case of an ICT4D initiative, the stakeholders should include rural community champions, rural community members with basic computer literacy, project initiators, NGOs, donors, national and international development agencies, as well as local and national government representatives. The inclusion of the rural people in ICT4D management structure will make them feel part of the initiative and thereby create sense of ownership, rather than seeing the initiative as being beneficiaries (Kapugama, Lokanathan, & Perera, 2011). Therefore the success of ICT4D implementation largely depends to whether the actors' interests are aligned with the objectives of the initiative itself, which in turn will make the actors to be actively involved as their roles will be clearly articulated in the stakeholders' analysis. During the identification of the stakeholders their profiles will automatically be profiled allowing a better understanding of each stakeholder and how to get each stakeholder involved.

After setting up the ICT4D steering committee and identifying relevant stakeholders, harmonious effort is required to carry out the following activities which are critical success factors for sustained ICT4D implementation

7.3.2 Identify rural community needs

Needs assessment is the fundamental component of implementing effective services and achievement of the objectives that can be defined as a process of getting involved in a community with the aim to assist community members to learn more about their current situation, problems and needs to facilitate development goals to address those problems (Westaway, 2012; Dlodlo, et al., 2009). Prior to conducting a needs assessment, a baseline study should be carried out as part of the needs assessment exercise as it will assist to guide the entire exercise by highlighting all the key needs and priorities of the rural community. It is recommended to engage community stakeholders as it is an effective way to learn more about the community and the services needed from the community members. Needs assessment will also help to determine if there are any existing infrastructures and services which can be used when implementing the ICT4D initiatives or if there will be a need and possibility to provide relevant infrastructure and services (Harindranath & Sein, 2007).

7.3.3 Identify project goals

Any initiated project serves a purpose and goals to achieve, whether is to respond to an opportunity, to resolve a problem or to conform to directive (Satzinger, Jackson, & Burd, 2007; Shelly, Vermaat, Sebok, Quasney, & Freund, 2012). In the case of an ICT4D initiative, their goal is to respond on the call to resolve and close development gaps in rural communities through the use of ICTs. These are achieved by implementing ICT4D projects with services that are designed to suit the needs of the rural communities. Once the project goals have been identified the next activity is the execution of pre-implementation processes which will assist to assess the feasibility of implementing and achieving the project goals. These are discussed next.

7.3.4 Execute pre-implementation processes

For any initiative to be implemented successfully the following processes need to be considered:

- **Determine financial sources and stability**

Before deciding on implementing ICT4D initiatives, funding plans should be determined before commencing with the implementation process as they will be the deciding factor on whether the initiative will be successfully implemented (Kasigwa, Williams, and Baryamureeba, 2009). Once the funding and finances are in order, it will be easy to decide whether to go on with the ICT4D implementation process. Implementation of ICTs in rural communities begins by identifying rural community needs that can be addressed by making use of technology.

- **Determine appropriate infrastructure**

The technology infrastructure for an ICT4D initiative depends on the type of services required by the rural community; hence this should be addressed prior to setting the infrastructure so as to integrate the rural community needs. Affordable technology choices for a rural community set up may include: thin client systems, Linux operating system, Linux Terminal Server Project System, refurbished computers and handheld computers. As some of the rural communities' needs may include electricity infrastructures, affordable power sources can be established by making use of a solar power photovoltaic, wind energy, micro hydro-power clockwork power and surge protection (Avnita, 2010; Burgess, 2012).

ICT services are defined as services that are offered to the user by the telecommunications network operator (Dlodlo, et al., 2009). For a rural community set up, these services should be established in consideration of the rural social context as they should be created to address specific rural community needs as outlined in the needs assessment. As rural communities are described to have challenges with electricity, finances, literacy levels and poor infrastructure, ICT4D initiatives should offer **ICT resources** and services that are demand driven as requested by the beneficiary, and these should be made to adapt to rural communities environments (Avnita, 2010). Computing services, communication services, training and education services, basic office services and information services are examples of services that should be offered to rural communities.

The two models on which ICT service provision in rural communities is based were discovered by Dlodlo, et al. (2009) to be:

- **Private Service access:** In this model the users own the ICT terminal devices which they use to access services from.

- **Communal service access:** In this type of a model the third party facilities provider (telecentres, phone shop) provides physical premises for a shared use of ICT devices and services.

The difference between the above mentioned rural ICT services models is that it costs more to access services privately than accessing them from a shared or communal facilities provider. Therefore, the best model for accessing ICT services for a rural community is the communal service access model as it offers affordable access to ICT services, and some of the services that can be obtained from this model include public libraries, telecentres, living labs and Thusong service centres. The rural ICT services should be implemented in such a manner that they are able to integrate the **local content** needs as identified in the rural community needs assessment, as this will assist to reduce social exclusion. After achieving the pre-implementation activities, the next activity is to conduct the actual implementation as discussed in the following section.

7.3.5 Conduct actual implementation Activities

The following activities are executed during the implementation stage:

- **Develop and install the rural initiative**

The initiative to be developed depends on the needs of the rural community which were outlined during the analysis stage. During this stage the developers should try to integrate the rural community needs as these will be success factors for the initiative implements.

- **Involve community members through personnel hiring and trainings**

When the ICT4D initiative is up and running there has to be people hired to operate the initiative. As the stakeholders will identified in the stakeholders analysis, this would be an easy exercise as the potential stakeholders would be easily identified and assigned to roles they attract. Hiring rural community champions will also assist in making the ICT4D initiative effective as they will develop a sense of ownership as the rural community would want to see the initiative operational at all times. Additionally, **training** is also as important to equip the ICT4D users and the rural community with relevant skills to operate the initiatives. Human resources can also act as an entrance for incentives for the people hired within the ICT4D initiative.

- **Implement and launch the initiative to create awareness**

Marketing strategies can be used as a way of launching ICT4D initiatives to the community, because not all rural community members may be aware of initiatives, products and services that are being offered by the initiative implemented their community. The relevant rural marketing strategies and other ICT related communication strategies may include: word of mouth, rural community forums, community radio stations and Imbizos. Once the rural community is aware of these ICT4D initiatives they may use the ICT4D services offered by the initiative for their benefit (Clough, 2011). The use of these initiatives needs to be evaluated and monitored in order to determine whether they are used effectively.

Regular communication and coordination amongst the stakeholders of an ICT4D initiative is central to the success of that particular initiative. Therefore ICT4D stakeholders should commit themselves to the sustainability of the initiative by maintaining effective communication channels that will require constant input and feedback from all stakeholders (Oltmanns, 2008). Different feedback mechanisms that can be engaged as a means to establish regular communication among the stakeholders may include but not limited to face- to-face communication, E-mails, chats, telephone conversations and SMS (Oltmann, 2008). The above mentioned components are referred to as the best practice for implementing successful ICT4D frameworks (Reijswoud, 2009). Once the initiative has been implemented there need to be ways in place to assess if the operations meet the specified project goals, the next section discusses processes that should happen during this activity. Following the implementation process is the assessment on operations support and security of the initiative as discussed in the following section.

7.3.6 Assess operations, support and security

The purpose of this implementation activity is to provide ongoing support for the ICT4D initiatives and the users once they are implemented. Shelly, Vermat, Sebok, Quarney, and Freund (2012) highlighted the following three processes which make up this activity:

- Performing maintenance: include fixing of errors, and improving the systems operations.
- Monitoring of the system: determine whether the initiative is performing according to the specified user requirements, as well as check if the system is unstable at any point.

- Assessing the system security: refers to securing the information systems and the resources against threats from within or outside the initiative.

When these processes are executed they lead to the success of the ICT4D initiatives. In order to know whether the operations of the ICT4D initiative are a success there need to be measures assessing showing the project impact which is discussed next.

7.3.7 Assess project impact

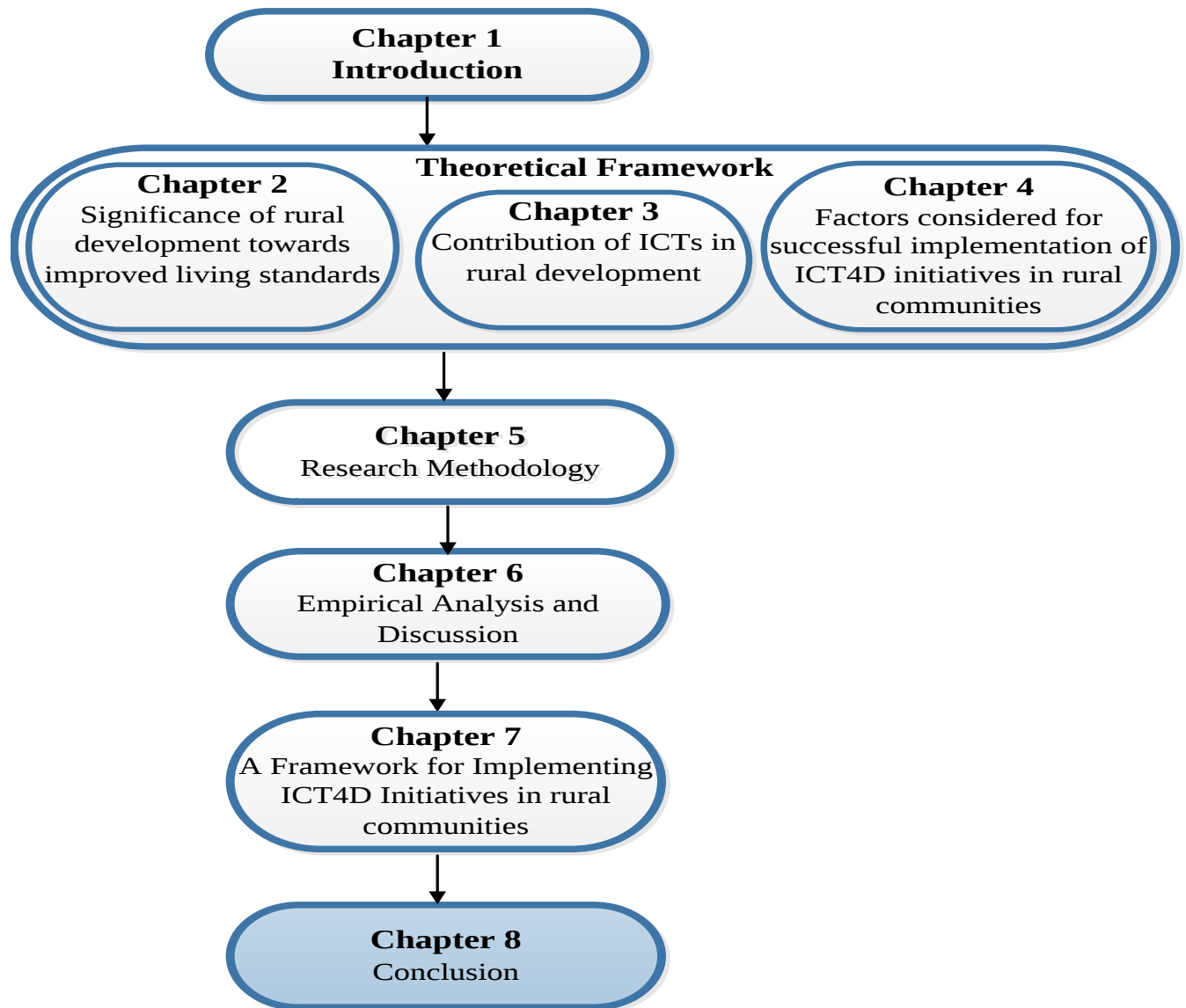
This exercise may include evaluation of resources, activities, participation, reactions, knowledge, attitudes, skills and aspirations, practices and evaluation of social economic and environmental conditions which can be done through field notes, photography and video and audio recording (Chyau & Raymond, 2005; Flora & Arnold, 2012; Surty, 2012). Okyere & Mekonnen (2012 and Anie (2012) labelled these as critical components for successful implementation of ICT4D in rural communities. According to Okyere & Mekonnen (2012 and Anie (2012). Evaluation and monitoring is a research based set of questions, interpretation and judgement of data from a forward-looking perspective on development priorities, mainstreaming and scaling to inform donors and partners. This will assist to check if the project meets the desired goals. Therefore, the review from the existing literature and analysis results enabled the development of the proposed ICT4D framework as shown in Figure 7.2. Presented next is the conclusion on this chapter.

7.4 Conclusion

Successful implementation of ICT4D initiatives is a task that involves multiple stakeholders. This makes it difficult to manage such initiatives as responsibilities are scattered amongst people with different social backgrounds. Continuous communication and coordination amongst stakeholders is emphasised in this research as this is one of the success factors in achieving the goals and objectives of the initiative.

This framework will assist to guide those interested in implementing successful ICT4D initiatives in rural communities. A summative conclusion of this research project will be presented in the next chapter. This concludes the research project by applying the knowledge gained from the research to the objectives of the study.

CHAPTER 8: CONCLUSION



8.0 Introduction

The theoretical framework for this study was discussed in Chapters 2, 3 and 4. Chapter 5 highlighted the research design and methodology applied in the study. The findings were presented through discussion of the analysed four cases in this study in Chapter 6 in response to the research question and sub-questions which constituted the proposed framework. Chapter 7 provided the recommendations in the form of the proposed framework. This led to the proposal of a framework to ensure successful implementation of ICT4D initiatives in South African rural communities.

The aim of this chapter is to provide the review and the contribution made by this study. A review of theoretical framework is presented. This is followed by a summary of the research findings and begins by discussing each research question that was posed in this study. The limitations and directions for future research are then outlined, followed by an evaluation of the research project and a brief conclusion.

8.1 Theoretical Framework

In order for the ICT4D initiatives to be implemented successfully, the project initiators must keep the network alive by integrating the key actors' interests in the implementation of the initiatives. Communication should be central to the implementation process, and rural community members should be involved and represented in the ICT4D steering committee as they are ones that will voice out their interests on what they would like to be delivered during implementation. Therefore, ICT4D implementation processes need to be coordinated and monitored to check if they meet the objective that they were implemented for.

Actor Network Theory (ANT) was used to trace the relationships between the stakeholders in the ICT4D networks. Lack of communication has been discovered to be a huge challenge in an actor network (McCubbins & Rodrigues, 2013). This theory was discussed in detail in Chapter 5 of this study. In decentralized projects like ICT4D initiatives it can be difficult to maintain collaborations as team structures are said to be complex (Yang, Ahija, & Shankar, 2007). The gist of this framework puts emphasis on the establishment of continuous communication between the stakeholders as this has been deemed as a life blood to any business endeavours and projects.

The analysis results from this study have deduced that one of the reasons for failure in the ICT4D initiatives was due to the lack of communication between the stakeholders. The recommendation made by this paper is on the importance of coordination between the ICT4D steering committee, of which its stakeholders should also involve community members so as to create a sense of ownership and user involvement in the implementation of ICT4D initiatives. This will result in effective and successful implementation of ICT4D initiatives.

8.2 Summary of Research Findings

The problem identified in this research study is that ICTs in rural communities are not implemented successfully and therefore they end up not serving the purpose for which they were intended. In order to address this research problem a research question was formulated and was subdivided into three sub-questions which were asked. This section will provide a summary of the research outcomes of this study against the research questions stated in Chapter 1. The sub-questions were used to collect information that would answer the main research question. This study will investigate the stated problem in order to provide answers to the following questions:

8.2.1 Research question:

How can ICT for development initiatives in rural communities be implemented successfully?

8.2.2 Sub-Questions:

a) What is the significance of rural development towards improved living standards?

The significance of ICTs in rural communities was discussed extensively in Chapter two of this study. It was highlighted that social benefits for rural communities include social interactions which involves collaborating with others making use of Internet services such as Email, chat, real-time video and audio communications. This also involves online access to press in digital formats, authored information sources, educational and research purposes, as well as accessing local government services and information (Anie, 2011). It was also pointed out that according to ITU (2010) social interactions were made possible by ICTs that facilitate social networks which support interactive communication, conversation and network; as opposed to traditional one-way media such as television, radio and newspaper. A good example of how ICTs can

facilitate social interactions in a positive way is through use of living labs and Reconstructed living labs (RLabs).

RLabs offer social innovators with incubation programmes on how to turn the original ideas into reality. In Cape Town, RLabs are successfully used as a support centre for drug abusers and support for their families. The success of the Siyakhula Living Lab which operates in deep rural communities in the Eastern Cape is another way of promoting social interaction within rural communities, whereby rural communities are provided with innovative methods to access information, thereby allowing rural people to expand their interactive social capabilities for socio-economic benefits.

The economic benefits category focuses on science and technology infrastructure. Rural people can now experience economic benefits through the use of ICTs and the most important benefit comes with the use of Internet, which has made their lives more economical as the Internet saves time, travelling and money. Internet has improved rural people's lives because farmers can participate in new farming activities that are supported by ICTs, allowing them to market their products, and know about the weather forecasts and commodity prices (Hoorik & Mweetwa, 2007).

Hoorik and Mweetwa (2007), highlighted that the Internet has been used to enhance the delivery of education outputs with the aim to improve education, through the use of e-learning which is said to have potential to bridge the educational gaps experienced by rural communities. Additionally, doctors in a rural community are now able to get up-to-date information on outbreak of diseases and be able to treat and warn the rural community (Okyere & Mekonnen, 2012).

There were also political benefits that were gained through ICTs as rural people were able to engage in democratic processes through the use of web-based public information kiosks, electronic citizens' forums and electronic voting. An example of this was highlighted in Chapter 3, as South African political parties made use of social networking forums to stay in touch with their wards during the 2009 elections. They also made use of new media technologies to announce their meetings, publicise their manifestos and communicate with party members. Prospective voters participated in online discussions with political parties to voice out their

views (Marishane & Shackleton, 2009). The next section addresses the second question on the contribution made by ICTs to support rural development.

b) How do ICTs contribute to development in rural communities?

This question was addressed in Chapter 3 which outlined the contributions made by ICTs to support rural development. This chapter discussed a brief overview of how ICTs initiatives have contributed in the improvement of human lives by highlighting how ICTs. Challenges associated with ICT4D implementation in rural communities were also highlighted. These included poor telecommunications, lack of appropriate ICT skills, accessibility challenges. These challenges and other challenges that were discovered from the analysed cases laid ground to propose an ICT4D framework as a means to address these mentioned challenges, in order to improve on the implementation of ICT4D initiatives. The third question was addressed as follows:

c) What factors must be considered for successful implementation of ICT4D in rural communities?

The analysis results together with literature review formed the basis into construction of the answers for this question. This was presented in a form of a proposed framework which was discussed in Chapter 7 of this study, highlighting the components which needed to be considered in order to implement successful ICT4D initiatives in rural communities. These components included: identification of ICT4D stakeholders, rural community needs, assessment of operations, and support, and security, assessment of project impact and maintenance of ICTs. Central to these components was frequent communication which has to be maintained in order to keep the projects running and sustained for long.

As highlighted earlier, the main objective of this study was to develop ICT4D initiatives to be successfully implemented in rural communities of South Africa, and this objective has been addressed through by providing answers to the research sub-questions which were posed in this study. Contribution made by this study is discussed in the following section.

8.3 Contribution made by this study

This study has developed and proposed a framework for successful implementation of ICT4D initiatives in rural communities of South Africa. The framework depicted in Figure 6. 2 illustrate

the factors to be considered as success factors for ICT4D implementation in rural communities. The implementation of ICT4D initiatives has brought about many benefits for rural communities which included social and economic benefits as these ICT4D services are offered at lower transaction. These have been practised through the implementation of telecentres, ICT schools' projects, and living labs. Along with these benefits there are challenges that are said to be stumbling blocks in the implementation and sustainability of these initiatives. The proposed framework addressed such challenges by outlining a set of considerations for successful implementation of ICT4D. The limitations of this study are outlined in the next section.

8.4 Limitations of the Study

This study attempts to address ICT4D implementation challenges for initiatives implemented in rural communities. The specific focus of this research project was on ICT4D initiatives and relationships between the actors in the ICT4D networks. Another limitation was the fact that the researcher could not contact initiators as some initiators were no longer linked to the initiatives, of which their views were hoped to have helped in compiling this study.

8.5 Directions for future research

This research has identified a set of activities that can assist to improve the implementation of ICT4D initiatives in rural communities. Although it can be possible to generalise to some extent about the ICT4D framework, this study realises that conditions may be different for each rural community depending on local context and there is no ICT4D framework that will encompass all the rural communities' local context.

Future research would take set of case studies and benchmark their contribution according to the framework to test the framework further. From this study it is clear that the success of ICT4D initiatives is hindered mostly by the lack of communication between the stakeholders, therefore communication is central to all the activities of the proposed framework.

8.6 Evaluation of the Research Project

In order to ensure the credibility and integrity of the research project, research evaluation is a necessary step. According to Lincoln & Guba (1985), there is a set of criterias for evaluating an interpretive research to ensure the credibility and intergrity of a reseach project. These criterias

include trustworthy, conformability, dependability, credibility and transferability. As this research is interpretive in nature the mentioned criterias were applied as follows:

- **Trustworthy:** This research employed well used theories and published literature which have been used to develop the proposed framework. The proposed framework was confirmed using primary data collected from ICT4D managers and rural community members.
- **Conformability:** The proposed framework was developed using the literature and was confirmed using primary data. The findings from the primary data were found to be consistent with the theoretical explanations of this research.
- **Dependability:** Interview questions were developed based on relevant published studies. Dependability of this research was also ensured by using theories and relevant literature which have been evaluated and published.
- **Credibility:** Unstructured interviews were used to elicit data from different ICT4D initiatives
- **Transferability:** Although the research focused on implementation of ICT4D in rural areas of the Eastern Cape province of South Africa; to show transferability, the proposed framework can also be applied in the implementation of other rural ICT4D initiatives.

Since the five criterias have been addressed in this way, this makes this research to be considered credible.

To add more, this research was also evaluated during the presentation of a paper with the framework proposed in this study at the 2013 International Conference on Engineering Education and Research & International Conference on Information Technology (ICEE/CIT) in Cape Town University of Technology.

8.7 Conclusion

The research questions in this study have been answered, setting grounds for the establishment of the proposed framework. The objective of this study was to develop a framework to ensure successful implementation of ICT4D initiatives in rural communities of South Africa. This framework was developed through the use of use of secondary existing literature and validated

through the use of primary data. The study has applied 7 components which were discovered to be success factors for the implementation of ICT4D initiatives in rural communities. These were appointment of relevant stakeholders, establishment of project goals, establishment of rural community needs, execution of pre-implementation process, conducting actual implementation activities, as well as assessing the operations, support and security needs of the implemented ICT4D initiative. Central to these is frequent communication amongst all the stakeholders so as to keep the initiatives sustained.

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Appendices

Appendix A: Interview Questions and Answers

Table 4: Research Interview Questions and Answers

Rural community Interview question 1	Respondents from Milton Mbekela	Respondents from Mpheko Dumrana Tele-centre	Respondents from Qunu Integrated Energy Centre	Respondents from Viedgesville Telecentre
1. What are you benefiting from ICT project in your community?	Respondent 1: <i>2 Years Experience:</i> No benefit, site not functional	Respondent 1: <i>1 Year Experience</i> Typing documents and printing CV, photocopy	Respondent 1: <i>6 Months Experience</i> ICT resources and services are brought closer to our rural community	Respondent 1: <i>2 Years Experience</i> No benefit, no activities
	Respondent 2: 2 Y No benefit, site not functional	Respondent 2: Free chance to practise computer	Respondent 2: End user training for job opportunities	Respondent 2: No benefit, site not functional
	Respondent 3: No benefit, site not accessible to the entire community	Respondent 3: Trainings	Respondent 3: Free basic computers training, printing, fax, and copying services	Respondent 3: Nothing, because of the state of the site
	Respondent 4: Yes, especially for students	Respondent 4: Photocopying	Respondent 4: Development for our community	Respondent 4: No benefit, site not functional
	Respondent 5: <i>4 Years Experience:</i> Yes, we are benefiting from the project as our students gets exposure to computers and are able to do their school research without going to town, as this community is far from town	Respondent 5: <i>6 Years Experience:</i> <i>* See Manager's Responses</i>	Respondent 5 <i>1 Year Experience:</i> <i>* See Manager's Responses</i>	Respondent 5: <i>6 Months Experience:</i> <i>* See Manager's Responses</i>
Interview question 2				
2. What is your view about the ICT service providers in the community in providing services that you want in this community?	Respondent 1: They did try to provide the relevant services but the problem lies with the maintenance	Respondent 1: We wish the service provider could extend to other government services as we only have home affairs	Respondent 1: Helped the community but we still want more services	Respondent 1: Nothing achieved from the project as the community members were not made aware of the project, no communication between the service provider and the community
	Respondent 2: Lab is there but it's not in a good state	Respondent 2: I am grateful about the services they offer to the community because we don't have to travel to town to	Respondent 2: Good service providers but we want certification from the training conducted	Respondent 2: No needs were met as they did not even ask what services the community wanted, there is no sense of ownership

		access basic computer services		as no one wants to take responsibility of the project. The municipality just helps when they can, but end up saying they do not own the project so it can't be their responsibility
	Respondent 3: Students can only get limited usage of the computers as there no is Internet for them to do their research	Respondent 3: The service provider has helped the community as we now have government services closer to our community	Respondent 3: Positive impact through trainings, the centre offers free services to the community The service provider has helped the community as we now have government services closer to our community	Respondent 3: The provider donated incomplete equipment hence there is just no development
	Respondent 4: The project can only offer limited services which sometimes become insufficient for the learners and they still have to go to town to access a wide range of ICT services	Respondent 4: They did meet the community needs as this was communicated through the meetings with the chief who spreads the word to the entire community	Respondent 4: Some services are missing	Respondent 4: People were not trained on how to use these computers, and they end up being stripped off parts that people want to sell
	Respondent 5: No enough work has done as the computers are not functioning	Respondent 5: * See <i>Manager's Responses</i>	Respondent 5: * See <i>Manager's Responses</i>	Respondent 5: The provider did not take into consideration the needs of the community
Interview Question 3				
3. What do you think the service providers should have/ should do to improve service delivery in this community?	Increase number of computers, refurbish and continuously maintain the computer, train people and extend the training to school leavers	Respondent 1: Keep the communication channels open	Respondent 1: Should get accreditation for certification, make link with government departments to bring services closer to the community through the resources provided within the project	Respondent 1: Communicate with community members in order to know what they need
	Respondent 2: Provide Internet connection, install blinds for the lab	Respondent 2: Conduct more trainings	Respondent 2: Allow learners to get training and certification, increase number of	Respondent 2: Provide Internet connection, printers and faxes

	to secure computers from direct sunlight, install air-conditioners		computers	
	Respondent 3: Offer affordable and unlimited Internet access, extend the services to the rural community as a whole, bring government to the rural people through the computers	Respondent 3: Bring research facilities	Respondent 3: Get someone qualified to offer trainings for certification, increase number of computers for individual practise	Respondent 3: Create awareness about the intention of the donation; seek active involvement which will end being the benefit the community. No one knows what went wrong with the project as there is no communication with the service provider
	Respondent 4: Upgrade and service the computers, do regular visit to the sites to check if it's still working and benefitting the community.	Respondent 4: Improve on trainings as more people are interested to be trained	Respondent 4: Appoint qualified person staying closer to the site to maintain the ICTs equipment	Respondent 4: Bring good and complete equipment that will not be complicated to be used by rural people. Train people on how to use these services, bring Internet services, updated applications Service provider should bring photocopy services as there are government services that are run within the premises where the project is based
	Respondent 5: Provide Internet connection at an affordable price, not a limited connection	Respondent 5: <i>* See Manager's Responses</i>	Respondent 5: <i>* See Manager's Responses</i>	Respondent 5: Service the computers and provide a trainer because our community is interested in using these computers and services, as these will brought closer to us
Interview question 4				
4. What would say about this ICT project in terms of enabling you to generate any income?	Respondent 1: No income	Respondent 1: Community depends on social grants there it is not each to charge them above a minimum fee	Respondent 1: No income only using the services	Respondent 1: The service provider just donated incomplete equipment, therefore it is not easy to do anything that can

				generate income and develop the community
	Respondent 2: No income at all	Respondent 2: No income for me	Respondent 2: No income, free services to the community	Respondent 2: No income at all
	Respondent 3: No income	Respondent 3: No income	Respondent 3: No income	Respondent 3: No income
	Respondent 4: No income	Respondent 4: No income	Respondent 4: No income	Respondent 4: No income
	Respondent 5: No income	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5: No income
Interview question 5				
5. As an individual what would you do to ensure that ICTs benefit you?	Respondent 1: Get advanced training on computer applications	Respondent 1: Obtain access to the needs of the community before getting anything for myself as this is a poor community	Respondent 1: Get computer certification for job opportunities	Respondent 1: Get advanced training on computer applications
	Respondent 2: Use available resources to equip myself	Respondent 2: Training on typing	Respondent 2: Attend more trainings on computers skills	Respondent 2: Obtain computer skills and use email facility
	Respondent 3: Get Internet connection for sending emails for job opportunities	Respondent 3: Use Internet for job opportunities and government forms as this community	Respondent 3: Get training on A+ and N+	Respondent 3: Get Internet connection for sending emails for job opportunities and government forms as this community is a bit far from town
	Respondent 4: Learn how to fix computers	Respondent 4: To get certification on computers skills	Respondent 4: Use ICTs for social and economic benefits	Respondent 4: Be productive as a rural worker, as rural workers are stuck in producing better quality due to lack of resources. We want to be connected to the world standards as rural communities; we want to know what is happening in the outside world.
	Respondent 5: Socially to send emails and search for job opportunities	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5: We want to get certification on computers skills, Internet access to look for job

				opportunities
Interview Question 6				
6. <i>What is the ICT service provider doing to support your ICT skills?</i>	Respondent 1: Nothing	Respondent 1: Computer skills trainings, even though trained people leave the centres for job opportunities, leaving the centre with endless job of training.	Respondent 1: Rent out the lab to the accredited institution to offer trainings for certification for the community members	Respondent 1: Nothing
	Respondent 2: Nothing	Respondent 2: Typing offered for free	Respondent 2: Allow other accredited institutions to use their facilities to train the community	Respondent 2: Not sure
	Respondent 3: There was a once off a training on applications	Respondent 3: Allows students to do some research	Respondent 3: Trainings	Respondent 3: Nothing
	Respondent 4: There was once a training on applications	Respondent 4: Helps the rural educators to access encyclopaedia	Respondent 4: Educate people on how to type documents and do some research free	Respondent 4: There was once a training on applications for one group of women and youth
	Respondent 5: Slight program was offered but not on regular basis	Respondent 5: <i>* See Manager's Responses</i>	Respondent 5: <i>* See Manager's Responses</i>	Respondent 5: The service provider does nothing as the computers are still not functioning
Interview Question 7				
7. <i>What advice can you give to the ICT service providers so that ICTs benefit the whole community?</i>	Respondent 1: Provide training and workshops on regular basis, and make regular visits to the site and select project champions from the community	Respondent 1: Include government representatives in their plans so that they can support these projects financially as they are implemented to develop the communities within their municipalities	Respondent 1: Should use their own people instead of allowing the accredited institution to offer trainings as they are expensive	Respondent 1: Provide training and workshops on regular basis, and make regular visits to the site and select project champions from the community to create sense of ownership
	Respondent 2: Conduct workshops and include community members in their plans, to encourage people to use their services and create awareness	Respondent 2: Regular visits to the site to check and monitor if it is still in good condition	Respondent 2: Not sure	Respondent 2: Internet connection

	Respondent 3: Get Internet connection for sending emails for job opportunities	Respondent 3: There must be some incentives in place to pay salaries of the people who run these projects because they end up leaving since they do not have salaries. This will also motivate rural people to work within their communities	Respondent 3: Include academia in its stakeholders so as to get fresh ideas on how to keep the project running	Respondent 3: Engage with the community continuously and there has to be a proper plan to be followed on how to keep these projects running
	Respondent 4: Increase number of computers, refurbish the lab, train people who will be used to train the community	Respondent 4: Put in place security measures such as alarm system as the project was broken into as the equipment was broken and got stolen	Respondent 4: Researchers are needed to search for new ways of doing things so as to keep the project developing the community in all angles	Respondent 4: Promote Internet connectivity for nearest schools
	Respondent 5: No advice, just thanking the serving provider about the project	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5: Communicate and connect with community leaders in order to spread the word about these projects because people do not know about them
Interview Question 8				
8. Are all community members supporting the ICT project? If NOT what are their reasons?	Respondent 1: Yes, students sometimes do get to use the computers even though the lab is always not accessible to the especially during the week-ends. If the community members want to access services they ask students as they are ones who can access the school premises where these services are situated	Respondent 1: Yes the community is always told of the developments that take place in the community through the meetings with the chief	Respondent 1: Yes the community is using the services from the project	Respondent 1: No, but the community is interested in having it up and running
	Respondent 2: No, it's not accessible to the community	Respondent 2: Yes they appreciate the project, as a lot of the community members use the services from the	Respondent 2: Yes most of the board members/ stakeholders are from the rural community	Respondent 2: No, it's not functional

		project		
	Respondent 3: No, it's within the school premises which are not easy to access	Respondent 3: People in our community can now benefit socially through the use of Internet, fax, phone and email and these are offered at a lower. We no longer have to travel long distances to access these services	Respondent 3: Yes, helps the community as it has shortened the travelling distance for the community in order to access the services	Respondent 3: No, it's not functional
	Respondent 4: No, it's not open for public use	Respondent 4: Yes they are thankful to the service provider and would like more services to be added to the project	Respondent 4: Yes, the project is very helpful to the community	Respondent 4: No, it's not functional
	Respondent 5: No, only accessible to students	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5: No, it's not functional
Interview Question 9				
9. In general, what is the community's view on this ICT project?	Respondent 1: Thankful about the project, wish services could be extended to the entire community	Respondent 1: Interested as they want to use the computers	Respondent 1: Proper plan or a framework needs to be in place as there seem to be nothing followed when implementing these projects	Respondent 1: Interested as they want to use the computers but they are not functioning
	Respondent 2: Appreciate the project, as it helps the students to become computer literate	Respondent 2: Would like to see the computers fixed after the break in	Respondent 2: Development of a community should a continuing effort, these projects need to be maintained	Respondent 2: Would like to see the project working properly forever
	Respondent 3: Wish the project could be fully accessible to both the students and the entire community	Respondent 3: More security is needed after the break in, as the break ins will ruin the project for the community	Respondent 3: The project is a success so far, we expect it to continue running	Respondent 3: Eager to use the computers but they are not functional
	Respondent 4: Not sure as they are not involved in the project, it's only meant for school. We do appreciate it as it assist our students to become	Respondent 4: The project needs to be sustained as there is no need to go to town for services that could be offered within the project	Respondent 4: Appreciate the project as it has brought about development in the community	Respondent 4: Appreciate the project except that it's not functioning. It uplifts the community as community is deprived of the basic services because of

	computer literate			its location
	Respondent 5: A lot still needs to be done, especially monitoring these projects for sustained use	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5 <i>* See Manager's Responses</i>	Respondent 5: Feel that the computers were just dumped and no one cares what happens after they were implemented. People are willing to use the services from the project but it's not functional
Manager's Interview Question1	Responses from Centre Managers of Mpheko Dumrana Tele-centre & Qunu Integrated Energy Centre			
1. <i>ICTs when successfully implemented can play an important role in uplifting standards of living. Can you share your opinions on this statement?</i>		Respondent 5: ICTs play a key role in development process and service delivery especially in rural communities. Rural people can now benefit socially through the use of Internet, phone fax and email; and economically by accessing services at a lower cost	Respondent 5: Rural people can now benefit when the services are brought closer to them, and save them time and money to go to urban areas to access basic services which could brought to their communities through the use of Internet, phone fax and email	
Manager's Interview Question 2				
2. <i>I understand you are an ICT service provider to this community.</i> a. <i>Give an overview of your ICT project explaining briefly the history, stakeholders and targeted communities.</i> b. <i>What were the goals or</i>		Respondent 5: Project history: Started in 2005 as an NGO Stakeholders: WSU, NCSA, USSASA, UFH, SANTECH, Anglican church of St James Targeted communities: Mpeko rural community Respondent 5: Long term objective: to create awareness to the community on the issues of HIV & Aids and to train people to	Respondent 5: Project history: Started in 2009 initiated by Sasol to service around 18 communities surrounding the Qunu community Stakeholders: Department of Energy, Sasol, KSD Municipality Targeted communities: Qunu rural community Respondent 5: Long term objective: to offer updated ICT equipment and services to the Qunu community as Department of Energy sends a qualified	

objectives of the project when it was implanted (both short-term and long-term)?		become computer literate Short term objectives: to conduct trainings and workshops when needed	service provider for the repairs Short term objectives: conduct trainings and workshops when needed, as explained by the respondent	
Manager's Interview Question 3				
3. What ICT services and the value of the services you are providing to the community?		Respondent 5: Services: Faxing, photocopy and printing, public phones and Internet. These services are helpful to the community members as they do not have to travel to town to access basic ICT services	Respondent 5: Services: Faxing, typing photocopy and printing, and Internet facility	
Manager's Interview Question 4				
4. What needs would you say these ICT services address in the community? Justify		Respondent 5: Social needs are addressed most as there is a Home Affairs department closer to the project's premises and provision of Faxing, photocopy and printing, public phones and Internet services	Respondent 5: Social needs are addressed most through the services such faxing, typing photocopy and printing, and Internet facility	
Manager's Interview Question 5				
How have the project addressed the community needs in terms of economic, technical and social opportunities?		Respondent 5: Social needs: access to public phones, Internet and the existence of Home affairs department within the centre Economic: Faxing, photocopy and printing, public phones and Internet	Respondent 5: Social needs addressed: access to public phones, Internet Economic: Faxing, photocopy and printing offered at affordable price and sometimes	

		offered at an affordable price and sometimes typing is offered for free Technical needs: Installed satellite dish allows the community to have Internet access	typing is offered for free Technical: Installed satellite dish allows the community to have Internet access	
Manager's Interview Question 6			Respondent 5:	
6. Outline the involvement of different stakeholders i.e. government, community, academia and telecommunication operators.		Respondent 5: Government: Department of Home Affairs Development Agencies: USSASA, NTCA (USA) Telecommunications operator: SANTECH Academia: WSU, UFH, Community: Anglican church of St John's (local church with community members)	Respondent 5: Government: Department of Energy Development Agencies: Sasol Telecommunications operator: Telkom Academia: None Community: +- 10 shareholders are from the Qunu rural community	
Manager's Interview Question 7				
7. If you were to add more stakeholders in the ICT project – who is/are some of these and why?		Respondent 5: More community members are needed to represent their community so that there can be a sense of ownership for the project	Respondent 5: Academia to research on current ways of doing things that will keep the initiative alive	
Manager's Interview Question 8				
8. What were the steps taken to implement the ICT project?		Respondent 5: Not sure	Respondent 5: Not sure	
Manager's Interview Question 9				

9. <i>Could these steps be used in any other community and would you call these standard steps?</i>		Respondent 5: Don't know since I'm not sure of the steps that were used	Don't know since I'm not sure of the steps that were used	
Manager's Interview Question 8				
10. <i>What would you suggest as key ideas for implementing ICT projects?</i>		Respondent 5: Accessible and affordable projects that would be able to meet the needs of the rural community	Respondent 5: Communication, framework to be followed, maintenance and monitoring and funds are key elements for the sustenance of the initiatives	
Manager's Interview Question 9				
11. <i>What measures are in place to equip the community with ICT skill?</i>		Respondent 5: Computer applications and skills trainings	Respondent 5: Trainings for certification by an accredited service provider	
Manager's Interview Questions 10				
12. <i>What do you think are some of the actions that can be done to implement ICTs in rural South Africa?</i>		Respondent 5: Proper plan, finances, maintenance, coordination and stakeholder involvement	Involvement of government and rural communities to create sense of ownership for these initiatives	

APPENDIX B

Interview Questions

Framework for implementation of ICT4D initiatives in South Africa

My name is **Gcotyelwa Phingilili**, a Masters student at **University of Fort Hare, East London Campus**, and I am carrying out a research on the above topic. The research is driven by the following statement:

Many people focus mainly on ICTs deployment, but with no plan in place to ensure if the community benefit from those initiatives. Therefore, there is a need to establish a framework evaluating and improving implementation of ICT4D initiatives in order to ensure successful ICT4D implementation in rural communities. The aim is to understand the current state of ICT developments by various ICT stakeholders and assess how these have benefited the targeted communities. The focus is to propose an idle ICT framework that could improve ICT developments in South Africa:

Interview questions for the project initiators:

1. ICTs when successfully implemented can play an important role in uplifting standards of living. Can you share your opinions on this statement?
2. I understand you are an ICT service provider to this community (**name the community**).
 - c. Give an overview of your ICT project explaining briefly the history, stakeholders and targeted communities
 - d. What were the goals or objectives of the project when it was implanted (both short term and long term)?
3. What ICT services and the value of the services you are providing to the community?
4. What needs would you say these ICT services address in the community? Justify.
5. How have the project addressed the community needs in terms of economic, technical and social opportunities?
6. Outline the involvement of different stakeholders i.e. government, community, academia and telecommunication operators.

7. If you were to add more stakeholders in the ICT project – who is/are some of these and why?
8. What were the steps taken to implement the ICT project?
9. Could these steps be used in any other community and would you call these standard steps?
10. What would you suggest as key ideas for implementing ICT projects?
11. What measures are in place to equip the community with ICT skills?
12. What do you think are some of the actions that can be done to implement ICTs in rural South Africa?

Rural community members' questions

Introductory discussion:

Say one takes away from you all the ICT services, devices and platforms that you are using – do you think your life will remain the say? Share with me:

1. What are you benefiting from ICT project in your community?
2. What is your view about the ICT service providers such as: **(name the providers in the community project)** in providing services that you want in this community?
3. What do you think the service providers should have/ should do to improve service delivery in this community?
4. What would say about this ICT project in terms of enabling you to generate any income?
5. As an individual what would you do to ensure that ICTs benefit you?
6. What is the ICT service provider such as: **(name the providers in the community project)** doing to support your ICT skills?
7. What advise can you give to the ICT service providers so that ICTs benefit the whole community?
8. Are all community members supporting the ICT project? If NOT what are their reasons?

9. In general, what is the community's view on this ICT project?

Appendix C

List of Acronyms

ICT4D – Information and Communication Technology for Development

ANT – Actor Network Theory

MDGs’ – Millennium Development Goals

HDI – Human Development Index

GDP – Gross Development Product

GNI – Gross National Income

NDP – National Development Plan

NGO – Non-Government Organization

MPCCs – Multi-purpose Community Centres

EFA – Education For All

UNESCO – United Nations Educational Scientific and Cultural Organization

M-PESA – M for Mobile, Pesa is Swahili for Money

UNCTAD – United Nations Conference on Trade and Development

WAN – Wide Area Network

USSASA – Universal Service and Access Agency of South Africa

NTCSA – Northern Territory Christian Schools of South Africa

NCSA – National Centre for Supercomputing Applications

OPP – Obligatory Passage Point

IDP – International Development Plan

Appendix D



University of Fort Hare
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Ethics Research Confidentiality and Informed Consent Form

Please note:

This form is to be completed by the researcher(s) as well as by the interviewee before the commencement of the research. Copies of the signed form must be filed and kept on record

(To be adapted for individual circumstances/needs)

I am a Masters student from the department of Information Systems in University of Fort Hare, East London campus. I am currently undertaking a study which is about developing a framework for successful implementation of ICT4D initiatives in rural areas. You are therefore requested to take part in my research study. Before you decide to participate in this study it is thoroughly important to understand the aims and objectives of this study as mentioned above.

The study procedure

You are requested to participate in this research study which will take approximately 10-30 minutes. This amount of time will be spent in answering interview question that relate to the proposed framework.

Ethical considerations

There are no known risks to your involvement in this study. Please note that your responses will be strictly confidential, and that your participation is completely voluntarily. You may refuse to participate or withdraw from this study at any time. Some questions may be of a personal and/ or sensitive nature, I will be asking more questions that you may not have thought about before, and which may also involve thinking about the past or the future. We know that you cannot be absolutely certain about answering

those questions, but we ask that you try to think about these questions. When it comes to answering questions, there are not wrong or right answers. When we ask questions about the future we are not interested about what you think, the best thing would be to do, but what you think would actually happen.

If possible our institution would like to come back to this area once the study is completed to inform you and your community of what the result are, and discuss our findings and proposal around the research and what this means for people on this area. Should the result of this study be published your name will not be used.

Should you have questions or concerns about this study, please do not hesitate to contact me **Gcotyelwa Phingilili** at cell number **078985 2084** email: **gcogcop@gmail.com** and **N Wayi** at work **043 704 7072** and email **nwayi@ufh.ac.za**

INFORMED CONSENT

I hereby agree to participate in research regarding **framework for implementing of ICT4D initiatives in rural communities**. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop this interview at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not necessarily to benefit me personally.

I have received the telephone number of a person to contact should I need to speak about any issues which may arise in this interview.

I understand that this consent form will not be linked to the questionnaire, and that my answers will remain confidential.

I understand that if at all possible, feedback will be given to my community on the results of the completed research.

.....

Signature of participant

Date:.....

I hereby agree to the tape recording of my participation in the study

.....

Signature of participant

Date:.....

