Application of Information and Communication Technology in Uplifting Rural Dibate Community in South Africa

By

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Declaration

I, Thandeka Precious Hlatshwayo hereby declare that all the presented and submitted work is my own work, which has not been submitted elsewhere, and all other authors' work used, accordingly employed the correct referencing.

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Dedication

I dedicate this study to my older sister S'thembiso Promise Hlatshwayo who always encouraged me to achieve my goals and my mother who introduced me to God; hence, she is my pillar of strength.

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Thank God for giving me good health, wisdom and endurance to complete this dissertation. Further,

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Abstract

Different social classes of people in South Africa are divided, digitally. This phenomenon manifests as a disparity of information in ICT (Information and Communication Technologies), which is a matter of concern, as the use of ICT is acknowledged to greatly influence the world today, more specifically so in rural areas. An investigation to determine which factors affect rural communities' access to information, as well as progress levels that can be realised in the support means employed by people resident in rural areas, through introducing ICT's in their day-to-day living, thus addresses the purported 'digital divide'. The study's population was drawn from the Dibate Village community, located in Mmabatho in Mafikeng, South Africa. Recommendations from the findings, point out how ICT facilities can be utilised in the development of rural communities, not just socially but also economically. As main objective, the study evaluates and examines the use of ICT facilities for commercial activities, in uplifting the rural community in the area of Dibate Village. This study is of value to governmental and non-governmental organisations where improving both socio-economic development and service delivery is concerned, in South Africa's rural areas.

Keywords: Digital divide – rural areas, Telecentres, ICT - South Africa, Rural development - ICT.

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List of Abbreviations

ICT   Information Communication Technologies

DD   Digital divide

DL   Digital Literacy

List of Synonyms

Variable, factor and construct are used interchangeably in data analysis and results reporting to mean the same meaning.

Icon and metaphor are used interchangeably throughout the thesis.

Segment, class and category have the same semantic.

Chapter 1

Introduction

1.1 Introduction

This study concentrates on examining and analysing Digital Divide (DD) impacting on rural Dibate community within Mahikeng jurisdiction. In this study, digital divide means lack of access to Information and Communication Technology (ICT), lack of skills to use ICT and low application of ICT in rural areas around Dibate rural community. These three important ingredients of digital divide are problems to address in this study.

As Badger (2013) shows business world is undergoing frequent changes by rapid use of ICT. These occurrences improve ways of life in rural communities across the world especially in Africa. ICT serves rural people and enterprises by saving money in executing specific socio-economic tasks. ICT applications help in hiring an individual to perform a specific task and ensure this is done with time value of money without incurring high expenses. However, extensive and expansive uses of ICT have challenges to address in uplifting rural communities around the world. Despite these problems many small rural businesses can use ICT to enhance business activities and production services to improving livelihood and entrepreneurship (Elliott, 2016).

For instance, a small business can use less human resources by scaling up and delivering more services when aided by ICT. Rather than engaging many people to work in a specific section of manufacturing operations. Programmable Logic Controller (PLC) can replace labour for swift and timely production that automates manufacturing services. PLC advantages include improving productivity and accuracy of production services in rural communities. So, addressing digital divide between urban and rural areas in future bring more

flexibility, diversity and innovation to labour market in rural communities and rural enterprises (Lohr, 2015; Ross, 2016).

In retail inventories, there is less need for large number of staff to employ to keep track of and manage inventory quantities. The solution lies in using remote access database systems. Consequently, inventory data is more accessible within business by reducing delivery time of essential information. This polarises rural community labour market and enterprise functions in time and money (Autor and Dorn, 2013).

A serious advancement in ICT occurs at conjunction of especially the close of 20th Century and expansion in digital communication and business engagements in 21st Century. These advances in trying to bridge digital divide generate limitations to letter writing and postages through postal services across this Global Village. Meddie (2015) shows that bridging digital divide has its own resulting challenges to address not only in urban, but rural areas. While reducing waiting time for delivery of messages by postal services, ICT today minimises communication time and costs through electronic mails, facsimile, Skype as well as other ICT instruments and services (Lohr, 2015).

Communicating business and community messages through faxes and/or emails within seconds improve message delivery to recipients. This use of ICT allows recipients almost immediately respond with feedback without delays to the sender. Eventually, bridging digital divide is important as it creates both advantages and/or disadvantages without proper management of ICT (Glenin, 2014; Forstater, 2015).

An information gap occur known as digital divide among various social classes within a society. This digital divide is large in especially a rainbow nation like South Africa with different racial, ethnic, business and political classes of people both in urban and rural areas. Protests occur when online connectivity and

social media activities of people in rural areas tend to be left out (Hussain and Howard, 2013) as a result of digital divide.

digital divide means unequal access to and use of new ICT opportunities to especially poverty-stricken rural community. As Kapondera and Hart (2016) show information gap occurs as a result of lack of ICT tools such as library, internet or cyber café, electricity and telecommunication. Lack of ICT literacy in various areas especially rural communities demand answers necessary for rural labour and economic growth that impact on national business development (Vaidya and Nath, 2013; Smith and Anderson, 2014; Buabeng-Andoh, 2015).

Digital divide also exists between people having sufficient opportunities to access ICT tools and those without such opportunities. Rao (2014) argues social enrichment through ICT in rural community and entrepreneurship improve digital divide. However, these bridging of digital divide are with problems. These problems include vulnerabilities pervading among rural people, household proceeds, geographical information systems, ICT skills and literacy, standard of living and way of life, as well as ICT assets that can uplift rural communities and enterprises (Badger, 2013; Penjor and Dupka, 2016).

Greber (2015) argues employment faces serious challenges as global market place becomes automated through a focus on ICT in establishing businesses, empowering existing enterprises and improving skills and/or knowledge of people in rural areas. The research investigates ICT access, skills to use and application of ICT in rural community and businesses.

This helps to understand uplifting individuals and businesses in rural Dibate community. Bridging digital divide needs introducing ICT insights into livelihood of rural Dibate community and enterprises. The study analyzes importance of access to ICT, skills to use and application of ICT in rural Dibate community (Glenin, 2014; Ross, 2016; Suleri and Cavagnaro, 2016).

1.2   Background

Dynamics of globalisation influences ICT in transforming international relations amongst nations despite different levels of digital divide within rural areas in these societies. Zlotakova and Weide (2015) show facilitating communication through ICT improves lives of many rural and urban people across the world.

This happens by allowing wide-ranging access to ICT in different places creating a split between diverse political, racial, ethnic, as well as socio-economic groups of people (Ballantyne, 2014). This ICT divide is common in simply defining lack of access, skills to use and application of ICT in rural communities. These ingredients of digital divide impacting on Dibate village are the focal point of this study.

Janvry, Sadoulet and Murgai (2013) argue access to ICT for rural communities in comparison to urban counterparts is not as easy as spoken and written about in many societies and papers. Such challenges attribute these digital divide bottlenecks to poor access to information resources such as internet cafés, electronic libraries, and even simple business office automation. Mulama (2015) shows parts of these problems come from lack of access to ICT tools to apply in uplifting rural community and enterprises. Such challenging endeavours explain lack of know-how that exists in rural communities is a responsible factor for these digital divide problems.

Gennaio (2013) indicates people empowerment coming through access to ICT is important that demand constant use of these resources in all spheres of life. These access, use and application of ICT bring change in social structures through ICT instruments (Kivunike, et al., 2013).

It is therefore important to explain relevant extent to which ICT resources can deliver uplifting influences on rural community and enterprises. This implies that providing ICT as a means of addressing information access demand a qualified

professional advice, consultation as well as training of people to use ICT resources in uplifting rural community and entrepreneurs (Pima, Odetayo and Iqbal, 2016; Elliott, 2016).

1.3   Problem statement

Digital divide in this study demonstrates a teething challenge in rural communities in South Africa, which demands an understanding of ICT impact on rural community from economic and social perspectives. As Park (2015) argues this study identifies three important problems that define digital divide in rural Dibate community, the study area. Problems of socio-economic and political disparities exist that influences people and enterprises from stand point of access, skills to use and level of application of ICT.

As political history shows, digital divide in rural communities in South Africa partly comes from other developmental disparities. These occurrences engender ICT challenges including separate development policies and legislations, ethnicity, race and political affiliations (Elliott, 2016). Lack of access, skills to use and low application of ICT influences rural Dibate community and rural enterprises (Strover, 2014; Salemink, Strijker and Bosworth, 2015; Whitacre, Strover and Gallardo, 2015).

Townsend et al. (2013) argue rural areas in developing countries experience problems in accessing ICT. The impact of digital divide on these areas increases due to lack of ICT resources. The difficulty stems from majority of rural communities having low literacy levels and little or no understanding and knowledge of local issues. These demerits reduce opportunities from making use of ICT. These are benefits such as growing rural businesses by online advertising, promoting and networking for profitability and production innovations (Goggins and Mascaro, 2013).

Use of ICT in rural areas is often lacking and such does not create an environment where people have meaningful engagement on individual and business challenges. Poverty eradication, community social and economic inclusion in rural areas can benefit from ICT. This open up new world of knowledge and opportunities for creating new social systems and new communities (Kilpeläinen and Seppänen, 2014.)

As Moyes, et al. (2015) argues public participation can take place in local government affairs in affluent areas of South Africa, former townships and semi-urban areas. However, little achievement is on application of ICT to building social capital and environmental uplifting of rural communities and enterprises. The impact of digital divide is magnifying because of lack of ICT tools in rural Dibate Village for applications by individuals and rural enterprises (Mishra, Akman and Mishra, 2014).

The aim of this study is therefore to examine and evaluate application of ICT in uplifting rural Dibate Village and businesses. The study explores Dibate Village to determine how use ICT in uplifting disadvantaged communities. This study therefore concentrates on lack of access, skills to use and application of ICT. These problems hang on inequalities between individuals, enterprises, households and geographical areas within different socio-economic perspectives (Badger, 2013).

1.4 Objective of the study

1.4.1 Main objective

The motivation for this study comes from strong needs in addressing existing digital divide between rural and urban communities in South Africa. This need to examine and evaluate lack of access, lack of skills to use and low application of ICT to uplift rural Dibate community and enterprises engenders this study.

The aim of this study is therefore to examine and evaluate access, skills to use and application of ICT in uplifting rural Dibate community and rural business enterprises.

1.4.2 Sub-objectives:

Stemming from aim of the study are specific objectives. These are:

- To identify lack of access to ICT in uplifting rural Dibate community and business enterprises;
- To establish whether use of ICT in Dibate Village have an uplifting effect on management and performance of businesses in Dibate community;
- To investigate application of ICT in uplifting rural Dibate Village, and;
- To examine levels of strategic skills among citizens of rural Dibate Village to allow participation in use of ICT.

1.5 Research Questions

This study addresses questions concerning lack of access, skills to use, application of ICT in rural areas. Even with many questions having been previously dealt with, the following questions still need answers in addressing digital divide challenges:

- What factors are responsible for lack of access to ICT in uplifting rural community in addressing digital divide in Rural Dibate Village?
- What uplifting effect use of ICT has on management and performance of Dibate rural community and enterprises?
- How application of ICT impacts on bridging digital divide in uplifting individuals and businesses in Dibate community?
- How can current level of strategic skills of Dibate rural community members and enterprises impact on taking part in ICT applications?

1.6   Research design

Relevant design as Lundgren and Jansson (2016) argues offers a need for multiple research methods. These include quantitative and qualitative research methods for conducting research. In this study, a focus is on using mixed research methods to innovatively arrive at research objectives. Explanations help to understand how to arrive at a specific result from this research design. A qualitative and quantitative research adds value to answers for data gathering and analysis as Leedy and Ormrod (2014) explains. This study therefore uses strengths of one approach to smoothen out weaknesses of another. This engenders conducting both quantitative and qualitative research on a specific ICT challenge in rural Dibate Village.

Using multiple approaches help to triangulate results to overcome challenges of a single approach to this study. Accurate and valid results allows generalizing answers in solving digital divide challenges in other rural areas facing same or similar ICT problems. A need exists for using innovative approaches in dealing with ICT problems from data gathering. This is through different methodological angles to add value to progression of knowledge in improving ICT to bridging digital divide in helping uplift rural Dibate community and enterprises (Papachristos and Adamides, 2016).

Creswell (2013) argues for two distinct advantages in employing a quantitative research. These include a study depending on statistical results by a research with implications of determining whether better results come by using a different approach and/or changing a unit of analysis. This engineers professional fact findings to deliver valid and reliable ideas to user needs and applications in ICT (Alvesson, 2013).

Saunders and Bezzina (2015) suggests some advantage of using quantitative research is to allow a study to project population size to provide a meaningful data to measure better than qualitative analysis. However qualitative research

method has its own merits and demerits. It allows close contact between say an interviewer and a subject of study. A need exists to minimise barriers between weaknesses and/or strengths inherent within both quantitative and qualitative methods. This is important in helping get accurate, valid and reliable answers. This study uses both methods for gathering and analysis of data on Dibate Village (Lundgren and Jansson, 2016).

Papachristos (2014) suggests an appropriate sample for this research delivers accurate results representative of population. The main advantage of quantitative research is known parameters to undergo measurement before research starts. A study requires avoiding sampling errors through having a reflective interpretation of answers. It allows making inferences to deliver insights in improving ICT in uplifting rural community systems and enterprises (Nuzzo, 2014).

Questionnaires are main instruments for quantitative data gathering in this study. Administering these tools uses simple random sampling to representative sample of people in Dibate Village to take part in data gathering. Using questionnaires allows respondents to unfold true and free answer to questions. This is necessary when controversial and sensitive issues are to respond to during interviews. Participants expect to answer questions without naming and/or revealing subject identity, which is important in this casework (Duangmanee, Chuduang and Cheoysuwan, 2015).

Both a rating scale and checklist are in these questionnaires. This checklist helps in selecting from a list of possible items on a specific subject. In all these data gathering and instrument development ethical policy and guidelines are undergoing serious considerations throughout the study. This allows valid, reliable and innovative data items to answer with new ideas and insights adding value to advancement of knowledge in ICT for uplifting rural communities and enterprises (Åkerman, 2015).

Testing research design, methods and questionnaires before carrying out research is important. A pilot testing helps in understanding which way to gather data that brings best results for addressing digital divide through ICT for rural Dibate community. Letters of anonymity together with questionnaires stating clearly rights, protection and safety of participant were sent to all respondents (Lundgren and Jansson, 2016).

1.7 Rural Dibate Village

Dibate Village is a small rural community having serious digital divide in South Africa, which serves as motivation in this study. This study is to examine digital divide problems facing this rural community and enterprises. Dibate Village like many other rural areas in Mahikeng faces challenges in terms of access to ICT. It is not having enough ICT resources to use, apply and lack of access to basic ICT in comparison to urban counterparts is a common situation in this country (Lohr, 2015; Elliott, 2016).

The context for this research is rural Dibate village, which is outside Mmabatho in Mafikeng. The village history dates back to 1899, when this town was besieged during Second Boer War. Robert Baden-Powell became a national figure with the Siege of Mafeking, which continue for 217 days, starting in October 1899 and lasting until May 1900. An obelisk was unveiled at Mafikeng by Lord Roberts in September 1904 that bears the names of all who died in defence of the town. A total of 212 people were killed during the siege, with more than 600 people wounded. Boer losses, on the other hand, were much higher (Mbenga and Manson, 2013: 1-7).

From 1894 to 1965, Mafeking functions as Bechuanaland Protectorate capital, after which Gaborone serves as capital of what was to become Botswana. Before, and during 1970s pre-independence Bantustan of Bophuthatswana was briefly served by Mafeking as capital. Prior to Mmabatho, adjoining town was established as capital. Following 3 years after independence it was awarded to

Bophuthatswana in 1980. Later a local referendum makes Mafeking joins Bophuthatswana, and renamed Mafikeng. It was dealt with as a Mmabatho suburb (Mbenga and Manson, 2013: 1-7).

After official departure of apartheid in 1994, the capital of new North-West Province was established from merger of Mafikeng and Mmabatho, with new name Mafikeng. British settlers first spelt it as Mafikeng. However, this was changed back to Mafikeng incorporating into Bophuthatswana in 1980. A change was approved in its name to Mafikeng in February 2010 by then Minister of Arts and Culture, Lulu Xingwana. As many other towns in South Africa undergoing name changes such as Pretoria to City of Tshwane, Pietersburg to Polokwane, Bloemfontein to Manguang, and Nelspruit to City of Mbombela. The town is still referred to as Mafikeng despite name changes to Mahikeng by many local residents and even ANC-led local government.

Access to basic ICT is still an unaffordable luxury for many people in Mafikeng, with Dibate Village as one of many facing digital divide challenges. As a result, Dibate Village in comparison to urban counterparts like Paul Pietersburg, Mabatho, KwaMatikiring, Grantleigh, Rooigrond, Modimola and Lokaleng has been at a disadvantage in terms of market competition and ICT benefits. This village is part of areas facing online challenges, financial instability, and poor or no Digital Literacy (DL). As with many other communities around Mafikeng with digital divide disadvantages, Dibate Village is therefore a necessary rural community to be an important focal point for this study.

1.8 Plan of study

The structure of this study has a purpose to offer a summary of this research by providing an outline of chapters within this MTech Dissertation:

Chapter 1 shows a background and context along with problem statement, research questions and study objectives. This Chapter outlines introduction to

the research by detailing digital divide and ICT challenges rural communities like Dibate Village faces.

Chapter 2 focuses on literature reviews by reviewing national and international studies and existing literature on application of ICT in uplifting rural communities in South Africa in general and Dibate village in particular. This Chapter outlines and discusses literature reviews to addressing objectives and research questions.

Chapter 3 is concentrating on research methodology that outlines various methods used to prepare research design, methods, and sampling techniques. It further discusses data gathering and ways of analysis that produce accurate, valid and reliable answers to addressing digital divide problems and ICT challenges facing rural communities especially Dibate village and rural enterprises.

Chapter 4 presents and analyzes data. It is focusing on data analysis, comprising details of data collection, interpretation to generate inferences and determine means of resolving digital divide challenges and specific problems to address in this study in uplifting rural Dibate village and enterprises using ICT advantages.

Chapter 5 concludes and summarises results and findings with recommendations. It delivers limitations of study as well as direction for future studies in related areas of digital divide challenges and ICT in uplifting rural communities in South Africa in general and rural villages to be precise. It explains alignment of research problems to discussion of research questions and study findings.

1.9 Conclusion

Chapter 1 outlines introduction to this research by detailing background and context to this study. The impact of digital divide on rural areas has been magnified by lack of infrastructure in the context of Dibate Village. The aim of this study is to examine and evaluate uses of ICT as a management tool to uplift rural Dibate community. The case study on rural Dibate Village will further explore ways to empower previously disadvantaged communities through the use of innovative ICT.

As with numerous other disadvantaged rural communities situated around City of Mafikeng, Dibate Village is the basis for the study. As it is included in areas omitted from activities online owing to a dearth of information, lack of financial stability, and poor and/or no Digital Literacy (DL). Relevant terms and concepts that are used in the study were also defined in Chapter 1.

Chapter 2 outlines and discusses theoretical framework associated with applications of ICT as a management instrument to uplift Dibate Village. This literature reviews focused on addressing appropriate and applicable research objectives and research questions.

Chapter 2

Literature Review

2.1 Introduction

This chapter provides relevant literature reviews on ICT applications to uplifting rural communities across the world especially in developing countries. This literature reviews focus on discussions that address research objectives.

Korsgaard, Müller and Tanvig (2015) suggest the first set of digital divide include elements such as lack of access to ICT by rural communities and enterprises. These inabilities to access ICT are lack of motivation behaviours among individuals and enterprises. These individuals have problems of understanding technical ICT language. Many rural ICT individuals lack knowledge of ICT language. Many individuals are novice to English language and cannot understand ICT language. Local enterprises and people are not ICT savvy although virtually competing worldwide (Dubois, 2016).

The unavailability of ICT assets exacerbates digital divide challenges creating lack of access to ICT by rural communities and enterprises. Philip et al. (2017) show ICT resources are limited in rural areas; assets are aging, lack of operations and maintenance. Although government and Non-Governmental Organizations (NGOs) promise empowering rural people through bridging digital divide in uplifting rural communities, little is done to empower rural individuals and enterprises with ICT assets and services. Important current issues rural communities face needs ICT answers. Uplifting rural communities demand empowerment by bridging digital divide (Park, 2015).

Second set of issues causing digital divide in rural areas are rural village inabilities to use ICT including lack of skills. Such lack of skills in environment with few telecentres expands digital divide challenges. Limited number of

telecentres exists in these rural communities. This creates pressure on ICT tools. Sometimes overcrowding and queue in long lines to use telecentres capacity building and learning services. Because telecentres are small in number and size, little skills transfers of ICT occurs a month in rural communities (Meddie, 2015; Kapondera and Hart, 2016).

Other skills enhancing assets are few and expensive for individuals with no and/or little household income a month as in rural Limpopo Province where individual household income is mainly spent on bread and butter with nothing left as savings. Many individuals depend on government grant and/or little services that create additional income. This unavailability and expensive costs of using digital literacy expand digital divide for rural communities especially in South Africa (Kong, et al., 2014).

Low levels of digital literacy among individuals and enterprises in rural community are because of many reasons. Lack of and/or little formal and informal digital literacy through government and NGOs performance expand digital divide in rural community in many societies across the world especially in South Africa (Kong, et al., 2014). As a results of these attitudes and practices individuals and enterprises in rural areas find it difficult to take part in ICT activities including skills transfers thereby expanding digital divide challenges among rural communities in South Africa (White and Selwyn, 2013).

Third set of digital divide challenges influencing rural areas are no and/or low levels for application of ICT. As section 2.2 shows, lack of application of ICT comes from three important areas. This includes socio-economic divide, ICT assets divide and policy context divide. These set of digital divide has serious consequences on uplifting rural villages from ICT misery in especially developing nations like South Africa. This digital divide impacts on public access to ICT as little as access to mobile phones, iPad, laptops and fax machines (Kong, et al., 2014; Oyedemi, 2015; Williams, et al., 2016).

Above sets of digital divide influences lack of or low applications of ICT in rural communities and enterprises. Such consequences impact on three sets of entities as section 2.5 shows. Carson (2013) shows ICT challenges impact individuals including students, youths, employees, and elderly that need to benefit from ICT applications in rural areas much like in urban areas. Rural farming enterprises also face similar fate from low applications of ICT in business activities. Such digital divide disallows ICT participation in youthful farming and non-farming services (Oyedemi, 2015. Philip et al., 2017).

Rural farming enterprises are important for uplifting rural communities. These offer plants, animals and herbal farming products and services for uplifting community if ICT benefits reach rural enterprises (Oyedemi, 2015). Non-farming enterprises need bridging digital divide in uplifting rural community in which these enterprises operate. These rural enterprises operate with low rates of ICT access despite strong need to uplifting these rural communities and businesses (Internet World Stats, 2015). Therefore, realizing access to, uses of and application of ICT in rural communities and enterprises is to examine this digital divide impacting on uplifting efforts in Dibate Village.

2.2   Understanding DD in Rural Communities

The inabilities to access and make use of ICT in rural areas in South Africa are as Oyedemi (2015) shows not only a contributing factor to economic challenges. However, lack of skills existing in these areas plays an important role in socio-economic advances in rural areas. Consider an extent to which a resource use reflects its importance. Understanding access to ICT cannot only address digital divide challenges by providing ICT, unless addressing qualified professional challenges. Need for professionals and technical support practitioners as well as political-will to encourage ICT skills transfers are important. Availability of these resource persons engenders uplifting rural people, local economy, enterprises and communities though ICT skills transfers (Steenkamp and Hyde-Clarke, 2014; Powell, 2015).

Malyan and Jindal (2014) explain learners in rural areas still struggle to obtain basic learning resources. For example, lack of access to exercise, writing and text-books, chairs and desks as well as toilets. These assets are however available in urban areas with better access for learners attending schools. Bridging digital divide is relatively easier in urban areas than rural areas especially availability of ICT educational resources. These resources include computer centres with internet connections, skilful teachers, digital literacy, and other ICT assets. This situation place learners attending schools in rural areas at digital divide disadvantages. This suggests a need for innovative answers, value adding and uplifting leaders at both local and national levels (Stuenkel, 2013; Kleine, 2013).

Microsoft (2015) shows closing digital divide with mobile broadband in Africa empowers nations to compete with societies outside African Union both on individual and collective national basis. Leapfrogging is important because about 7 billion people on the globe, only 32% have Internet uses. Internet access is even lower on African continent. With 1 billion people in Africa, only 13% uses Internet. This is digital divide with poorer areas having less access to ICT especially in rural areas. Africa needing ICT for Development (ICT4D) aims to digitize every rural community and enterprise in Africa by Africa Information Society Initiative (AISI). Digitizing uplifts rural villages and enterprises. However, AISI fails to realize this vision to digitize African villages, thus Africa remains largely unable to bridge rural digital divide (Mlot, 2013; Flew and Waisbord, 2015; Ojo, 2016). Figure 2.1 (refer to Addendum page 156) shows closing digital divide with Africa Undersea Cables (2016).

Welsch et al. 2013 argue lessons from growth of cell phones in shows ICT needs a leapfrogging in bridging digital divide to speedup uplifting rural areas in African societies. Leapfrogging ICT empowers rural communities in Africa to uplift individuals and rural enterprises. Bridging digital divide is necessary because Africa has fastest mobile phones markets, with Kenya and Cameroon

scoring 300% growth rate in cell phone markets growth. However, bureaucratic, corrupt leadership and political ill-will often frustrates uplifting rural areas (Strover, 2014; Iftikhar, 2015).

Strover (2014) suggests United States of America (USA) has serious bureaucratic tendencies that contribute to expanding digital divide among especially the rural folk. The concept of digital divide emerges during mid-1990s. As years go on, more attention focuses on unequal access and use of this new ICT media and technology. Before these periods general terms in use include Information Inequality (II), Knowledge Gap (KG), and Media Literacy (ML) among others. Today, multiple ICT terms are continuously emerging as ICT problems for rural community exacerbates. These terminologies include digital divide, digital literacy, digital libraries, Electronic Marketing (e-marketing), Augmentative and Alternative Communication (AAC), which helps ICT users with challenges to speak using natural speech. Others are Baud, which is a unit for measuring data transfer speeds, and byte shows unit of data equal to eight Binary Digits (Bits). (Lohr, 2015; Penjor and Dupka, 2016).

However, Oyedemi (2015) states digital divide describes gap between people with no access to, or those without motivation to use new ICT as well as low application of ICT in daily living activities. Digital divide refers to access for computers, internet connectivity and associated ICT assets to apply in uplifting rural communities and enterprises for national development. This explains that associated ICT assets are many and some include additional digital equipment such as cell phones, radios, and televisions among others. Understanding digital divide for uplifting rural communities focuses on above three sets of digital divide (Steenkamp and Hyde-Clarke, 2014; Internet World Stats, 2015)

2.3 Socio-Economic Divide

This socio-economic digital divide partly stems from lack of awareness of ICT benefits for not only rural communities, but for nations worldwide. Modiko et al. (2014) argue even though there is improvement in ICT access, uses and applications in developing countries where total number of computer owners is small. Differing views on digital divide exists with writers showing 96% of 55 million South Africans having access to cell phones. There is sufficient availability of other ICT assets capable of uplifting rural communities and enterprises if rural communities are creative and industrious enough to use ICT assets. These include radio, iPad, phones, audio-visuals, and improvement in cellular networks in South Africa (Mishra, Akman and Mishra, 2014).

Rural areas need attitudinal change, making use of social capital for innovations among rural communities and enterprises. However, numbers of ICT users having internet access are also small. Many people hardly use these technologies. This is because of social, cultural and economic reasons. It is thought this is as a result of poor awareness of ICT. Socio-economic benefits to gain by bridging digital divide and uplifting rural communities engender positive change in rural entrepreneurship and local good governance that ICT brings (Meddie, 2015; Moyes, et al., 2015).

Modiko et al. (2014) argue about digital divide explaining that social disparities in rural areas are as a result of apartheid legacy with this nation still under segregation as a result. Rural areas are mainly for Blacks and even urban centres are segregated into blacks within former townships and Asians, Coloureds, and Whites residing in urban and associated affluent suburbs. Historical disparities in policies still favour non-black groups of people. As rural areas deteriorate, White farming areas are thriving using ICT benefits mainly in urban centres.

Institutional inabilities to support economic policies as state policies for national interests suffer from ethnic, racial and political identities. Non-black people mainly in urban centres are becoming computer literate from an early age. Children of these groups of people benefits from exposal to digital technologies. Research findings show language is a challenge in uplifting rural communities as people with geographical and socio-economic limitations contribute to digital divide (Frankema and van Waijenburg, 2013; Frankema, 2014).

Statistics South Africa (2015) shows this nation has 51.3% females and 48.7% males. Racial ingredients include Black African 79.2%, White 8.9%, Coloured 8.9%, and Indian/Asian 2.5%. Observation shows more males than female take part in online activities. This indicates serious gap exists between "haves and have-nots". It is also not surprising to find people who have disabilities suffer the most, since these people require special equipment to use ICT. This widens digital divide gaps that frustrate uplifting rural communities and enterprises (Moyes, et al., 2015; Philip et al., 2017).

Similar indications are 62.9% of students have no Internet access at home, 47.1% access Internet on cell phones through 3G mobile connection. Around 59% of male students use Internet each day than female students 49.3%. Also, 61.1% of female students never watch online videos in comparison to 52% of male students who never watch online videos. These shows male-female digital divide exist in schools and homes in South Africa (Steenkamp and Hyde-Clarke, 2014; Williams, et al., 2016). Africa Technology (2014) details proportion of Isizwe project mobile networks, phone and internet access in Africa with its one billion population as in Figure 2.2 (refer to Addendum page 156)

Africa as Figure 2.2 (refer to Addendum page 156) shows has a one billion people with 90% cover by mobile networks, 70% cell phones and 18% internet access (Africa Technology, 2014). In many ways digital divide concept shows existing contrast between people with right to use immediate informational resources and tools of technology and those who do not. Digital divide therefore

means disparities between who have and those that do not have. This means a digital divide is about rich people as against poor in a society (Modiko et al.,2014).

Nonetheless, Ojo (2016) highlights important contribution to bridging digital divide is not merely installation of computers and internet connections in rural communities. Bridging ICT divide need social capital building in a cohesive manner to uplift rural communities and enterprises. Providing ICT assets to close digital divide are merely a partial approach to closing multiple facets of rural-urban digital divide. In addition, Mutula (2011:473) stipulates issues of digital divide deliver holistic answers with regard to access to ICT, effective uses as well as creative applications of ICT.

Access to computers and internet for development and lifting of socio-economic status is becoming increasingly important in contemporary society. Rao (2014:474) shows various issues preventing full benefits of ICT to rural communities worldwide and Africa in particular. Rural communities will remain on wrong sides of digital divide if no effort is made to address these multiple social, economic and political divides. Falling further behind ultimately widen this division between rural communities with social and economic peers. Some of these socioeconomic factors are household income, education and racial divide. Others include age, gender and rural-urban divide known as geographical divide. Important and overlooked divide are skills, awareness as well as political, cultural and psychological attitudes (Rao, 2014:479; Kong, et al., 2014).

2.4 ICT Assets Divide

This is partly a digital divide due to geographical space between urban and rural communities to ICT tools which are easily available in urban centres. In this regard, lack of access points for computers and internet in rural communities are costly and challenging. This lack is primarily because of exorbitant cost of

computers and internet connections to average rural people. Many access points are usually available in urban areas where markets boom in comparison to people in rural areas who find it costly and unaffordable (Malyan, 2014; Williams, et al., 2016).

Sikiti da Silva (2013) illustrates that although migration takes place for many reasons migration of rural teachers is because of lack of ICT assets to help rural students. Explanations show teachers migrate from rural areas to urban centres over 12 years of successive changes of schools due to serious lack of ICT assets to empower rural schools in Africa especially in Senegal. Figure 2.3 (refer to Addendum page 157) shows teacher depending on improvising ICT for teaching to be more humane in rural areas.

Salemink, Strijker and Bosworth (2015) argue uses of ICT and innovations influence rural as well as urban areas worldwide. However, people living in marginal areas seems to be excluded from ICT such as internet. This is because of limitations of geography and insufficient literacy levels among rural communities. While ICT instruments such as computers improve many lives through communication and information access virtually anywhere, geographical divide makes marginal areas in some rural areas out of digital reach. This challenge puts ICT division within and between rural and urban parts of societies, known as digital divide needing answers for cohesive independence (Lin and Wu, 2013; Townsend et al., 2013).

Many rural communities in Africa are living below poverty line as with many other countries elsewhere. Such livelihood with poor living standards largely exists in South Africa with many people depending on government grants and friendly gifts. Such standard of living continues in South Africa. Scarcity of basic ICT assets such as internet connectivity, quality water, electricity, digital libraries and rural community libraries which play a major role in community development. As a result it is not easy to access information at these rural

communities for individual and business uses in comparison to urban counterparts (Prieger, 2013; Powell, 2015; Oyedemi, 2015).

2.5   Policy Context Divide

Before dealing with socio-economic and ICT assets divides between urban and rural areas, national regulations and policies are to engender uplifting rural communities. These rural areas and enterprises are to benefits from ICT. This involves setting out of laws, guidelines, and regulations to develop, implement and use ICT. Roberts et al. (2016) argue empowering people to access ICT is an important pathway for uplifting human lives by eliminating poverty and overcoming digital divide. Various areas offer access to public ITC for those who cannot manage to pay for say a private computer and internet connections. Some of these services are at no cost and/or relatively cheap including telecentres and digital libraries. However, some of these places require payment for accessing internet cafés and/or getting other ICT services. In reducing expenses require making use of local resources to develop ICT assets. This allows building rural ownership and sustenance of data infrastructure thereafter (Scott, 2013:603).

Kivunike et al. (2013) argue despite all publicity, advertisements and political propaganda ICT engenders a social, cultural and economic significance that demand uplifting rural communities, individuals and enterprises. This helps to satisfy requirements of rural communities, people and businesses in uplifting rural areas from poverty and other problems. ITC public access areas effectively contribute to developing people. It is important for government to effectively address information requirements of affected rural communities. Digital libraries and telecentres are designed to develop ICT in uplifting rural communities through effective rural policies. ICT influences almost all spheres of rural and urban livelihood; anywhere, anytime in various ways such as internet connectivity and mobile subscriptions (Jorgenson and Vu, 2016).

Prakash (2015) shows e-governance policies are important for rural development in many nations. However, many e-governance systems lack essential data and insights to implement and/or if available, these are not implemented at all in many developing countries. Implementing and augmenting development in rural communities need effective rural commerce plans and policies to use through having related government agencies. These public institutions are important in redirecting ICT policies and regulations, legislations ad bylaws while serving as electronic service providers. Such arrangements allow rural communities, individuals and enterprises to compete at local and global levels (Dubois, 2016).

Malyan and Jindal (2014) explain a need to give high quality ICT instructional assets and policy supports at local and national levels to Kenyan rural teachers. Innovative research findings are to inform rural development policy debates. As Africa is trying to improve basic education in rural areas, quality of input and/or output at primary, secondary and higher education levels are poor. Policy changes help teaching quality to align with ITC in bridging digital divide especially among rural basic schools with factors such as teacher-learner ratio challenges (Piper and Zuilkowski, 2015).

Philip, et al. (2017) shows challenges facing rural few in United Kingdom (UK) demand swift answers for bridging digital divide by an understanding of socio-economic, political and psycho-cultural patterns, policies and practices among rural and urban centres. Rural polices are to help address rural-urban digital divide with desire to connecting rural few communities to mainstream societal and economic arena. Needs exist for dealing with merits and demerits of cell phones influencing digital divide and uplifting of former township migrants in Cape Town. In Africa, cell phones and Short Message Service (SMS) text contributes to quick communication although sometimes its wrongful use contributes to breaking of informal relationships and even marriages (Powell, 2015).

Advocates of rural development shows creative policies help in uplifting rural communities, individuals and enterprises by bridging digital divide and improving ICT skills transfers. These encompass agricultural, educational, land and other rural development assets like cell phones. Mobile marketing contributes to rural SMMEs in South Africa although global e-marketing expenses reaches US$ 17.96 billion in 2014 (Janvry, Sadoulet and Murgai, 2013; Maduku, Mpinganjira and Duh, 2016).

2.6 Lack of Access to ICT

Townsend et al. (2013) suggest important factor in empowering rural communities is access to ICT assets. Further, world economic advances influence ICT revolution in uplifting rural communities as well as urban centres worldwide. This study shows important types of access to ICT assets. This can be material access to things. This constitutes a common focus though digital access recently replaces material access. Access to digital materials gets prominence regardless of where such materials resides. When needs arise to own and/or put a physical item into storages eventually eliminate digitisation. However, bridging digital divide helps uplift rural access to digitization that engender uplifting rural communities and enterprises operating in these rural villages (Microsoft, 2015; Jorgenson and Vu, 2016).

Recording and itemising physical items are necessary for storing these items and this enhances stock inventory. This occurs according to particular symbols and/or words although digitisation has no such requirement. Browsing using worldwide web depends on defining keywords, hyperlinks, and/or any measure of relatedness, which means that same subject materials do not need to be near one another. Thus, internet uses in South Africa is rising even though it is low considering national population. These uses reflect racial distribution as below (Oyedemi, 2015).

No needs for physical visits by users of broadcasting technology and digital library. These visits are by electronic means. Digital library is available from any place and allow access to individuals, businesses and institutions such as schools, homes, cars and/or offices. Speed of digital transmission keeps rising and such ICT uplifts rural communities, enterprises and other rural engagements. ICT transition from slow to fast worldwide shows transistors within innovative chip double between one and a half to two years. This prediction shows exemplar growth between 35% and 45% a year (Moore, 2015).

Access to ICT relates to formal education, technical and/or vocational training for young people in need to creating long-term ICT resources for bridging rural-urban digital divides. To ensure effective long-term distribution and local innovation of ICT a safeguard is relevant in developing countries. This is important in improving ICT investment through implementing innovative and integrative policies. These are to take place using educational system including primary, secondary, and higher education (Roberts et al. 2016). Figure 2.4 (refer to Addendum page 157) shows internet uses in South Africa.

Oyedemi (2015) illustrates as Figure 2.4 (refer to Addendum page 157) shows that South African internet uses reflects socio-economic strengths of racial divide influencing ICT benefits making up national population. While black Africans many residing in rural areas score 47.10%, coloureds and Indian/Asian equally benefits from internet with 68% and 68.40% respectively. Also, Whites score 78.2% of internet uses per population. Bridging digital divide therefore need concentring on many Africans mostly resides in rural areas.

Such uplifting of rural communities through ICT encompasses training and technical supports. Brand new and first-hand skills for youths are important to all areas within society. This includes rural and urban areas as well as business sectors, trainers and teachers in addition to IT professionals. The resultant

outcome delivers ICT support skills necessary for ICT access to wider economy (World Bank, 2015).

World Trade Organization (2015) demonstrates part of long-term transformation strategy involve making use of education and training to build ICT proficiency. This foster developing national available skills for innovative transformation. This need extensive financial resources and funding, language constraints and curricula adaptation. Others include an effective management of both technical and vocational ICT programmes. ICT learning including computer training ought to be an integral aspect of an educational game plan. Although, this is more expansive and involves additional time and resources (Microsoft, 2015).

ICT Access and associated security needs answers for establishing who have access to and ways in which to access say digital library. This also concerns security needs to take into account in protecting digital library functions and resources (Uduku, 2015).

2.7 Motivation to Using ICT

Lack of motivation to use information say over Internet in this study encourages lack of access to ICT. Access to ICT and skills to use is not enough to benefit from access to computers as well as internet connections. This is insufficient because motivation is important for people to use in dealing with satisfaction from uplifting strategies by bridging existing digital divide among rural communities and enterprises (Jayne, 2014). In developing rural communities, above factors can play an important role. Government awareness is crucial for these factors to generate strategies for achieving greater ICT application results (Carson, 2013; Baud et al., 2015; Dubois, 2016).

Motivational access is important as Barjis, Kolfschoten and Maritz (2013) contends many people have motivational problems in accessing ICT. Such problems come from various reasons especially healthcare. This is an important

digital divide bridging answer to uplifting rural poor people and enterprises. Health problems can create serious digital divide for people to access ICT. The argument here is desire to own a computer and have connections must exist before actually having access to a personal computer and connecting to internet (Moore, 2015).

Alkire et al. (2015) show access to use ICT comes from motivating someone to apply and actually use computers and Internet in person. This delivers fundamental satisfaction from say obtaining and using a digital media. Having enough motivation makes access and skills to use a computer as well as having access to internet even more easily. This lack of motivation among poor groups of people limits access to ICT needing answers through uplifting rural communities. However, actual use of ICT does not only depend on motivation, skills and access. This has its own foundation and determining factors. Measuring use of ICT to uplift rural communities, individuals and enterprises relies on factors that include time of use, an assortment of use and purposes for accessing ICT (Townsend et al., 2013).

2.8   Understanding ICT Language

Language barriers when using internet can prevent people in becoming familiar with benefits of Internet-based information resources. This usually necessitates abilities to comprehend international languages, specifically English. This brings another digital divide for rural people not being able to read and understand many electronic contents. Another factor is high rate of illiteracy prevailing among rural people that affects access through social innovation in uplifting rural communities and enterprises. Improving ICT access needs bridging language digital divide influencing rural communities and enterprises through technology skills transfers (Cajaiba-Santana, 2014).

Kleine (2013) argues local content and language barriers impede uplifting rural communities. Information available through ICT is mainly presented in English

as medium of communication. This poses problems as people in rural areas are unlikely to comprehend English as a medium of communication and language. In addition, lack educational materials in indigenous languages add to digital divide in access to ICT by rural people, communities and enterprises (Moyes, et al, 2015).

Language barriers in using the Internet raises additional element of low literacy rates within rural communities. Such low levels of general skills and ICT know-how in particular inhibits learning and abilities to take advantage of good sources of information from internet. This call for an understanding of English to access content of Internet and software programs (Frankema and van Waijenburg, 2013; Ojo, 2016).

Penjor and Dupka (2016) argue lack of local language information products for learning limits access to ICT by rural communities, individuals and enterprises. This scarcity refers to suitable digital commodities associated with ICT needs and abilities of rural people to learn new technologies. Putting these techniques and traditions into practice add value to uplifting rural communities through applications of ICT. Current information is needed as a guide to make best investments decisions. In addition, a need exists for new methods to improve product and service quality as well as understanding shifting market demands and conditions (Uduku, 2015).

Many rural people do not understand and/or speak English, which is a major language for accessing internet in South Africa. However, since this is mainly a current internet language, opportunities to access ICT is small because rural people lack this language ability. Bridging such digital divide need uplifting rural ICT through which to acquire skills of using computers and understanding contents for internet access (Scott, 2013). Additional factors include matters such as gender, age, and where applicable status of any disabilities. Prior studies show that participation by elderly people in online activities in

comparison to younger people is relatively low among rural communities (Hall, Matos and Martin, 2014; Pima, Odetayo and Iqbal, 2016).

2.9   Availability of ICT resources

Some prescriptions and conditions are necessary for implementing ICT in trying to uplift rural communities and bridge existing rural-urban digital divide. New technologies require electricity to function. In some parts of rural South Africa, exists either a lack of electricity, irregular outages and/or no electricity supplies in these areas. Computers and mobile phones require internet connectivity and/or network connections to function either for personal and/or business reasons. Often network infrastructure in rural and distant communities is lacking (Prieger, 2013; Welsch et al., 2013).

Zlotakova and Weide (2015:74) show internet connectivity in rural communities becomes more impossible to obtain. Many rural communities still do not have a reliable electricity supply. These communities are still protesting and fighting to receive basic needs such as water and electricity. Access to an internet connection is a basic human need for worldwide communications through the worldwide web. But, this basic need ends up becoming a luxury in rural areas (World Bank, 2015).

Studies show in rural communities, problems and challenging experiences people and enterprises face are about accessing information that comes from unavailability of ICT resources (Uduku, 2015). This is usually associated with lack of infrastructure in rural areas. Such lack of ICT assets for empowering rural communities and enterprises are normally taken for granted by urban counterparts. Some important factors for rural and national economic growth and development are provision of knowledge and access to ICT resources (Janvry, Sadoulet and Murgai, 2013:1593).

2.10 Rural ICT Empowerment

Empowering rural communities and enterprises are not only important, but key drivers for rural and national economic growth through SMMEs empowerment. Despite all exceptional benefits and potential introduction of digital library in rural areas there are uplifting and bridging digital divide failures. Government fails to make digital library a priority, which contributes to underdevelopment of many rural communities (Baud et al., 2015).

Claims governments make are scarcity of financial and other resources for being unable to supply basic human needs. Basic needs for rural people include water, food, health care and electricity. It is therefore, not surprising that many countries have seen no and/or minimal investment in digital libraries for rural areas. This is not part of stipulated basic human needs necessary for ICT empowerment for rural communities and enterprises (Barjis, Kolfschoten and Maritz, 2013; Jorgenson and Vu, 2016).

Rural ICT empowerment uplifts rural communities through access to ICT. However, challenges are how many people have access to Internet connections and personal computers. This is specifically where demographic categories such as ethnicity, gender, knowledge and skills as well as education play important roles. Also, a need exists for effective e-governance to improve health and nutrition in rural communities and enterprises as this factor challenges uplifting digital divide (Jayne, 2014; Prakash, 2015).

In response to above claims, Barjis, Kolfschoten and Maritz (2013) demonstrate a home-base healthcare service to uplift rural areas in South Africa. A patient support monitoring method uses Unstructured Supplementary Service Data (USSD). This mobile phone scheme is a decision support that helps medical personnel. These people are nurses and doctors to help decide on health issues and/or take extra treatment actions. This system uses important signs

from patients under digital monitoring on a regular basis as Figure 2.5 (refer to Addendum page 158) shows.

Figure 2.5 (refer to Addendum page 158) shows some USSD screenshots using a mobile phone. Indicators include calling the number, request for patient number and main menu for patient data. Others are submenu for temperature and main menu after entering vital signs. A complaint from caregivers does not know how to act when a patient is having a critical illness. ALARM alternative, number 6 within main menu answers this need by allowing a caregiver to clinic a sister via an automated SMS. This contains patient and caregiver names with phone number. As this sister gets an emergency SMS, she calls back caregiver to help in such a case (Barjis, Kolfschoten and Maritz, 2013).

Pima, Odetayo and Iqbal (2016:48) argue TCs are important in fostering participative democracy and active citizenship in ICT empowerment. However, these centres are not fully in use. In many cases rural communities where these centres are cannot equally access these ITC centres. Access is mainly by all groups of people including youths, mostly male adults, school and/or college students. In some cases access is by more educated and people from higher income households (Alkire et al. (2015)

Furthermore, Buabeng-Andoh (2015:108) suggests telecentres experience a number of challenges and limitations for uplifting rural communities. These include high costs and unreliability of power supplies, telecommunications challenges and excessive price for access to ICT. Opening hours are inadequate adding to challenges as most telecentres have kept operating hours to limited time (Baud et al., 2015; Prakash, 2015).

2.11 Lack of Skills to Use of ICT

Availability of human resources inventory is lacking in many rural areas nationwide. People need training to use, apply and maintain ICT resources. This increases knowledge and confidence of rural individuals in using ICT. However, there exists a shortage of IT professionals in rural areas. Also, Kapondera and Hart (2016:23) point out education is essential to eliminate misconstructions that technology is made for educated élite. Nevertheless, learning structures are lacking for as much as skills to use ICT. Bridging rural digital divide needs application of ICT with more services needing capacity for reading and innovation. This includes skills transfers among rural people and enterprises for creative rural uplifting (Hall, Matos and Martin, 2014).

Further, Uduku (2015) shows access to skills limits skills availability to enable rural individuals and enterprises to use ICT. An example is after gaining skills to use technology and some form of access to ICT uplifts rural people to learning how to use this equipment in bridging digital divide among rural communities and enterprises. A problem is lack of skills necessary to make use of computer technology. Such problem expand digital divide of access to Internet that need answers. This obstacle is in many times seen as a lack of computer and/or digital skills, and digital literacy (Microsoft, 2015).

2.12 Telecentres

Telecentres have no single universally agreed definition as such depend on sophistication and location. Telecentres have many names like community Electronic Centres (E-Centres), community centres, tele-cottages, community learning centres and so on (Galindo and Méndez, 2014). Janvry, Sadoulet and Murgai (2013:1593) show Electronic Commerce (E-Commerce), many definitions for telecentres confuses an understanding of ICT terms especially in rural areas. All these definitions demonstrate needs for skills building for community resource improvement. This allows bridging digital divide and

uplifting rural communities where all which belong to a community can access information. Such skills transfers are pertinent to employing ICT in improving and developing human lives. Telecentres have multiple definitions per locations of origin (World Bank (2015).

Penjor and Dupka (2016:72) define a telecentre as a space physically providing public access to ICT for economic, social, and educational growth. These centres come in various forms and Suleri and Cavagnaro (2016:170) shows these give access to ICT by rural communities easy. Therefore, people can obtain digital information in a way similar to urban communities. Telecentres range from rooms with basic ICT assets and/or consist of multipurpose information centres, which also serve as public libraries.

Oyedemi (2015) shows this concept is an action for responding to ICT access. This includes especially internet access as part of uplifting rural communities. It is necessary to manage telecentres like businesses for purpose of sustaining ICT resources. Suggestions are profit not being a primary focus, but skills improvement in bridging digital divide (Pick, Gollakota and Singh, 2014). This helps to prevent telecentres from shutting down as community centres and becoming other forms of businesses. Such centres are bi-directional system in sense of use within communities being able to exchange information in uplifting rural communities (Cajaiba-Santana, 2014).

Telecentres have purpose of furthering rural community through digital literacy, while offering a base from where access to internet is possible. Second, telecentres aim to increase participation among rural communities in Internet activities. Such is like e-government in developing rural communities with socio-economic use of ICT as Pick, Gollakota and Singh (2014) illustrate. Telecentres are meant to increase access to ICT in rural communities, although seem no universal performance indicators to use.

However, according to World Trade Organization (2015) telecentres are deeming to have no failures in community development stemming from availability and/or use of ICT. Moreover, an argument by Meddie (2015) states success of telecentres today determines future uplifting of rural communities. This includes innovative bridging of ICT divides for extra investment from governments, social investors and development partners.

Okoye (2014) shows intensities of people desiring to shop online. A yearly ongoing online shopping behaviour fact finding shows this ICT uses to shop in South Africa. This study encompasses 11 countries in Africa and Middle East with consumers using banks between ages of 18 and 64 accessing internet a week at least once. Figure 2.6 (refer to Addendum page 158) shows these shopping behaviour in South Africa using ICT arrangements.

As Okoye (2014) shows online shopping behaviour generates five important facts influencing application of these ICT instruments. These include 90% responses for secure online payment and 87% for satisfaction with online shopping experiences. Further, responses show 69% has at least online buying activities within past three months. Also, some responses indicate 33% shopping experiences through mobile phone or plan to do so in following six months. Around 23% of South Africans shopping buying is through an overseas website.

Buabeng-Andoh (2015) explains a Ghanaian facilitator gave a keynote address on sustainability of e-commerce in telecentres for developing countries. A fact finding by an ICT, UgaBYTES, showing telecentres an initiative that exist in many forms, sizes and varying levels of sophistication. Some telecentres assist numerous vendors to provide services such as e-mail and Internet access including access to facsimiles, word processing and photocopying machines and other ICT services (Moore, 2015).

Galindo and Méndez (2014) show a distinction needs between different telecentres types to implement, which are comprising of mini- and comprehensive TCs. Small private businesses generally own and run mini-telecentres made up of a movable cabinet. In addition, a microcomputer and what is generally known as a '3-in-1', which means a copier, a scanner and a printer. Government institutions in addition to community organisations in general, own and manage comprehensive telecentres. Such telecentres consist of schools, conference centres and postal services (World Trade Organization, 2015.)

2.13 Digital Libraries

Lack of skills to use ICT is unable to change social structure. It is only through an ongoing use of ICT resources such as digital library encourages change in all spheres of rural community daily activities (Prieger, 2013). Digital library is therefore an important ICT instrument for promotion of economic and social development in rural communities. Crucial demonstration of rights to use digital library for accessing information by rural population engenders uplifting rural communities and enterprises. This concerns topics such as relevant government-related, agricultural and educational skills improvement in bridging digital divide (Vaidya and Nath, 2013:356).

Improving skills are priorities in countries such as South Africa about hygiene and sanitation, health and nutrition as well as safe drinking water. Even though perception of computers is important, these are not a priority. Access to information is uncomplicated and reliably significant in satisfying fundamental needs of rural communities, which makes it a priority (Foster and Heeks, 2013; Kong, et al., 2014).

Having access to information and knowledge is important for good competition across ICT global village. Internet is a vault of knowledge offering access to enormous stores of information about various issues and challenges around the

world. ICT provides a competitive edge to rural and urban people, communities and enterprises that use it (Pick, Gollakota and Singh, 2014).

Digital Libraries act as intermediaries for information in overcoming digital divide that comes through unequal access to internet and ICT resources. This creates an intrinsic handicap for people that do not have access and/or use of ICT resources (Vaidya and Nath, 2013:358; Cajaiba-Santana, 2014). A study by Vaidya and Nath (2013:360) offers a definition of a Digital Library. This explains it as a standard for storage and retrieval of relevant and reliable information. These standards include procurement and administration of communications and knowledge for urban and rural growth.

A digital library is a solution to conditions for access and application of ICT, thereby having quality of lives transforming and eliminating poverty. Digital libraries can help to better rural livelihood of people and businesses in rural communities. Digital Libraries help to decrease in current low percentages of literacy and increase knowledge. Introduction of digital library suggests offering a solution to problems of lack of skills to use ICT (Uduku, 2015).

Cajaiba-Santana (2014) shows any digital library requires crucial elements for it to effectively empower rural communities and thus accomplish its mission. Improving social services through innovative ideas and concepts need a fundamental requirement in operations or setting up a digital library. That is, access to basic ICT infrastructures and Internet. Zlotakova and Weide (2015) shows consideration is for capital associated with growing sustainable digital libraries, systems and services as well as maintenance.

Digital libraries are by no means least element to ensure providing services and information that meet basic standards for information and literacy. These are in need to benefit fully from bridging ICT divides. Other factors include target audiences in defining digital library target audience (s) and importance of

compiling a profile and establishing information needs. Collaborating with others to acquire information resources and mechanisms for collaboration necessitate acquiring permission to include particular resources. Such services cover ICT resources development and application of conditions to include content (Baud et al., 2015; Salemink, Strijker and Bosworth, 2015).

Vaidya and Nath (2013) argue usability of digital library comprises of a variety of differing usability components issues of functionality. Consideration is given on interface challenges in user experiences and standard guidelines on practice concerning digital library use. Quality of digital library holdings has explicit criteria for inclusion crucial in sourcing correct information requirement by users. Effective operations and maintenance of digital library offer long-term sustainability and preservation of digital library. Rights to copyright, intellectual property and distribution are important to uplifting rural communities. The obstacles concerning copyright, permissions, and additional legal implications of materials is available at digital library (Pima, Odetayo and Iqbal, 2016).

2.14 Digital Literacy

Digital Literacy is an important aspect of getting skills to use ICT in rural communities and enterprises. An argument by Poole, et al. (2013) show many experienced and skilful teachers live in urban areas in comparison with rural areas. A perception is better access to and availability of relevant facilities and resources. Low quality education delivery to learners in rural areas is resulting from teaching lessons without relevant ICT instructional resources and skilful personnel (World Bank, 2015).

Baud et al. (2015) show even though there are more people who own a computer and have access to internet, majority of people in rural areas have either no and/or limited opportunities to access the World Wide Web. The resultant effect is ignorance of socio-economic stimulus and benefits to good governance that ICT can bring. The quasi-absence of demonstration projects in

some rural communities means limited information available to assess and advocate for ICT growth (Microsoft, 2015).

Providing ICT resources for access to skills are costly to buy and/or rent and incur additional costs such as electricity, modem, cabling and connections for use. This is defined as immediate needs for rural communities where people and rural enterprises reside and operate. It is vital to know that bridging digital divide encourages ICT to answer to more problems than creating challenges for humankind (Uduku, 2015).

World Bank (2013) shows a study in rural communities indicating word-of-mouth is in general a useful method to pass on information concerning three news worthy topics about government, agriculture and health. Learners put faith in information from parents, teachers, friends, and neighbours to complete school assignments and learn. Not having access to ICT resources stunts development of reading for recreation, hence a poor culture of reading exists in many rural areas. Mlot (2013) shows a rising internet subscriptions and penetration as Figure 2.7 (refer to Addendum page 160) shows.

As Figure 2.7 (refer to Addendum page 160) shows Mlot (2013) explains internet in Africa is growing at fast rate despite low levels of literacy and poverty among especially rural population. This speed in internet access makes Africa a fastest growing internet markets on the planet. Important facts include out of 7 continents on earth Africa is 2nd largest in spatial and population sizes after Asia. It covers 6% of total surface area with 20.4% of total land area. This continent has over one billion people with 650 million cell phone subscribers, more than combine value for USA and European Union (EU).

Africa has 700 million Subscriber Identity Module (SIM) cards with 7% of households having internet access. SIM card is a secure integrated circuit that store International Mobile Subscriber Identity (IMSI) password and number. These keywords identify and verify subscribers on cell phone services

networks. By 2012 over 167 million internet users representing over 15% of population and by 2011 it was 11%. These represent 7% of world total internet users. Over 51.5 million Facebook users with 4.8% penetration rate. Mobile broadband of 93 million subscription with 11% penetration and 41% mobile broadband growth rate a year (Mlot, 2013).

Other important facts to know about ICT uplifting rural communities include national demographics and socioeconomic contributions to internet access and uses as well as applications to improving both urban and rural communities in Africa and Dibate Village within South Africa in particular. Some of these statistics include Nigeria with 170 million people having 101.2 million mobile users with 57.9% of web traffic being through mobile in comparison with world average of 10%. Egypt has 78.3 million people with 71.4 million mobile users and 8% having internet access. Kenya has 42 million people with 28 million mobile phone subscribers (Mlot, 2013).

South Africa has 50.5 million people with 59.4 million mobile phone users. The nation is 15th largest telecom market in the world as at 2012 and 11% of population has internet access. South African places for internet access include workplace 18.9%, home 9.8% and at school 5.4% (Mlot, 2013).

Lack of awareness regarding benefits of ICT informs digital literacy as important uplifting skills for rural communities and enterprises in Dibate village and other rural areas. Digital literacy refers to skills and knowledge to use ICT (Foster and Heeks, 2013). Making use of digital devices employs knowledge, skills, and behaviours relevant to operate broad range of available devices. These digital assets include smart phones and tablets, laptops and desktop Personal Computers (PCs), which are part of system's networks rather than computing machines. Earlier, some focus of digital literacy was on digital skills and standalone computers. However, emphasis has change to network devices in opposition to previous standalone devices (Hall, Matos and Martin, 2014).

Internet services and access to information are necessary for rural communities to acquire knowledge and skills to access computers. English as an effective internet language in South Africa especially within black rural communities is a prerequisite for training. Knowledge, awareness and information can assist rural communities to respond to socio-economic and technological needs. Training and skills transfers of entire rural areas and enterprises begins a great uplifting of rural communities through bridging of digital divide in places such as Dibate Village (Malyan and Jindal, 2014).

2.15 Participating Skills in ICT Activities

Taking part in ICT services needs innovative skills to help in communication among participants. Cornell University, INSEAD and WIPO (2013) explain innovation in local skills for uplifting rural communities and enterprises require discussing certain distinct skills relevant for bridging digital divide among rural communities. Operational skills are basic knowledge and abilities to use hardware and software with an understanding of mastering problems of lack of skills among rural communities and enterprises. Formal skills are to enable people working with files, folders and hyperlinks. Examples include formal structures of computers and Internet services networks. Informal skills include abilities of individuals to identify, select and analyse information on Internet with ease. Strategic skills refer to individual abilities in getting specific objectives in improving professional strength of mind through use of computers and information on Internet (Hall, Matos and Martin, 2014).

A range of digital skills people with digital experiences possess include an understanding of basic principles of computing. This covers computer networking skills and abilities to engage in social networks and online communities while abiding by behavioural protocols. Also abilities to find out obtain and evaluate information for understanding societal issues that come to fore through digital technologies. These include things such as big data. Having critical thinking skills is different from traditional forms of literacy. digital literacy

requires innovations instead of traditional forms of thinking to build upon for uplifting rural communities (Poole, et al, 2013).

Vaidya and Nath (2013:361) illustrate digital literacies is an opportunity with goal of supplying necessary ICT manpower and infrastructure to rural communities. This helps to effectively deal with evolution to an information culture. In order to provide access for rural communities to information services and sources that are situated anywhere in the world, ICTs and World Wide Web are in use (Uduku, 2015).

2.16 Lack of and/or Low Application of ICT

Many people residing in rural communities of South Africa and parts of Africa still live below poverty line. With no improvement and/or involvement from outside parties, these people carry on living in this way. These conditions are attributed to a lack of infrastructure, service delivery and knowledge. New world of opportunities are relevant by introducing ICT in rural communities (Microsoft, 2015). Low application of ICT in rural areas limits community development through social and economic elements like poverty eradication that allows bridging of digital divide (Alkire et al., 2015)

Proper ICT implementation act as an instrument in empowering rural people in becoming more than a mere tool to empower businesses. Stuenkel (2013) explains a need to train a change of thinking and drive for innovation in bridging digital divide between rural and urban communities. This suggests two defining groups for use by rural communities to make ICT:ICT ratio as an instrument to improve individual abilities and/or as a business tool. Value adding to businesses through ICT by making work performance quicker and easier. ICT skills can further facilitate communication at minimal cost over either short and/or long distances (Kleine, 2013; Ojo, 2016).

Kapondera and Hart (2016:23) show it is important a community conducts assessments to find out what ICT assets it needs. This happens with collaborating organisations and associations that produce content. Mlot (2013) shows an infographic snapshot of internet use in Africa as Figure 2.8 (refer to Addendum page 160) shows:

Lack of and/or low application of ICT for effective bridging of digital divide for uplifting rural communities is a factor of concerns in this study. An infographic analysis by Mlot (2013) shows Africa as one of fastest growing internet markets. A revelation of top 10 internet countries in Africa includes Nigeria as first having 48.4 million internet users. Second position is for Egypt having 29.8 million users. Third position is with morocco having 16.5 million users. Fourth and Fifth positions respectively goes to Kenya with 12 million users and South Africa with 8.5 million users. Sudan, Tanzania and Algeria respectively hold sixth, seventh and eight positions for internet access with 6.5 million, 5.6 million and 5.2 million. Further, Uganda and Tunisia respectively have 4.4 million and 4.2 million users to taking ninth and tenth positions respectively.

2.17 Individuals

Elements by which most rural communities in South Africa are still affected include low sustainable income and high levels of poverty. Jayne (2014) shows even through low levels of literacy exist among rural people cell phones improve relationships. These phones offer low cost services such as SMS known as text messages, what's up to mean what is currently happening offer low cost communication among people.

These calls add value to instant messaging, colleagues and friends. Mobile phones are important ICT assets in uplifting rural as well as urban communities worldwide. There are multiple other uses of cell phones. Examples are making money from lending out phones to other users in need especially for emergencies. However, no and/or minimal awareness concerning cell phones

as ICT uplifting assets. There are advantages these mobile phone deliver to rural people (Kivunike et al., 2013).

Mlot (2013) also mentions despite awareness by many people living in rural areas, the reality and presence of benefits ICT offer in improving quality of lives is an unknown. It is therefore not surprising that resources such as computers are not accessible by many people living in rural areas. As a result, there is a lack of access to internet in many rural homes. Investing in such technologies is not seen as important strategies (Kivunike et al., 2013). Pew Research Centre (2013) shows payments of cell phone users across Africa to indicate access to ICT benefits for individual gains. This is in comparison to worldwide payment average suggesting high mobile payment in Africa as Figure 2.9 (refer to Addendum page 161) shows.

As in Figure 2.9 (refer to Addendum page 161), Pew Research Centre (2013) shows lack of and/or low application of ICT among rural communities affect individuals, rural farming enterprises and non-farming enterprises. Individual's cell phone payment show levels of application of ICT from some countries in Africa. While scores are 11% from worldwide mobile payment average, Kenya scores highest with 68% and Uganda next with 50%. South Africa third with 29%, Senegal fourth with 24% and fifth is Nigeria with 13%. Ghana, Egypt and Tunisia have sixth, seventh and eight positions with respective scores of 11%, 6% and 3%. These levels of payment show willingness and motivation of nations in Africa to pay for ICT services and benefit from these digital services. Such services impact on uplifting rural communities such as Dibate village in South Africa, which is the focal point of this study.

2.18 Rural Farming Enterprises

Roberts et al. (2016) argue creative rural improvement depend on sound ICT policies for rural community growth and enterprise sustenance. SMMEs are growing because of bridging of ICT divides in rural areas. Certain drivers of

mobile phone growth are perception about usefulness of this device, workers ICT skills and applicability on the job, executive management support for clients, employees as well as customer responses demanding for effective service delivery. These factors help bridge SMMEs many of which are in rural areas (Maduku, Mpinganjira and Duh, 2016).

Jayne (2014) explains use of ICT in uplifting rural communities through developing ideas framework to examine determinants of and/or responses to shortages of land for especially agricultural activities within rural areas in Africa. Figure 2.10 (refer to Addendum page 161) shows a conceptual framework of this analysis.

Conceptual analysis to determine land scarcity as Figure 2.10 (refer to Addendum page 161) shows help explain ICT determinants of land scarcity impacting on rural communities and enterprises. Such determinants include change in local population density due to rural-urban drift. Land quality also drives people in search of arable land for effective rural farming and market access conditions. These are important factors affecting bridging digital divide from rural farming communities that challenges rural enterprises. Land allocation policies and institutions influence rural farming enterprises for growth. All above factors influence degree of land scarcity that rural farming households experience needing especially rural uplifting through ICT answers (Jayne, 2014; Kong, et al., 2014).

These levels of land scarcity rural farming households experience also influence potential responses including boseruption for intensifying sustenance. A shift exists in household labour for non-farming services around home areas and resulting migration to sparsely populated rural and urban areas. A special impact is felt by demand for contraception (Jayne, 2014; Adenle, Manning and Azadi, 2017).

Factors influencing responses to land scarcity are present land size, soil quality and market access conditions. Further factors are cost of acquiring land in receiving area, land quality and market access conditions in receiving area. Other factors include cost of migration, agricultural output and input prices, farming ability and household purchasing power. Last is expected returns to labour in non-farming employment determined by education and skills levels (Kong, et al., 2014;Jayne, 2014).

Jayne (2014) shows use of ICT with local input, skills and resources enhances acquiring professional extension workers. This encompasses technology and skills transfers which contribute to developing local farmers thereby uplifting rural communities and enterprises. Bridging digital divide need strong skills and practical training of local people for longevity and sustaining ICT benefits among rural communities.

As Figure 2.10 (refer to Addendum page 161) shows Scott (2013) believes in domestication through use of local resources in delivering ICT assets, skills and motivation. This encourages ownership of ICT for uplifting rural farming businesses.

2.19 Non-Farming Enterprises

Creative ICT governance for rural uplifting using knowledge management is an essential ingredient for bridging digital divide for improving rural communities and enterprises as Baud et al. (2015) suggest. Innovations in knowledge management brings good leadership through electronic governance (e-governance) both rural and local levels. Non-farming activities offer multiple linkages to uplifting rural communities and enterprises. Bridging digital divide by use of effective knowledge management in business development and rural advances in ICT benefit these rural entities (Prieger, 2013).

Adenle, Manning and Azadi (2017) suggest digital divide in rural areas need bridging through ICT agribusiness advances to improving both farming and non-farming enterprises. It requires serious investment in fact finding current technologies with strong Research and Development (R&D). Innovations in non-farming activities help propel areas for farming as well as non-farming entrepreneurial innovations that help uplift rural areas and these enterprises. Development of rural business clusters within value chains for bringing forward and backward linkages in business help digitize and uplift rural communities and enterprises (Cornell University, INSEAD and WIPO, 2013).

World Bank (2013) explains non-framing technologies interfacing agribusiness technologies with potentials to uplifting rural communities and enterprises include biotechnology interlinking with genetic engineering. Uplifting rural people through advances in ICT and intellectual property encourages creativity among local people in both agribusiness and non-farming businesses. Digital advances engender better quality in crops and yields despite challenges associated with these advances such as ecological risks like toxicity (Adenle, Manning and Azadi, 2017).

Nanotechnology for improving food making, packaging and retailing to add value to food insecurity worldwide especially across rural communities. Managing through nano-pesticides and insecticides as well as nano-particles for releasing nutrients and water for improving crop growth and yields. This technological advance helps uplift rural businesses. However, care is necessary in controlling environmental uncertainties in application and uses of nano-materials because nano-materials can cause health hazards and ecological damage that require socio-economic resilience and sustenance (Scott, 2013; Roberts et al., 2016).

Other ICT advances to uplifting rural communities include Geographical Information System (GIS) in addition to other ICT assets such as cell phones. GIS adds value to rural businesses through delivering access to input and

market information for business people. GIS helps in reducing transaction costs as well as monitoring fields and yields for farmers and enterprises. However, GIS tools have demerits including poor rural assets, power failures and low transmission signals. Other challenges are lack of skills transfers and awareness, poverty and language barriers that need address through skills transfers (World Bank, 2013; Poole, et al., 2013).

2.20 Conclusion

Applications of ICT for uplifting rural communities and enterprises have many advantages and disadvantages to address. As in above sections of this study, research objectives focus on understanding digital divide impacting rural communities and enterprises. Other objectives focus on addressing lack of access to ICT, lack of skills to use ICT as well as lack of and/or low levels of application of ICT in uplifting rural communities with a focus on Dibate village.

In addressing such digital divide among rural communities with emphasis on Dibate village drive this study. Current literature reviews using new academic reference from 2013 through 2017. These help understand ways of dealing with digital divide and uplifting rural communities and enterprises through ICT supports and benefits. This chapter concentrates on applying ideas within conceptual formwork and detailing issues relevant to four important research objectives.

These items include understanding digital divide that influence rural communities with specific focus on demographic and socio-economic characteristics, ICT assets and policy context. Some important areas across this section and even across this chapter are discussions on socioeconomic factors like household income, education and racial characteristics. Others are age, gender and rural-urban characteristics known as geographical disparity. Essential and ignored challenges are skills, awareness plus political, cultural and psychological attitudes among rural people and businesses.

Another important area of focus is lack of access to ICT. Important areas dealt with here are motivation for using ICT, understanding ICT language, availability of ICT resources as well as rural ICT empowerment. Explanations show all these factors cause digital divide in access to ICT among rural communities and enterprises.

Similarly lack of skills to use ICT discussions and reviews show areas causing digital divide among rural communities and enterprises. This section focuses on telecentre, digital libraries, digital literacy and participating skills in ICT engagements for dealing with digital divide that creates limitations for uplifting rural communities and enterprises.

In addition, a focus is on lack of and/or low application of ICT that causes digital divide that influences rural communities and enterprises. A focus on items in this section is on individuals, rural farming enterprises and non-farming enterprises. Thus, application of ICT in uplifting rural Dibate community in South Africa is essential for delivering answers to resolving digital divide among rural communities and enterprises.

Detailed explanations of research design and methods for data gathering and analysis for fulfilling objectives of this study are in next chapter.

Chapter 3

Research Methodology

1.1 3.1 Introduction

This case study research design is about rural Dibate community in South Africa. It used multi method qualitative research that allowed collecting data using multiple strategies and techniques (Saunders and Bezzina, 2015). In this study, research methods, data gathering strategies, target audiences and respective instruments were used.

Since this case study is a multi-method research, there was no need for research hypothesis although quantitative data analysis is relevant. Research techniques, strategies and instruments for data, using multi method qualitative research (Leedy and Ormrod, 2014) are detailed in the following sections.

3.2 Research Design

As section 1.8 explains this casework on rural Dibate village used multiple strategies to gather valid, reliable and ethically sound data for advancement of knowledge. A creative data gathering, analysis and interpretation was done using three sets of participants. These trustworthy practices involved surveying, interviewing and observing participants with certain sections of Dibate community. This allowed for triangulation involving 40 community members and 10 unemployed people that added value to data gathering, analysis and reporting (Leedy and Ormrod, 2014).

This case study helped to fulfil research objectives with understanding for bridging digital divide in uplifting rural Dibate community. It delivered responses that offered accurate and creative answers for generalizing results. A case study research design defines a logical technique of delivering logical solution

to logical challenges. This explains research design, data gathering and research methods are different in technical terms. This research design gave multiple qualities to multiple research respondents for holistic picture in interpretation of results. Selection of particular set of participants for ICT applications in Dibate community improved data gathering, analysis and interpretation of answers (Clements, Darroch and Green, 2017).

It was relevant choosing a case study research design that offered in-depth analysis of complex problems impacting on people and businesses in Dibate village. This case study delivered detailed explanation of difficulties in addressing digital divide among rural communities. This made possible answers in solving problems from comprehensive ways of looking at issues. There are misconceptions on case study being a qualitative study design only. A case study uses varying strategies and methods involving literature reviews, questionnaires, interviews and observation for facts finding. It allowed new ideas to deal with challenging errors and show clear data measuring with valid and reliable theoretical evidences (Leung, 2015; Hyland, 2016).

This casework added an enriching understanding of digital divide that is influencing rural communities and enterprises with special emphasis on Dibate village. This practice helped to triangulate data gathering, and analysis of results from different data sources to strengthen how this study is reliable, valid and ethically sound as section 3.8 demonstrates. This study triangulated data gathering using community members and unemployed people through unstructured interviews. Used of multiple methods to understand complex and multifaceted digital divide much like existing divide between qualitative and quantitative methods (Venkatesh, Brown and Bala, 2013).

This study focused on building a research design to offer quality research findings that added value to knowledge and bridge digital divide in uplifting rural communities. Caillaud, Rose, and Goepp (2016) suggest ICT research is for building and evaluating theories and artefacts in engendering sound research.

As Clements, Darroch and Green (2017) argue this casework allowed getting creative benefits from merits of management judgement in conflict with quantitative analysis in research applications. This offered robust research framework for this ICT research in uplifting rural communities especially Dibate village. In this study as Caillaud, Rose, and Goepp (2016) suggest any Information Systems (IS) research design innovatively followed 7 cost-effective principles as follows:

1. Plan a viable work of art in line with research objectives;
2. Solve important business problems;
3. Evaluate research design for creative work of art;
4. Put forward clear and verifiable scientific contributions;
5. Apply precise research methods;
6. Use available means within research environment, and;
7. Present research findings to ICT and management oriented audiences.

As Figure 3.2 shows, within rural Dibate community environment, this case study facts found by using roles, capabilities and characteristics. This helped to understand people about bridging digital divide and benefits to derive from ICT in uplifting rural Dibate village. Understanding through relevant strategies, structures, culture and processes helped to research and instrument design for responses to questions (Rehan, et al., 2013; Ouyang, 2014; Caillaud, Rose, and Goepp, 2016).

These included responses from rural farming and non-farming individuals, institutions and enterprises in rural Dibate environment. Understanding environmental items of people and organizations rested on ICT infrastructure, applications, communications architecture and development capabilities that delivered relevant business needs to IS research (Rehan, et al., 2013; Papachristos and Adamides, 2016).

This is research helped build and develop an understanding of certain theories and artefacts for assessing and refining research design — a case study. Some other areas to evaluate and justify included analytical, experimental, field study and simulation. This simulation meant trying to be like an item of a real-world practice or system for a period of time and/or simply created a computer model of an item for objectives of learning. These were however not necessarily the focal point of this research. Ideas from these helped evaluate and justify use of case study design to apply in rural Dibate environment. This added to knowledge base by rigorous application of existing evidences (Ouyang, 2014; Caillaud, Rose, and Goepp, 2016).

Also, this understanding contributed to knowledge base through foundations of theories, frameworks, instruments, constructs, models and methods for sound ICT assets instantiations. These instantiations delivered knowledge of a case and/or real evidence to support set of abstract objects, theories, concepts, claims, and/or computer processes. These helped in understanding uplifting rural communities and bridging digital divide. Knowledge base further offered skills that were used to improve methodologies including data analysis, techniques, formalisms, measures and validation standards used in this research design. Total knowledge base contributed applicable knowledge and continue to influence ICT research on rural Dibate village (Alvesson, 2013; Leedy and Ormrod, 2014; Caillaud, Rose, and Goepp, 2016).

3.3   Mixed Research Methods

This mixed method with a strand of multi method qualitative research in alignment to case study research design offered logical analysis of digital divide for logical answers. This allowed use of both quantitative and qualitative research methods — mixed research method — that helped in using triangulation through participatory observation. Triangulation used variable means and/or techniques that added value to research methods that ironed out

weaknesses within traditional research methods (Venkatesh, Brown and Bala, 2013; Creswell, 2013; Saunders and Bezzina, 2015).

Triangulation involved participatory observation, informal interactions, prose cues, skype, storytelling, SMS text messaging, and what's up among others. This therefore concentrated on participants including individuals, rural farming enterprises, non-farming enterprises, funders, institutions and government bodies for data gathering. These were for applications in Dibate rural environment and addition to knowledge base. Explanations of methods used in this study are based on research choice, strategy, rationale, philosophy and environmental audience analysis. These helped in needs assessment of research methodologies to adopt (Venkatesh, Brown and Bala, 2013; Ballantyne, 2014; Hyland, 2016; Caillaud, Rose, and Goepp, 2016).

3.3.1 Quantitative Method

Creswell (2013) argues for bridging divide between quantitative and qualitative methods to deliver multiple methods in solving challenging research. This case study focused on DD through effective application of ICT as a management tool to uplift rural communities specifically Dibate rural village.

The *choice of quantitative research* concentrated on gathering accurate numeric data through large number of respondents. This created large amount of data to process from large sample size for data focusing on structured surveys and questionnaires. In general, structured and semi-structured research instruments required no ethically informed consent before data gathering because completing a questionnaires is equivalent to meeting of consenting minds between a surveyor and respondents (Venkatesh, Brown and Bala, 2013; Clements, Darroch and Green, 2017).

This *research strategy* concentrated on using surveys with applications of structured questionnaires. The focus was on rural environment with specific

attention on organizations' strategies, structure and culture as well as processes that created relevant business needs. Primary data gathering was mainly through large sample size generating large numeric data (Saunders and Bezzina, 2015).

The *rationale for this quantitative method* was to gather valid and reliable big numeric data representative of population of rural Dibate environment. This means using large sample size from a population of 3353 people. This allowed gathering exact and useful quantitative data for input and analysis (Statistics South Africa, 2015).

The *philosophy in this study* concentrated on understanding environmental factors relating to technology that helped create relevant business needs. These variables included as Figure 3.2 illustrates ICT infrastructure, applications, communications architecture and development capabilities. Interpretation focused on positive analysis instead of normative judgement of surveyor and/or participants. Quantitative study usually focuses on use of hypothesis. However, no specific use of hypothesis in this casework to verify and/or prove a testable statement that mainly worked with closed ended questions (Scott and Orlikowski, 2014; Hyland, 2016).

Environmental audience analysis is an important part of this study. This focused on understanding people's roles, capabilities and characteristics that helped deliver relevant business needs that triggered this study. However, quantitative method gave little consideration to human actors in helping resolve digital divide through uplifting of rural Dibate community. The emphases were on scientific and subjective interpretation of quantitative evidences derived from quantitative statistics. This involved surveys of students, rural farming and non-farming enterprises, and municipal officers. It used structured questions to get new ideas to refute or accept known theories (Volkoff and Strong, 2013; Clements, Darroch and Green, 2017).

3.3.2 Qualitative Method

This qualitative method was applied to benefit from merits of human actors in research for getting a rounded picture of answers to questions. This helped measure multiple qualities applied to multiple strategies and few participants. This qualitative method focused on bridging digital divide and uplifting rural communities with specific focus on Dibate rural village. This gave consistent approach to information and measurements from sets of views of writing, texts and methods of participants on applying ICT to solve rural-urban digital divide (Venkatesh, Brown and Bala, 2013; Baillie, 2015 Hyland, 2016).

The *choice of qualitative method* was to gather accurate non-numeric data through limited number of participants. This created making choices for small sample size of 3 for data to analyse from small, but detailed data focusing on semi-structured interviews and interview guides. Generally, semi-structured interview guides needed ethically informed consent letters to participants before data gathering. This legally and morally created meeting of consenting minds. It created trusts and useful relationships between interviewer and her interviewees for credible data gathering and interpretation (Baillie, 2015; Clements, Darroch and Green, 2017).

In this study, *qualitative research strategy* focused on using face-to-face interviews with applications of semi-structured interview guides. The focal point was to understand rural environment with particular direction on strategies, structure and culture over and above processes of organizations that created relevant business needs. Primary data gathering was mainly through small sample size in getting small non-numeric data with strong human actors and actions (Grover and Lyytinen, 2015).

The *rationale for this qualitative method* was to gather valid, reliable and ethically sound and detailed non-numeric data. These were from selected segments of population in rural Dibate environment. This used small human

actor-oriented sample size from a population using purposive sampling. This allowed gathering exact and practical qualitative data for value added input including opinions, viewpoints, discussions and friendly conversations for analysis (Shields and Rangarjan, 2013).

The *philosophy for using qualitative method* hinged on revealing insights from environmental ingredients about technology that helped engender relevant business needs. These ingredients included ICT infrastructure, applications, communications architecture and development capabilities. Interpretative philosophy concentrated on analytical science. This allowed case study research design and interviews to gather general knowledge about bridging digital divide and uplifting rural areas especially Dibate community. This helped to get new study to falsify existing theories on ICT uplifting of rural communities. This gave credible answers to knowledge gaps through interview guides that used open ended questions (Scott and Orlikowski, 2014; Hyland, 2016).

Environmental audience analysis for this qualitative method tried to understand roles, capabilities and characteristics of people that helped build relevant business needs that triggered this study. Interpretative thinking focused on human actors as social ingredients in resolving DD to uplift rural Dibate community. This used interviews to find out insights from respectively a student, a rural farmer and a municipal officer. It used unstructured questions to get new insights to deal with conflicts between methods and interpretations. Also, bridged subjective interpretation that challenges quantitative-qualitative divide. This analytical science delivered new ideas to refute or accept existing theories (Volkoff and Strong, 2013; Saunders and Bezzina, 2015).

3.3.3 Triangulation

Shields and Rangarjan (2013) argues that triangulation is a universal way of using any techniques for an improved study. This means using any method including applied research techniques. This triangulation was about bridging DD

and uplifting rural communities specifically Dibate rural village. This offered ways to brainstorm, share valid, tested and agreed data from institutions, funders, government agencies, ICT entities, and municipal personnel on application of ICT to solve rural-urban digital divide.

The *choice of triangulation* was to collect any data that added value to data gathering for this study. These included numeric and non-numeric data from various grapevine interactions involving different participants. There was no need for selected choices of sample size, composition and/or data size to infuse into analysis from this unstructured and informal interactions. Although this study ensured ethically informed consensus in every part of data gathering and analysis. Many community members and unemployed participants voluntarily joined conversation without prior letters. This was allowed because this triangulation used informal participatory observation through informal interactions (Leedy and Ormrod, 2014; Baillie, 2015).

Research strategy for triangulation in this study concentrated on using relatively medium sample size to gather additional data. This helped to smooth out divides between quantitative and qualitative methods. The concern was to understand rural environment with particular focus on strategies, structure and culture in addition to processes of organizations that delivered relevant business needs. Primary data gathering was mainly through uncontrollable reasoning and responses although medium sample size emerged in getting data with strong human actors and interactions (Shields and Rangarjan, 2013; Grover and Lyytinen, 2015; Baillie, 2015).

The *rationale was to triangulate* valid, reliable and trustworthy data for wider understanding of digital divide and ICT to uplift rural areas. These were from informally selected segments of population in rural Dibate environment. This used emerged medium sample size from Dibate population. It allowed gathering uncontrollable comments, opinions, viewpoints, interactions and storytelling for

analysis. These helped deal with weaknesses of other research instruments (Law and Chan, 2016).

The *triangulation philosophy* pivoted on getting facts from environmental features on technology that delivered relevant business needs. These bits and pieces included ICT infrastructure, applications, communications architecture and development capabilities. This philosophy concentrated on analytical science using participatory observation to gather knowledge on bridging DD and uplifting rural areas particularly Dibate community. This helped to benefit from management judgement of multiple contributions to deliver holistic answers that deal with differences between methods and interpretation of answers. This delivered value added responses for bridging knowledge gaps through informal interactions that used diverse techniques, tools and reasoning to get sound data (Scott and Orlikowski, 2014; Law and Chan, 2016).

Environmental audience analysis for triangulation generated insights on roles, capabilities and characteristics of people that created relevant business needs that engineered this research. The philosophy focused on diverse ways of answering digital divide problems and uplifting rural Dibate community. This used grapevine interactions to gather ideas from diverse numbers of 40 community members and 10 unemployed people. Law and Chan (2016) show using any means, ideas, tools and tactics to triangulate new insights that modified subjective interpretations from quantitative and qualitative methods improved outcomes (Volkoff and Strong, 2013; Baillie, 2015).

3.4   Sampling Methods

In this study, Baillie (2015) suggests sampling techniques can make and/or unmake a study if not properly dealt with using appropriate mechanism. Therefore no taking for granted understanding of sampling techniques were used in this study. Since this study used different participants with novice,

middle and seasoned professionals in various areas of personal and business engagements (Law and Chan, 2016).

3.4.1 Selecting Participants

This study used various participants with an assortment of backgrounds that told stories and offer responses to both quantitative and qualitative methods as well as triangulation. As Lessard, Caine and Clandinin (2015) show students narrated stories that impacted on educational lives of aboriginal youths in Australia. This includes inherent ethical, validity and reliability problems about school curricula and so on.

Many participants narrated ICT stories in Dibate village concerning digital divide that needed an uplift of rural communities. Some stories used ICT learning from international strategies, lessons learnt and outcomes about bridging rural-urban digital divide through internationalising rural enterprises (Åkerman, 2015). In this study were three sets of people taking part in data gathering. Details of these participants are as below.

Survey respondents — completed structured questionnaires. A sample size of 345 from Dibate population of 3353 were selected by simple random sampling. Four sets of participants including students, rural farmers, non-farmers and municipal officers responded to questionnaires. Lindsay and Schwind (2016) illustrate that people's professional setting, experiences and skills matter in selection of participants. Thus:

1. *Students*: These were learners within ages of 17 and 60 years mainly secondary school, college and university level students. Specific categories of students came from public schools and training centres, private schools and colleges, municipal training centres, Technical, Vocational Education and Training (TVET) colleges and some university students.

The rationale for selecting students to complete questionnaires in uplifting ICT and bridging digital divide in rural village began at the bottom cream of social pyramid that needed future vessels for learning, innovation and creativity through education and training.

2. *Rural farmers*: These included individuals and rural enterprises engaged in the following farming functions in rural Dibate village:

- Chicken and eggs producers, other birds as well as fishing and aquaculture;
- Livestock including cattle, sheep, pig, goat and other domestic animals;
- Pasture and forages including legumes, grasses and various animal feeds;
- Vegetables such as cabbage, lettuce, spinach, tomato, butter nuts and onions;
- Cash crops including mangoes, avocado, apple, banana and macadamia;
- Food crops including maize, potatoes, sweet potatoes, and cassava;
- Herbal and medicinal crops including ginger, garlic, spices and Moringa, and;
- Traditional medicines and reflexology plant products from wild forests.

The rationale for selecting rural farmers in uplifting ICT was farming activities are not only core to rural growth, but important areas for Local Economic Development (LED) through food security and nutritional requirements nationwide.

3. *Non-farmers*: These included individuals and any rural enterprises engaged in non-farming activities, but including agro-processing in rural Dibate village:

- Agro-processing and forest products harvesting and trading services;

- TCs including cyber cafés, photocopying, typing and printing shops;
- Taxis, buses and other transport services including travel and tour services;
- Tourism services including recreation and hospitality services;
- Personal grooming shops like barber, hairdressing, manicure and pedicure;
- Alcoholic and non-alcoholic beverage shops like taverns and restaurants, and;
- Container sales shops with various food items, groceries and so on.

The rationale for selecting non-farmers was to bridge digital divide through forward and backward linkages between individual farmer products and services in addition to economic sectors in rural areas for cohesive rural entrepreneurship.

4. *Municipal officers*: These included individual municipal officers engaged in public services that influence rural Dibate village. Officers with various backgrounds including, technical staff, managers, shop floor officers, LED personnel, SMMEs officers, IT officers, water infrastructure, electricity, tourism and marketing officers.

The rationale for selecting municipal officers was to know how to uplift rural Dibate village through ICT public management support for SMMEs and rural enterprises in improving LED and Comprehensive Rural Development (CRD).

Interviewees — responded to semi-structured interview guides through face-to-face interviews. A sample size of 3 from rural Dibate village population were selected by purposive sampling. Three individual participants of 1 student, 1 rural farmer, and 1 municipal officer responded to inquiries. Gorard (2013) argues a sound research design such as a case study delivers robust answers for human actor inclusive data gathering. This offers logical data through

creative methodologies such as face-to-face interviews in uplifting rural areas with ICT benefits (Adler and Clark, 2015).

The rationale for interviewees was to distinguish how to uplift rural Dibate village through ICT by using case study research design aligned with interviews. These are:

- Face-to-face interviews through a case study research design delivered in-depth evaluation of complex digital divide affecting rural Dibate village;
- These interviews produced robust appreciation of ICT problems to address in a wide-ranging fashion that permitted effective analysis of digital divide;
- This case study research design through interviews engineered multiple ways of collecting data from interviewees by questioning, observing, and listening, and;
- Interviews using case study design gave new ideas to solve difficult digital divide and illuminated theoretical dimensions for sound answers to ICT problems.

Informal participants — interacted with other participants as the author triangulated from end to end by participatory observation. This was through informal discussions and unstructured explanations. A sample size of 50 participants from rural Dibate village were instantaneously selected by purposive sampling. The fifty participants consisted of 40 Dibate community members and 10 unemployed people. This allowed multiple answers from multiple backgrounds as Bernroider, Pilkington and Cordoba (2013) suggest that discussions using interdisciplinary and diverse sets of people and issues added value to fact finding in solving DD. Participants included people engaged in various areas of know-how in rural Dibate village. These are:

- Artisans, technicians, masons, carpenters, auto mechanics, welding personnel;

- Casual labourers, unskilled, full-time, part-time, semi-skilled and skilled labourers;
- Unemployed people, house wives, security personnel, sales persons, marketers;
- IT personal, engineers, researchers, computer and equipment repairers, and;
- Teachers, police, lawyers, agriculturist, filling station workers, abattoir operators.

The rationale for selecting informal participants was to get instant data that are difficult to gather and those not covered by surveys and interviews, but relevant for this study to help uplift rural Dibate village through ICT value addition.

3.4.2 Specific sampling

This study used three ways of gathering data and selecting sample sizes to use in data collection. Law and Chan (2016) argue a study uses particular types of sampling techniques for specific reasons. In this study, sampling involved selecting a set of participants as above to do a case study using questionnaires, interview guides and informal interactions. This capture multiple descriptions for appropriate sampling to develop sample sizes from population of 3353 people in Dibate Village.

In survey, as already mentioned the sample size was 345, which is equal to scientific share of above population to study. This sample size was arrived at by using a scientific calculation with confidence level at 95%, and confidence interval of 5. It used simple random sampling. Interviews and informal interactions used purposive sampling with sample sizes respectively equal to 1:1:1 ratio and 40:10 part. This involved a student, a rural farmer, and a municipal officer. Also involved community members and unemployed people in that respect (Leung, 2015).

Simple random sampling — implementing this simple random sampling offered identical likelihood to participants in selecting sample sizes used in this research. This random sampling used Microsoft Excel 2010 to select participants through completed lists of participants from random numbers. This study coded names of participants to randomly choose to avoid bias in gathering data (Lucas, 2014).

In this study a random numbers were primarily consigned to every participant's name and highlighted with allocated number among participants in each set of population constituents discussed in section 3.4.1. Only participants with highest random numbers were selected for data gathering. These were used to put data together, process and analyse data that were sampled (Devkota, 2017).

Further, this gave thoughtful insights that needed less labours in coding names of participants for selection. These were cross sectional works that delivered creative answers for sampling participants. This sampling technique was resourceful and added value to results. These answers were representative sample that gave large volume of data for credible, valid and reliable answers (Wadan, 2013).

This simple random sampling offered precise and suitable answers that improved selecting sample size. In this study, this sampling technique had essential influence on putting data together to analyse that delivered important information. This simple random sampling was cost-effective and gave accurate sample size notwithstanding the large data volume it delivered (Rehan, et al., 2013; Adler and Clark, 2015).

The rationale for simple random sampling in this study (Devkota, 2017) included the following. It gave an healthier likelihood for sample to represent Dibate village population. It was an easy, simple, short and time saver in gathering and analysing data as it was cost-effective in time and money spent. It made this

study unbiased and gave lesser surveyor judgement as it was fairly easier means to sample different sets of participants. It allowed this beginner surveyor to use with ease although the repetitive processes bored her and risked selecting small number of varieties and diversities among participants in Dibate community (Leung, 2015).

Purposive sampling — in general, purposive sampling as its name implies uses non-probability technique to sample select for a study. Such purposive selection uses population features, makeup and research objectives as focal point for selection of a sample in a research undertaking. However, purposive sampling is a technique that uses management judgments, selective options, and/or subjective ways of choosing sample for data gathering (Gorard, 2013; Crossman, 2017). In this study, maximum variation and heterogeneous purposive sampling were used for interviews and triangulation through informal interactions as explained below with Figure 3.4.

Maximum variation and heterogeneous purposive sampling — this study selected different sets of sample components pertinent to understanding insights for bridging digital divide and to uplift rural Dibate Village. The objective of this sampling was to gather sufficient ideas and facts about application of ICT as a management tool to uplift rural communities with emphasis on Dibate village. This sampling allowed the observer to collect data from diverse sets of people to build healthy and real world viewpoints on using ICT to bridge digital divide in Dibate Village (Nuzzo, 2014; Crossman, 2017).

3.4.3 Sample Size

Many explanations were done about sample sizes from population of 3353 under sampling methods and other pages above. Here, the focus was to tabulate these indices so that readers can have a round picture of samples at a glance (Venkatesh, Brown and Bala, 2013). The total sample size is 398, which

is an appropriate sample size for this study. Breakdown details of these samples are in Table 3.1.

Table 3.1 Sample Sizes

Participants	Questionnaires	Interviews	Observation
Students	148	1	0
Rural farmers	69	1	0
Non-farmers	113	0	0
Municipal officers	15	1	0
Community members	0	0	40
Unemployed people	0	0	10
Total completed and used	**345**	**3**	**50**
Questionnaires sent out	350	0	0
Discarded questionnaires	5	0	0
Dibate village sample			**398**

Source: Study Data (2017)

As Leung (2015) suggests the sample size arrangements for survey in this study considered confidence level at 95% and confidence interval of 5. These were used on above population with 345 for survey sample adding to 3 for interviews and 50 for participatory observation that gave 398 Dibate village sample size. There were 5 discarded questionnaires because of incompleteness and/or time allocated for participants to complete for collection elapsed (Wadan, 2013; Lucas, 2014).

3.5   Data Collection and Analysis

In gathering data for analysis Lindsay and Schwind (2016) put emphasis on having experiences in managing multiple diversities and varieties of backgrounds. The study managed to have a balance among gender, race and

age groups of community members responding to questionnaires. The surveyor collected both quantitative and qualitative data in person. One sub-area was visited a day and data collection took five days to complete per area. The same process applied to other areas including different municipal meetings to complete data collections.

Bernroider, Pilkington and Cordoba (2013) explain that in a population with diversity and multidisciplinary dialogues like Dibate Village in ward 16 data gathering needed care and innovative decision. This was therefore the first area visited for data collection. Data collected from Ward 16 was meant to deliver answers aligned with research objectives and questions. This helped gather innovative data regarding bridging digital divide and uplifting rural Dibate village. This data therefore helped verify and strengthen questioning participants during second area in Ward 3 meetings.

This method encouraged cross-checking for possible problems to correct and update research tools. Despite all problems related to sampling this study ensured validity and reliability were obtained from results. Participants were drawn from people who were available at home during normal working days. Whether this person was on leave, unemployed and/or self-employed. Creative interviews involving available participants helped answer research questions (Shields and Rangarjan, 2013).

As Law and Chan (2016) argue no standard measuring instruments and/or formulae existed in general about problem statement and specific problems. Consequently this research had to design measuring instrument based on ideas from literature reviews in chapter 2. In this research, no participants knew about someone's opinions for adherence to ethical reasons. The survey questionnaires were handed over to participants and collected after completion.

As mentioned earlier Microsoft Excel (2010) and Statistical Package for Social Sciences (IBM SPSS Version 24, 2016) were used to analyse and test data.

Correlation statistical procedure was used to establish relationship between findings as a means of comparison with problems of lack of access, use and application of ICT to uplift rural Dibate Village.

In aligning ideas Leedy and Ormrod (2014) suggest, this study used both descriptive statistical and inferential statistical analyses. Descriptive statistics helped in summarising raw data collected. Results were interpreted as data about population from inferential statistics. Investigations used closed-ended questions, which allowed participants to provide data, which the study needed for analysis.

Lucas (2014) shows difficult datasets create biases and out of place inferences from interpretations involving multiple representations. Completed questionnaires were therefore screened to make sure whether questions answered were completed. Only questionnaires that were completed in full were considered and used in the study. Correlation and Chi-Square statistic were used to analyse data to establish whether categorical variables in this case obstacles to access ICT were determined by frequency responses from participants in rural Dibate community.

3.6   Research Instruments

The methods used for designing questions were scientific and questionnaires were carefully designed for purpose of collecting accurate data from selected respondents. In this study, self-administered questionnaires were made and used to deliver and collected after questionnaires were completed (Leung, 2015).

Ways of using questionnaires were explained to participants before the surveyor distributed these research instruments to respondents by hand. Completed questionnaires were collected after completion. This allowed

gathering scientific data to analyse and determine both arrangements and associations within these data (Rehan, et al., 2013).

Leedy and Ormrod (2014) explain questionnaires are sets of structured and extensively tested questions to use for obtaining consistent responses from selected groups of sample to take part in a study. In this study, the rationale for such design of questionnaires was to discover thoughts, roles, capabilities, characteristics and/or happenings about ICT as a tool that impact on participants in rural Dibate village.

Nuzzo (2014) argues ways of designing research instruments vary depending on how these tools are managed and interactions existing between surveyor and participants to study. This study used two research instruments. These were self-administered questionnaires and interview-administered interview guides. These self-administered questionnaires were completed by rural Dibate village participants. Interview-administered interview guides were used by interviewer to guide interviewees to answer questions. These were through face-to-face interviews between the interviewer and her interviewees (Adler and Clark, 2015).

This study was aware of limitations of instruments that needed robust research designs and approaches for minimising limitations to improve these tools. However, time consuming limitation from these instruments impacted on the study. Many rural communities lack knowledge and understanding of local issues with low literacy levels especially in rural Dibate Village. People knew about this research and therefore some participants provided answers to impress and/or please surveyor. So, participants expected some kinds of returns after completing these instruments to improve living standards and community development projects (Gorard, 2013).

3.7   Reliability and Validity

It is relevant to explain that both research tools, data gathering, analysis and reporting are to be valid, reliable and trustworthy. This study therefore emphasised on not only having a once-off answers, but results that rural villages nationwide and worldwide can replicate upon credible modifications (Wadan, 2013).

It ensured similar results under the same conditions of studies must be achieved by other studies. The study made sure similar results are probable if such examinations were performed in same manner using same or similar approaches. These findings reinforced research objectives and questions accepted by wider scientific and professional communities (Leung, 2015).

Wadan (2013) argues a sound study need to be reliable, valid and trustworthy to yield realistic answers and standard discoveries of insights throughout the research from beginning to analysis and application of results. Further, moral, valid and reliable answers are relevant especially when applying diversity of issues, people, processes and methodologies. This fact finding therefore ensured valid outcomes comprised of complete experimental concept to uplift rural communities. This helped to determine whether obtained results met scientific research requirements in same or similar study conducts to be accepted by scientific community.

Bernroider, Pilkington and Cordoba (2013) argue validity of measuring instruments needed to be determined clearly to ensure necessary content relevant to addressing research objectives and answering research questions. The questionnaires were as a result pre-tested before data collection. The study assured quality of outcomes to solve digital divide by making sure questionnaires were tested before study started to increase content accuracy of questionnaires in terms of relevance, clarity and understanding.

Nuzzo (2014) shows statistical errors are teething challenges for many studies. A study that does not formulate and ask correct questions cannot collect necessary data from which suitable logical conclusions can be drawn. Therefore, this study considered questions are primary basis for ICT research. Rural Dibate community was contacted formally to obtain rights to access the area to conduct this study. Dibate Village Authorities in general and Councillor in particular in Ward 16 governed by both municipal and traditional leadership welcomed and validated this study.

As Adler and Clark (2015) explain always avoiding research inaccuracies is relevant for innovative study outcomes. This study avoided prior proposal and instruments development, during data gathering and analysis for reporting inopportune data and bias study performances.

Such inaccuracy can generate inappropriate inferences that were avoided to make these DD research outcomes valid, reliable and ethically trustworthy. Data collected were captured, analysed using Microsoft Excel 2010 and IBM SPSS Version 24, 2016. These helped to determine suitable answers to research questions in responding to research problem statement (Lucas, 2014).

3.8 Ethical Concerns

As with ethical issues in research, Clements, Darroch and Green (2017) discuss that it is relevant for a study to adhere to certain ethical standards. This study therefore had ethical clearance from Durban University of Technology prior this study. This behaviour and clearance guided her decisions. That is, ways to behave and built trust that fostered friendly participation among people involved in DD fact finding exercises. These ethical concerns helped her protect all rights of people at all times that were taking part in this study. This ethical protection involved anonymity and freewill for anyone to take part or opt out at anytime at his/her own discretion. This helped to deliver ethically sound and morally innovative research answers.

Gorard (2013) shows credible social science facts finding must always go after ethical principles when developing research agenda to implement. This study consequently protected and offered safety for all involved in ICT study including participants, authorities and the surveyor in data collection and analysis. These ethical steps ensured study was conducted with well-planned ethical benchmarks. This helped the surveyor to stay on ethical course for entire duration of the study.

Lessard, Caine and Clandinin (2015) argue about educational ethical dilemma involving multiethnic and multiracial learners within same jurisdiction. This ethical challenges involved school curriculum and aboriginal youths. With similar ethnic and racial diversity, the study delivered innovative strategies to motivate participants to apply prudence. This creatively encouraged these participants that gave relevant data on ICT application study.

These participants were given freedom to stay and/or leave the exercise safely without any physical and/or emotional harassment and/or any intimidation. It is clearly relevant to understand this study applied qualitative and quantitative research methods and instruments with sound ethical consistency in delivering answers to resolve digital divide influencing rural areas (Wadan, 2013).

Leedy and Ormrod (2014:145-160) show feelings of participants causes more security needs for responses to remain anonymous. Many open-ended questions were therefore asked. This was decided because of how many resources to access specifically when limited time was on hand for data gathering and analysis.

Lucas (2014) shows successful end to a study relies on how surveyor is ready to give pleasant interactions with participants. This study consequently offered better ethical standards during data gathering for building trust and loyal companionship among all participants that improved ethical values throughout the study and beyond.

1.2 Conclusion

In chapter three, various data and research methods were discussed. Questionnaires and interview guides were used as a means of collecting data. Determination of population and sample size for data handling was discussed. Questionnaires were used as main research instruments in the study. These questionnaires were used to collect data to obtain truthful responses from respondents as opposed to face-to- face interviews. These were used particularly when enquiring about matters that are contentious, sensitive and/or delicate on bridging digital divide through ICT rural uplift.

Chapter 3 addressed questions raised from chapter 2 by undertaking reviews of characteristics and perspectives of Dibate Village concerning ICT applications as a management tool to uplift rural communities. Questionnaires allowed collection of quantifiable data, while permitting quantitative analysis of these results to establish correlation between patterns and behaviours of indicators analysed.

Analysis and interpretation of data are in Chapter 4. These use results obtained from questionnaires and interview guides in addition to informal interactions presented. An examination of selected statistical approach to understanding discussions provided for each question on demographics and socio-economic characteristics. Further analysis of application of ICT to uplift rural farming activities closes the discussion. The approach was employed to assess correlations that existed between and among sets of variables used for analysis and interpretation of results.

Chapter 4

Data analysis and interpretation

4.1 Introduction

Using a quantitative method, data was obtained from self-administered questionnaires, completed by one hundred (100) respondents as well as informal group discussions with the respondent. The data was then analysed using various methods, with findings relevant to the research questions that guided the study. The analysis of data was to identify, explore and describe ways on how rural communities can be developed socio-economically through the ICT usage.

Data was elicited to find ways on how socio-economic development in rural communities can be achieved through the use of ICT. The questions tabled in this chapter address various issues which impact on ICT access in rural areas such as the Dibate Village.

In chapter four, questions will be analysed separately through the use of frequency tables/graphs for each question and doing appropriate univariate analysis. This will be followed by a discussion of the results acquired from the questionnaire as a means of answering the research question.

The responses to questionnaires were checked for completeness, accuracy and inconsistencies. Data were coded and classified in relation to the critical questions. Data is presented in different ways to provide the most meaningful summaries; tables and graphs are therefore used to present the data. Word-processing and Statistics programs were used to present the data.

Percentages in this study are not rounded to whole numbers but show exact percentages. Both quantitative and qualitative statistics were made use of in

this study. Questionnaires were grouped into three categories: Personal details of the candidate, the importance of ICTs in rural communities and closing the community's digital divide.

The topics that will be discussed in this section include: respondent profiles, digital skills levels, the importance of ICTs in rural development, closing the digital divide and the discrepancies in the levels of digital skills between the different categories of respondents.

4.2 Respondent's profile

As part of respondent profiles, 100 respondents were randomly selected to complete the questionnaire, with respondents comprised of Dibate Village's male and female residents. Due to limitations to do with time, cost and other resources, the sample was chosen from a population of residents belonging to only ward 16 of the municipality, and, as a result of this, the total sample population count for the study amounted to 100 people.

4.2.1   Question 1: Race

Table 4.2.1: Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asian	3	3.0	3.0	3.0
	Black	94	94.0	94.0	97.0
	Coloured	2	2.0	2.0	100.0
	White	1	1.0	1.0	98.0
Total		100	100.0	100.0	

Table 4.2.1 illustrates the distribution of race of all the respondents. Findings show that, of the selected respondents there were three percent (three) Asian, 94percent (94) Black, one percent (1) White and two percent (two) Coloured.

Adequate effort was made to allow all respondents equal opportunity to be part of the study.

The respondents were grouped into four categories and from the table above indicate that there is a far greater number of Black people resident in rural areas (94 percent) than any other race (p<.0005). This supports Ryder's report (2001 in Ali 2011), which finds Asians, Whites, and Coloureds to be much more urbanised as opposed to Black people.

4.2.2 Question 2: Gender

Table 4.2.2: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	57	57.0	57.0	57.0
	Female	43	43.0	43.0	100.0
Total		100	100.0	100.0	

Table 4.2.2 shows the respondents' gender distribution. Question two's goal was to determine who were male and female from the number of respondents. From the same table it can be deduced that the majority of the respondents 57 percent were males and it also shows more male respondents because data was collected using the community meetings that took place quarterly with the assumption that attendance in rural community is always male dominated. In rural areas, males are those who always go out and look for jobs, attend community meetings and take part in the decision making in the community. Males are normally assigned to perform physical work as most of the rural community members were found to be illiterate which also led to difficulties to complete the questionnaire presented to them. The data showed that it was characteristic for males in rural areas to assume responsibility, due to being seen as the family head. A statement from a daily newspaper (The Daily News 2003: 4) substantiates this.

Gardner and Rausser (2002) indicated that though women have little political power in leadership structures, most of the work done that aid communities in dealing with their problems is done by women. There are instances where the majority is made up by women but they do not occupy any positions of power and these include rural areas, churches, and leadership that is dealt with in traditional leaders' jurisdiction. However, there seems to be a gradual change in this trend in recent years. Leadership in provincial and national executives of all political parties, women are poorly represented as compared to men who take up 80 percent of the leadership positions.

1.1.1   4.2.3   Question 3: Residence Area Distribution

Table 4.2.3: Residence Area Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	84	84.0	84.0	84.0
	Urban	16	16.0	16.0	100.0
Total		100	100.0	100.0	

Table 4.2.3 above illustrates the types of environment in which the respondents were raised. Question 3 was formulated from the idea that although currently residing in Dibate Village, which is a rural area, not all the respondents were raised there. Migration due to work may have been the motivation, along with various other reasons. The findings illustrated (Table 4.2.3) show 84 percent of the respondents were raised in rural areas, while only 16 percent were raised in urban areas.

In terms of information access, well-known differences exist between those who live in rural areas as opposed to people who reside in urban areas, and this forms the core of the study as people living in urban areas have a greater opportunity to access knowledge than those who reside rurally.

The majority of those who live in Dibate Village were raised in a rural setting, as indicated by table 4.2.3 below. This implies that many people living in Dibate Village were raised with the limitation inherent in the environment in which they were raised and are less likely to be information-driven and ultimately become excluded when it comes to digital knowledge and activities.
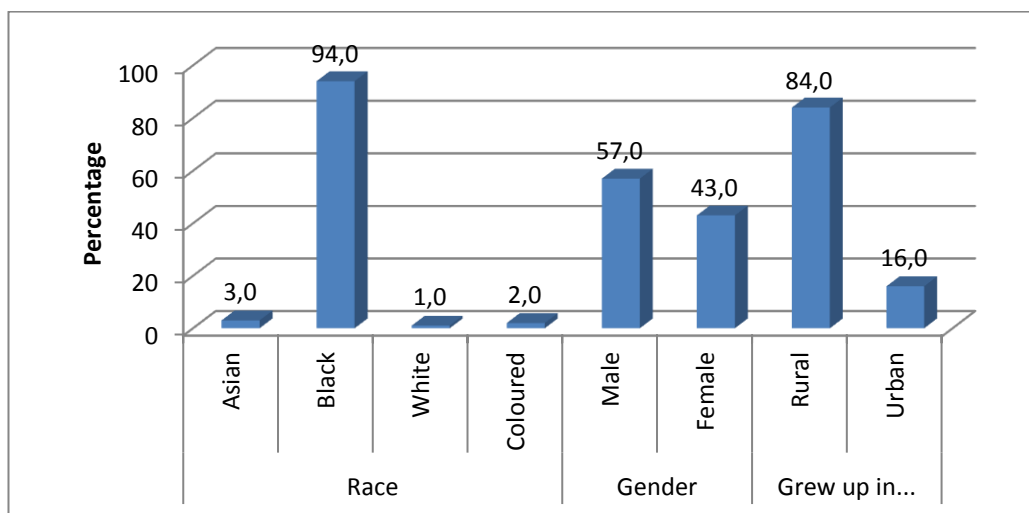
Figure 4.2.3: Respondent's profile

4.3 Question 4: The physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established?

Table 4.3: The physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	61	61.0	61.0	61.0
	Agree	28	28.0	28.0	89.0
	Disagree	7	7.0	7.0	96.0
	Strongly disagree	4	4.0	4.0	100.0
Total		100	100.0	100.0	

The majority of community development projects are unable to persist in the long term since they are note given the support necessary from the communities they serve.

The purpose of question 4 was to ascertain that if the respondents agree that taking advantage of physical information access (motivation, language, resources and skills) will benefit their business in Dibate Village.

Respondents' perception to question 4 shows that of the respondents sampled, 61 percent (strongly agree), 28 percent (agree), seven percent (disagree) and four percent (strongly disagree) (Table 4.3). The stats above also show that physical information access can be established to empower the rural people.
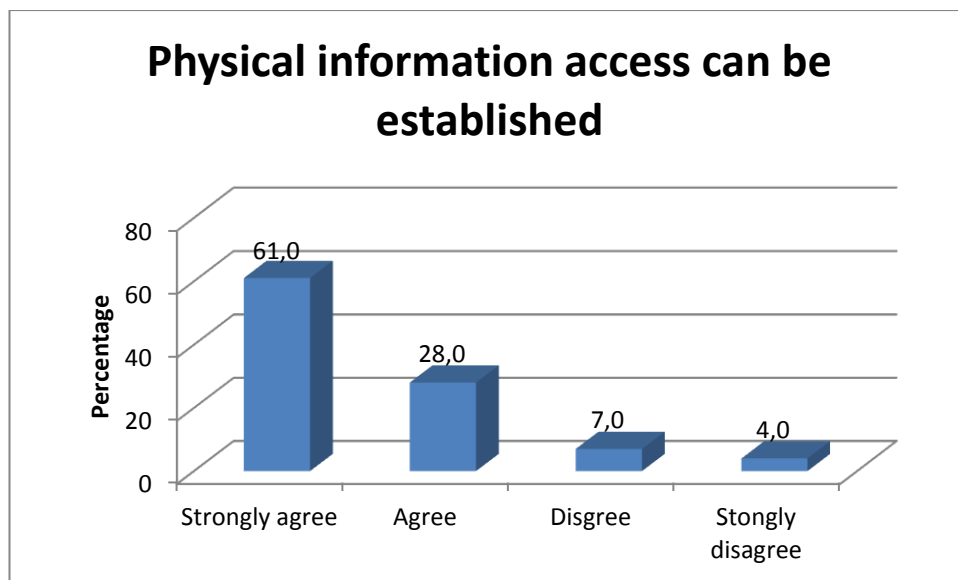
Figure 4.3: Physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established

These responses were tested to see if there is significant agreement or disagreement.

Results of a binomial test showed that a significant proportion (89 percent) indicated agreement that physical information access can be established (p<.0005). That means that they would support such an initiative.

Further tests show that in fact a significant proportion (61 percent) strongly agree that this is the case (p=.035)

4.4 Question 5: Do you think the use of ICT facilities can have a positive effect on the management of business in Dibate Village?

Table 4.4: Do you think the use of ICT facilities can have a positive effect on the management of business in Dibate Village?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	88	88.0	88.0	88.0
	No	12	12.0	12.0	100.0
Total		100	100.0	100.0	
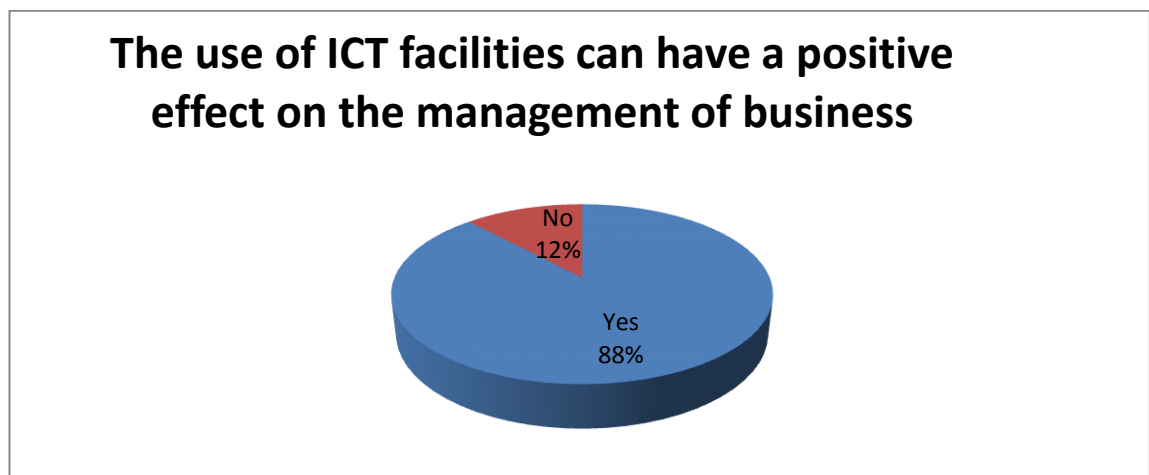
Figure 4.4: Do you think the use of ICT facilities can have a positive effect on the management of business in Dibate Village?

The purpose of question 5 was to establish whether respondents thought a positive impact would be made by the use of ICT facilities on the management of businesses in Dibate Village. Figure 4.4 above shows the respondents'

perception of this question and from the respondents selected, 88 percent of them thought that the usage of ICT facilities is necessary and will benefit businesses but only 12 percent negatively responded.

Results of Binomial test- significant 88 percent of the respondents agreed that a positive effect can result on business management from the use of ICT facilities (p<.0005).

4.5 Question 6: Level of computer expertise

Table 4.5: Level of computer expertise

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-user	27	27.0	27.0	27.0
	Basic elementary	34	34.0	34.0	61.0
	Average	23	23.0	23.0	84.0
	Proficient	16	16.0	16.0	100.0
Total		100	100.0	100.0	
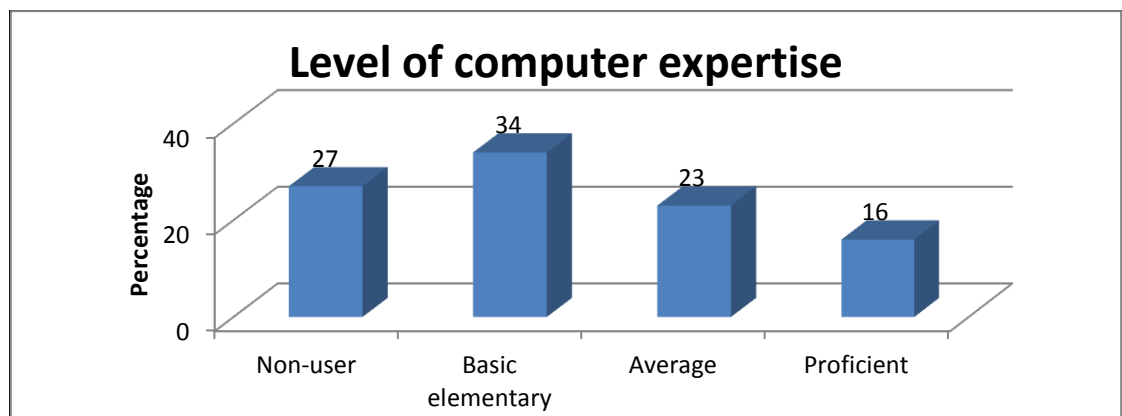
Figure 4.5: Level of computer expertise

Personal judgement on the level of respondents' computer expertise was asked of each respondent, by indicating whether they perceived themselves to be proficient, intermediate, basic/elementary, or non-users.

The level of expertise of respondents in computer usage is illustrated in Figure 4.5. Based on the data or table from the 100 respondents chosen, 16 percent rated their computer expertise level as being proficient, 23 percent (average), 27 percent (no-user), and the majority (34 percent), as basic elementary. The cause of this is usually attributed to a lack of infrastructure in rural areas, according to a study by Yu (2002 in Sikhakhane and Lubbe 2005), yet their urban counterparts regard it as normal.

The research data shows that there is an even spread across these classifications.

4.6 Question 7: Computer training courses attendance

Table 4.6: Computer training courses attendance?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	44	44.0	44.4	44.4
	Once	39	39.0	39.4	83.8
	More than once	16	16.0	16.2	100.0
	Total	99	99.0	100.0	
Missing	System	1	1.0		
Total		100	100.0		
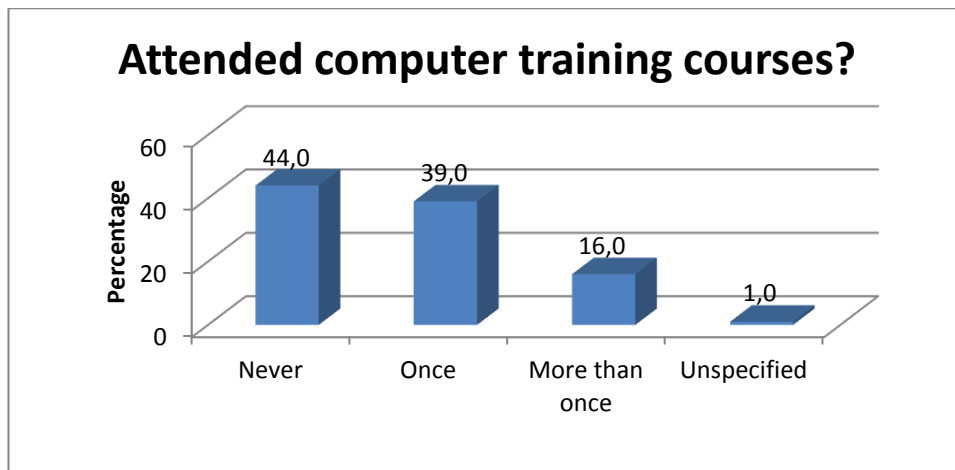
Figure 4.6: Computer training courses attendance?

Figure 4.6 represents the computer training experience of the respondents and also shows that, of the 100 respondents sampled, one percent (unspecified), 16 percent had attended computer training courses more than once, 39 percent had done so only once, with the majority, representing 44 percent, that had not attended training courses on computers at all.

Maghsoudi et al. (2010: 584) find that rural people can be empowered, through addressing their technological and socio-economic needs, growing their awareness, from access to information and knowledge related to available opportunities and challenges. In addition, they state that training of the entire population, nationwide, can be a great beginning to building a nation.

Analysis from a Chi-square goodness-of-fit test shows that more than expected (if we expect an equal distribution of responses) indicated that they never attended a training course and fewer than expected attended more than one course (χ^2 (2) = 13.515, p=0.001).

Breaking the responses down into attended a course(s) and not attended a course, and applying the binomial test, it is shown that there is no difference, statistically, in the proportions that have and have not attended a course.

4.7 Question 8: Do you think the training on computer programs can improve the turnover in the local business?

Table 4.7: Do you think the training on computer programs can improve the turnover in the local business?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	91	91.0	91.0	91.0
	No	9	9.0	9.0	100.0
Total		100	100.0	100.0	

The purpose of question 8 was to find out if the respondents understood the importance or benefits received from improving their computer knowledge trough training. Notwithstanding the initial financial costs, business investment is paid back by staff training, which helps a business run better. Employees that are trained will be better equipped to make a sale, use computer systems, or handle customer inquiries.

Figure 4.7 represents the respondents' perception of the above-mentioned question. The data indicates that of the respondents sampled, 91ercent agreed that training in computer can improve the turnover in the local businesses but only nine percent disagreed with the statement.

A significant 91percent of the respondents believed that training on computer programs can improve turnover in local business (p<.0005).

4.8 Question 9: Computer knowledge and skills

Table 4.8: Computer knowledge and skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	19	19.0	20.9	20.9
	Good	7	7.0	7.7	28.6
	Average	39	39.0	42.9	71.4
	Poor	26	26.0	28.6	100.0
Total		91	91.0	100.0	
Missing	System	9	9.0		
Total		100	100.0		
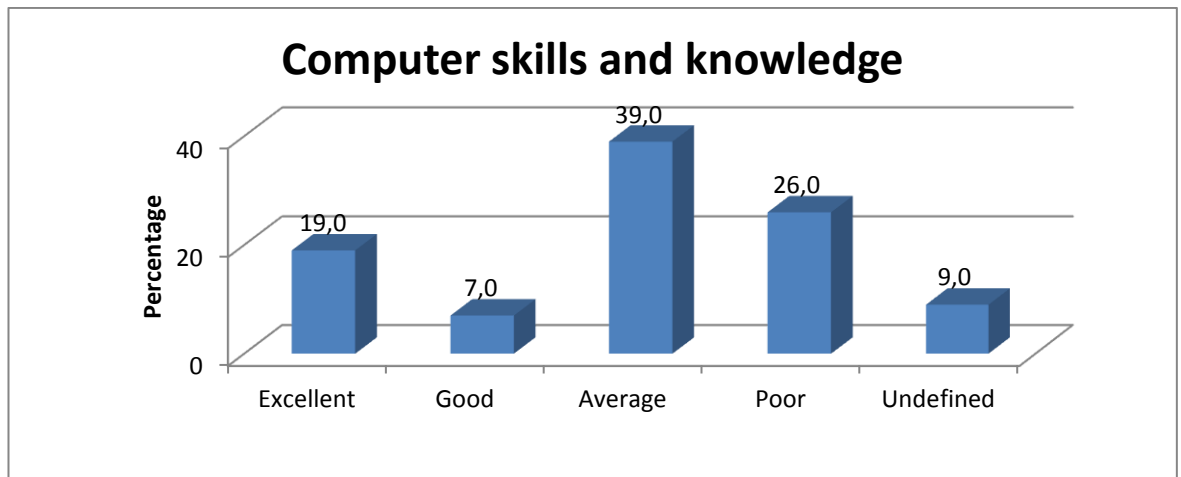
Figure 4.8: Computer knowledge and skills

Only the 91 percent who answered yes to question 8 are included in this question.

The figure 4.8 above presents the computer knowledge and respondents skills level. From that data, it shows that from the sample selected 19 percent scored their knowledge and computer skills as excellent, seven percent (good), 39 percent (average), 26 percent (poor), and nine percent as undefined.

Analysis shows that a significant number rate their computer skill and knowledge is average (χ^2 (3) = 23.593, p<.0005).

4.9 Question 10: Is it becoming increasingly important to have access to computers and internet in order to develop and lift one's socio-economic status in today's world?

Table 4.9: importance of computers for upliftment and development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	72	72.0	72.0	72.0
	Agree	19	19.0	19.0	91.0
	Disagree	7	7.0	7.0	98.0
	Strongly disagree	2	2.0	2.0	100.0
Total		100	100.0	100.0	
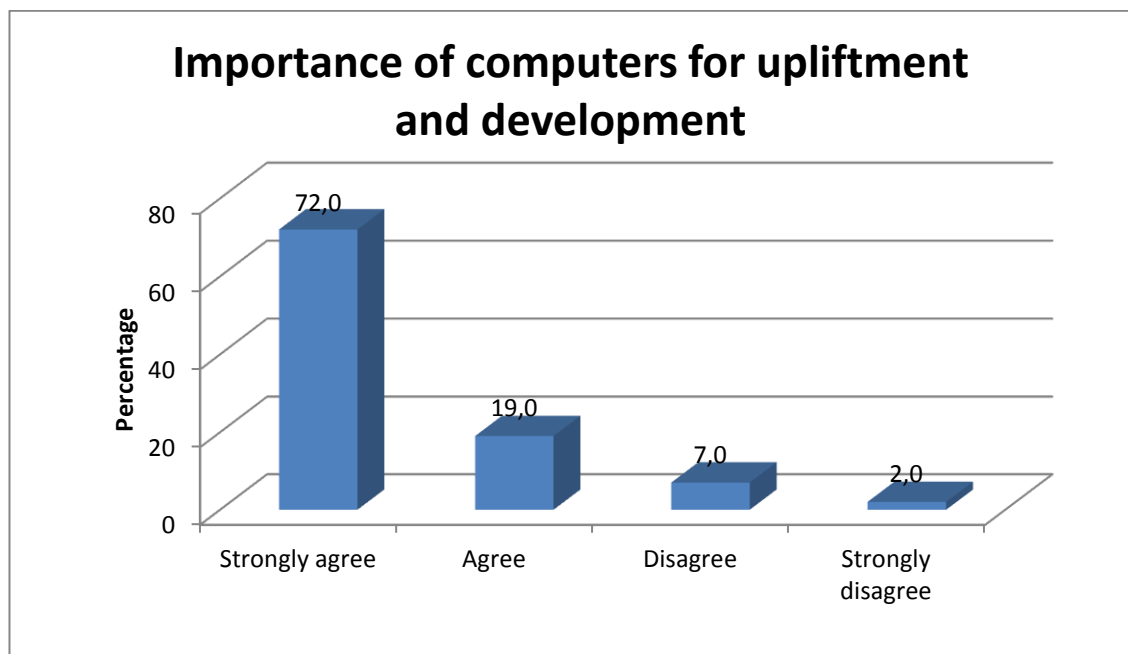
Figure 4.9: important of computers for upliftment and development

Figure 4.9 above presents the respondents' perception to question number 10. It also shows from respondents sampled that 72 percent strongly agree that it is vital to have access to computers and the internet in order to develop better socio-economic status, 19 percent (agreed), seven percent (disagreed) and two percent strongly disagreed.

A significant 91 percent agreed that computers are important to completely immerse oneself in the economic and social aspects of not just Dibate Village, but of the world (p<.0005).

Further analysis shows that a significant 72 percent of the respondents agreed strongly to this statement (χ^2 (3) = 123.920, p<.0005).

4.10 Question 11: In your own opinion do you think that the use of ICT has an effect on the management and business performances in Dibate Village?

Table 4.10 The use of ICT has an effect on business management and performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	60	60.0	60.0	60.0
	Agree	18	18.0	18.0	78.0
	Disagree	16	16.0	16.0	94.0
	Strongly disagree	6	6.0	6.0	100.0
Total		100	100.0	100.0	
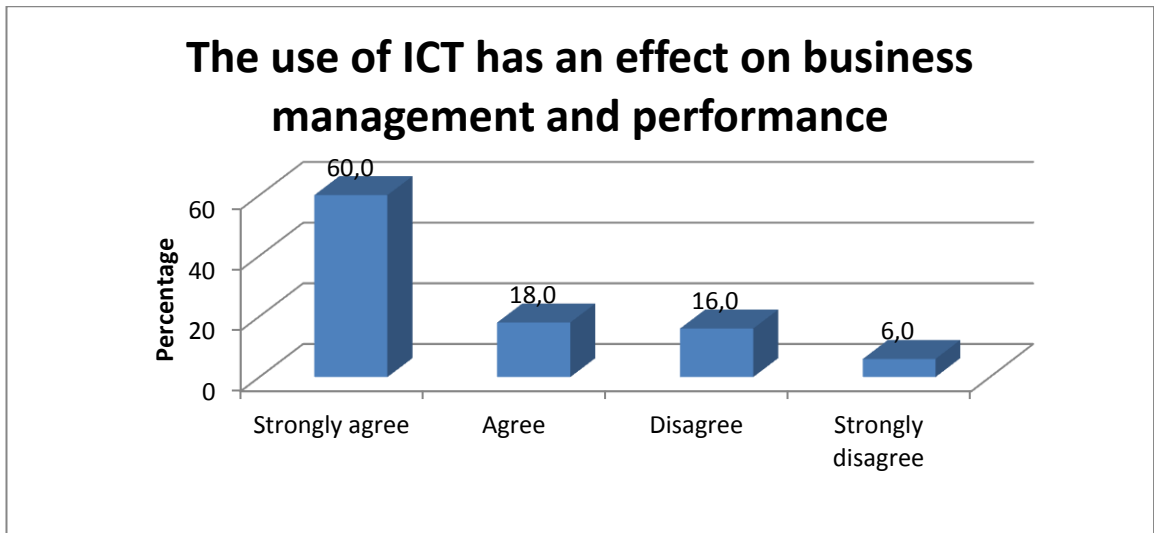
Figure 4.10: Use of ICT has an effect on business management and performance

Figure 4.10 above presents the respondents' perception to the question 11 by showing that of the respondents sampled, 60 percent strongly agree that the use of ICT have an effect on the management and business performance in Dibate Village while 18 percent agreed, 16 percent disagreed and six percent strongly disagreed.

A significant 78 percent agreed that the use of ICT has an effect on the management and Business performance in Dibate Village (p<.0005).

Further analysis shows that a significant 60 percent of the respondents agreed strongly with this statement (χ^2 (3) = 68.640, p<.0005).

4.11 Question 12: Use ICT to manage business?

Table 4.11 Use ICT to manage business?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	59	59.0	59.0	59.0
	No	41	41.0	41.0	100.0
Total		100	100.0	100.0	

The purpose of question 12 was to find out how respondents use ICT programs for business management.

Table 4.11 illustrates that, of the sample selected, 59 percent of the respondents indicated their use of ICT programs and 41 percent respondents' said they don't use ICT programs. The Binomial test was applied to determine whether a significant difference exists between the number of 'yes' and the number of 'no' to the use of ICT programs on the management of businesses. The result illustrated in table 4.11 indicates no significant difference between the proportions of respondents who indicated 'yes' and 'no' to the use of ICT programs on the management of businesses.

4.12 Question 13: which one do you use often?

Usage patterns – only those 59 who indicated usage.

Table 4.12: Which one do you use often?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internet	14	14.0	23.7	23.7
	Telephone	15	15.0	25.4	49.2
	Cell phone	23	23.0	39.0	88.1
	Emails	7	7.0	11.9	100.0
Total		59	59.0	100.0	
Missing system		41	41.0		
Total		100	100.0		
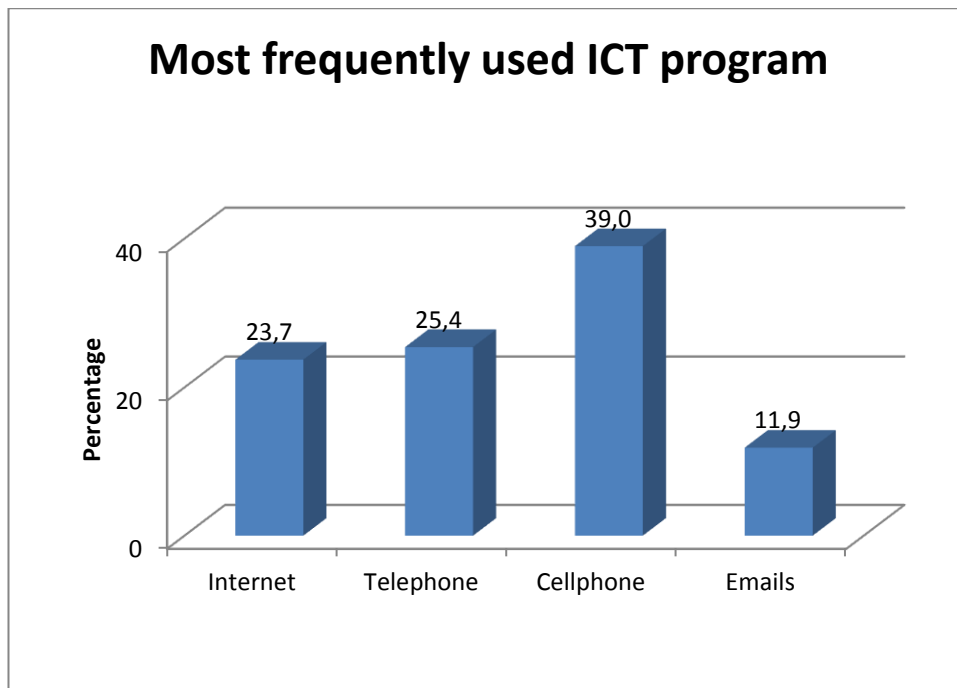
Figure 4.12: which one do you use often?

The purpose of question 12 was to determine from the respondents the means of accessing information they use the most and these were classed into four groups. Views from 100 respondents were expected, however only 59 respondents replied to the question 12.

Figure 4.12 above presents the responses to question 13 from the respondents to this question, (14) 23.7 percent use the internet access information for management of businesses. (15) 25.4 percent use the telephone to access information for management of businesses, (23) 39.0 percent use the cell-phone to access information and manage their business with (7) 11.9 percent using internet as a method of accessing information and management of business.

Access to information and knowledge is critical in present times of competitive world environment. The Internet is a token which allows access to enormous amounts of information situated around the world on various subjects. Those who make use of the Internet have a competitive advantage and having unequal Internet access and the right to use other ICT resources creates a

fundamental disadvantage for people who do not use these resources resulting in the DD (Vaidya and Shrestha, 2013).

Analysis shows that cell phones are the most frequently used ICT program (χ^2 (3) = 8.729, p=.033). In addition, e-mails were the least used of the options given.

4.13 Question 14: Frequency usage of ICT programs

Usage patterns – only those 59 who indicated usage.

Table 4.13 Frequency usage of ICT programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	14	14.0	23.7	23.7
	Once a week	15	15.0	25.4	49.2
	Twice a month	23	23.0	39.0	88.1
	Never	7	7.0	11.9	100.0
Total		59	59.0	100.0	
Missing	System	41	41.0		
Total		100	100.0		
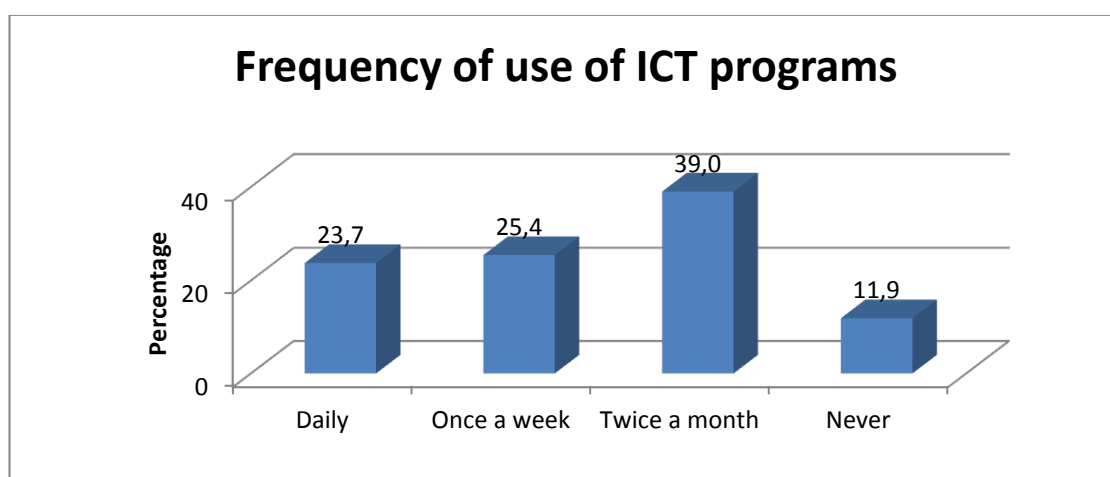
Figure 4.13: Frequency usages of ICT programs

Question 14's purpose was to determine the frequency of use by respondents who use the ICT programs available to them on a weekly basis.

Figure 4.13 above represents the weekly ICT programs usage by the respondents by showing that of the sample chosen, 23 percent use the ICT programs daily, and 25.4 percent, use the ICT programs once a week, 39 percent use the ICT programs twice a month and only 11 percent never used the ICT programs.

A significant number of respondents indicated that they use ICT programs twice a month (χ^2 (3) = 8.729, p=.033).

4.14 Question 15 Knowledge on ICT programs

Table 4.14: Knowledge on ICT programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	43	43.0	43.0	43.0
	No	57	57.0	57.0	100.0
Total		100	100.0	100.0	

This question was to establish how many respondents have knowledge of ICT programs. The above table shows that 43 percent have the knowledge on ICT programs and 57 percent responded no. Therefore, the majority of the respondents have no knowledge on the ICT programs.

The Binomial test was applied and it shows that no significant difference exists in the proportion of respondents that "have and do not have" knowledge on ICT programs.

4.15 Question 16 Web skills

Table 4.15 Web skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	8	8.0	8.0	8.0
	Good	11	11.0	11.0	19.0
	Average	24	24.0	24.0	43.0
	Poor	57	57.0	57.0	100.0
Total		100	100.0	100.0	
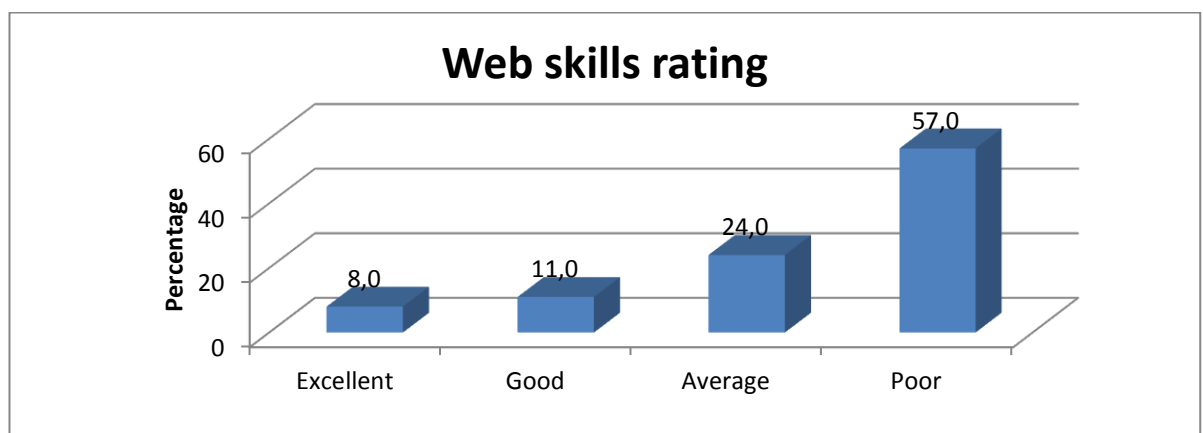
Figure 4.15: Web skills

Internet skills levels of the respondents are illustrated in Figure 4.15, showing that eight percent ranked their skills on the web as excellent, 11 percent as good, 24 percent as average and 57 percent as poor skills.

Chi-square of test- A significant number indicated that their current ICT or web skills are poor (x^2 (3) = 60.400, p<.0005).

4.16 Question 17: Are there public ICT facilities in your community?

Table 4.16: Are there public ICT facilities?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	73	73.0	73.0	73.0
	A little	27	27.0	27.0	100.0
Total		100	100.0	100.0	

When asked if there were any public ICT facilities in their community 73 percent replied 'not at all', 27 percent replied 'a little' and none of the respondents replied 'a lot'. A significant proportion indicated that there are no ICT facilities in their communities (p<.0005).

4.17 Question 18: Necessity of these access points

Table 4.17: Necessity of these access points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	98	98.0	98.0	98.0
	No	2	2.0	2.0	100.0
Total		100	100.0	100.0	

Following on from question 17, the aim of question 18 was to establish whether respondents thought implementing Internet access points was needed in their community. The respondent's perception of question 18 is illustrated in Figure 4.17, showing a significant 98 percent that thought the implementing of Internet access points was needed in their community and two percent thought implementing these access points was not essential (p<.0005).

This question was developed to assess Respondent awareness of the benefits of ICT facilities was assessed by this question, which also assessed the validity

of the argument by Kivunike et al. (2013), which states that although most people living in rural areas are aware of the existence of ICT facilities, they do not know of the advantages of ICTs in improving the value of their lives. Nevertheless, more people resident in Dibate Village are seemingly mindful of the importance of ICTs potential role in their lives, since the majority believe that computer and Internet access points being implemented is necessary in their community.

4.18 Question 19 Positive impact of use of ICT on management of business

Table 4.18 Positive impact of use of ICT on management of business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	94	94.0	94.0	94.0
	No	6	6.0	6.0	100.0
Total		100	100.0	100.0	

The question wanted to determine how many respondents think the use of ICT can have positive impact in management of businesses. The above table shows that 94 percent believe that the quality of their lives/ businesses can be improved with the use of ICT and 57 percent responded with "No"- they do not believe that a positive change can be achieved in their businesses through the use of ICT.

A significant proportion (94 percent) indicated the use of ICT can impact on the management of business in Dibate Village in a positive way (p<.0005).

4.19 Question 20: Areas of benefit the business the most

Table 4.19 Areas of benefit the business the most

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Skills	24	24.0	25.5	25.5
	Networking	28	28.0	29.8	55.3
	Communication	25	25.0	26.6	81.9
	Other	17	17.0	18.1	100.0
Total		94	94.0	100.0	
Missing System		6	6.0		
Total		100	100.0		
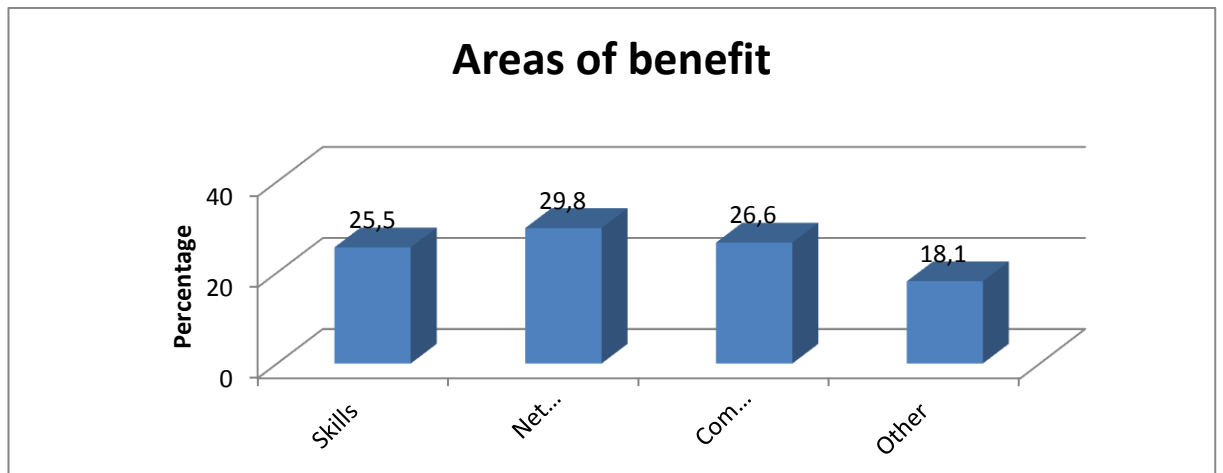
Figure 4.19: Areas of benefit to the business the most

The aim of question 20 was to establish, from the 100 respondents that responded yes to the question, 19 as to which business areas will benefit the most through the use of ICT. The answers were grouped into four categories: Skills, Networking, Communication and Other. From question 20, 94 definite responses were expected. However, 83 respondents of the total 17

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respondents chosen did not respond definitely and selected option four, indicated as "Other" in the questionnaire.

Table 4.19 illustrates respondents' replies to the question, showing that of the 94 respondents, (24) 25.5 percent selected Skills as the tool that will benefit the business the most (28) 29.8 percent selected Networking as a ICT facility that will benefit the business the most, (25) 26.6 percent selected Communication as a tool that will benefit the business the most while (17) 18.1 percent selected 'other' (The option to specified).

Analysis shows that these options are not selected significantly differently.

4.20 Q20 other specified

Table 4.20 Other Specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		83	83.0	83.0	83.0
	Advertising	3	3.0	3.0	86.0
	Growth of businesses	1	1.0	1.0	87.0
	Job creation	3	3.0	3.0	90.0
	Job Creation	1	1.0	1.0	91.0
	knowledge	2	2.0	2.0	93.0
	Learning	1	1.0	1.0	94.0
	Marketing	3	3.0	3.0	97.0
	Training	3	3.0	3.0	100.0
Total		100	100.0	100.0	

Table 4.20 presents the perception to question 20 by the respondents showing that the entire list for '*other*' and majority of answers shows that access to knowledge and information is crucial to being competitive, since it can help to

develop people. These are exactly the benefits that can be achieved by means of ICT facilities and training.

According to Maghsoudi et al. (2010: 586), having information, awareness and knowledge concerning the available opportunities and challenges can help communities in rural areas respond to their technological and socio-economic needs. The authors assert that the beginning of building a great nation starts with the training of its entire population (Maghsoudi et al. 2010: 587).

BIVARIATE ANALYSIS

4.21 Race

4.21.1 Race vs Knowledge and skills in computer programs

Table: 4.21 Race vs Knowledge and skills in computer programs

			Q9 If 1: How will you describe your knowledge and skill in the computer programs?				
			Excellent	Good	Average	Poor	Total
Q1 Race	Asian	Count	1	**2**	0	0	3
		% within Q1 Race	33.3%	**66.7%**	.0%	.0%	100.0%
	Black	Count	17	5	38	25	85
		% within Q1 Race	20.0%	5.9%	44.7%	29.4%	100.0%
	White	Count	0	0	0	1	1
		% within Q1 Race	.0%	.0%	.0%	100.0%	100.0%
	Coloured	Count	1	0	1	0	2
		% within Q1 Race	50.0%	.0%	50.0%	.0%	100.0%
Total		Count	19	7	39	26	91
		% within Q1 Race	20.9%	7.7%	42.9%	28.6%	100.0%

The essence of question 4.21 was to establish the relationship between race, knowledge and skills in the computer programs. For this question, respondents were split into four categories namely: Asian, Black, White and Coloured. The skills question was also divided into four categories: Excellent, Good, Average, and Poor.

Table 4.21 presents the knowledge and skills of respondents. It shows that out of the 100 respondents sampled, Asians respondents show the highest percentage of 66.7 percent indicated that their skill and knowledge in computer programs is good.

A significant relationship between race and computer program knowledge and skill exists (Fisher's = 14.205, p=.018). A significant proportion of the Asian respondents indicated that their skills and knowledge are good.

4.22.1 Correlation between Race and Knowledge on ICT programs

Table: 4.21.2 Correlation between Race and Knowledge on ICT programs

			Q15 Do you have knowledge on ICT (Information Communication Technologies) programs?		
			Yes	No	Total
Q1 Race	Asian	Count	**3**	0	3
		% within Q1 Race	**100.0%**	.0%	100.0%
	Black	Count	38	56	94
		% within Q1 Race	40.4%	59.6%	100.0%
	White	Count	0	1	1
		% within Q1 Race	.0%	100.0%	100.0%
	Coloured	Count	**2**	0	2
		% within Q1 Race	**100.0%**	.0%	100.0%
Total		Count	43	57	100
		% within Q1 Race	43.0%	57.0%	100.0%

A significant relationship between race and knowledge on ICT programs exists (Fisher's = 6.715, p=.013). A significant proportion of the Asian and Coloured respondents indicate that they have knowledge of ICT programs.

Table 4.21.2 shows correlations between the two variables as statistically significant, weak, and positive; r = -.081 (n = 100, p < 0.0005). Respondents' ethnicity cannot be an indicator of their individual expertise levels in ICT programs. Knowledge of ICT programs in rural communities is shown to be low, irrespective of race. Nonetheless, it can be seen that Asian and Coloured

respondents have more knowledge of ICT programs than Black and White respondents. This supports Chowdbury's (2002) findings from a previous study, which shows that rural communities' actively taking part in online activities is low, in comparison to their urban counterparts.

4.22 Gender

4.22.1 Correlation between Gender and level of expertise with computers

Table 4.22.1: Correlation between Gender and level of expertise with computers

| | | | Q6 how would you describe your level of expertise with computers? If non user skip the next question. | | | | |
			Non-user	Basic elementary	Average	Proficient	Total
Q2 Gender	Male	Count	13	15	16	**13**	57
		% within Q2 Gender	22.8%	26.3%	28.1%	**22.8%**	100.0%
	Female	Count	14	**19**	7	3	43
		% within Q2 Gender	32.6%	**44.2%**	16.3%	7.0%	100.0%
Total		Count	27	34	23	16	100
		% within Q2 Gender	27.0%	34.0%	23.0%	16.0%	100.0%

There is a significant relationship between gender and level of computer expertise (χ^2 (3) = 8.486, p=.037). A significant proportion of males indicated that they are proficient and females that they have basic elementary expertise.

Various surveys and reports during the 1990's and early 21st century investigated the 'digital gender divide', debated the problems faced by women in online access, and explored the differences in use of the technology by male and female. The latest statistics from National Statistics (2001), in terms of

access, shows that it is more likely for South African men to have accessed the Internet than women.

Table 4.22.1 present Majority of males (22 percent) has Proficient expertise for computers and most women (44.2 percent) have basic elementary computer skills.

It is important not to be biased when looking at female levels of computer expertise as use of the Internet by an individual woman depends on several variables. A lack of computing expertise is not prevalent among all women, indeed, some women are better equipped and more confident than some men where the technology is concerned.

Even though these disparities must be investigated, on the whole, digital disempowerment is a real danger for women as a number of barriers prevent them from the same extent of access to and use of the Internet as men.

4.23 Area

4.23.1 Correlation Between Area and level of expertise with computer

Table 4.23.1: Correlation between area and level of expertise with computer

			Q9 If 1: How will you describe your knowledge and skill in the computer programs?				
			Excellent	Good	Average	Poor	Total
Q3 grew up in…	Rural	Count	13	3	36	26	78
		% within Q3 grew up in…	16.7%	3.8%	46.2%	33.3%	100.0%
	Urban	Count	**6**	**4**	3	0	13
		% within Q3 grew up in…	**46.2%**	**30.8%**	23.1%	.0%	100.0%
Total		Count	19	7	39	26	91
		% within Q3 grew up in…	20.9%	7.7%	42.9%	28.6%	100.0%

A significant relationship exists between the area of distribution and the level of computer expertise (fisher's = 20.228, p<.0005). A significant proportion of urban respondents indicated that they are proficient compared to the rural respondents, where the majority indicate that they are non-users and have only a basic, elementary level of expertise with computers.

Resources, with which information can be accessed in urban communities, such as multi-purpose community centres and libraries, are easier for people to access. Nevertheless, Warschauer (2002) points out that people in rural areas do not have access, due to a paucity of these resources. This is also due to houses that are located far apart, making a common centre from where people can access information, difficult to have (Computers for Africa 2014). Added to this, residents in rural areas do not have the trainers or the skills to aid them in using such facilities (Warschauer 2002)

4.23.2 Correlation between Area of distribution and computer knowledge and skills

Table 4.23.2: Correlation between Area of distribution and computer knowledge and skills

			Q9 If 1: How will you describe your knowledge and skill in the computer programs.				
			Excellent	Good	Average	Poor	Total
Q3 grew up in…	Rural	Count	13	3	36	26	78
		% within Q3 grew up in…	16.7%	3.8%	46.2%	33.3%	100.0%
	Urban	Count	**6**	**4**	3	0	13
		% within Q3 grew up in…	**46.2%**	**30.8%**	23.1%	.0%	100.0%
Total		Count	19	7	39	26	91
		% within Q3 grew up in…	20.9%	7.7%	42.9%	28.6%	100.0%

There is a significant relationship between Area of Distribution and computer skills and knowledge (fisher's = 18.097, p<.0005). A significant proportion of urban respondents indicated that they have excellent computer skills compared to the rural respondent.

The table 4.23.2 indicates that 46.2 percent of urban respondents have excellent knowledge and skill in computer programs and 30.8 percent of urban respondents have good knowledge and skill in computer programs. The rural area only has 16.7 percent of respondents with excellent skills and three percent with good skills, while the majority in rural areas still reflects a high percentage of respondents with poor results of computer knowledge and skills. This is because there was no infrastructure and no computer training centres in the community. Gennaio (2013) states that there is no money available for training due to third-world countries having to pay debts. Some in the community were not aware of a computer's purpose or even what it looks like. Another contributing factor is the village's poor geographical location, which is not helpful in establishing good infrastructure.

4.23.3 Correlation between Area of distribution and knowledge on ICT programs.

Table 4.23.3: Correlation between Area of distribution and knowledge on ICT programs.

| | | | Q15 Do you have knowledge on ICT (Information Communication Technologies) programs? | | |
			Yes	No	Total
Q3 grew up in…	Rural	Count	30	54	84
		% within Q3 grew up in…	35.7%	64.3%	100.0%
	Urban	Count	**13**	3	16
		% within Q3 grew up in…	**81.3%**	18.8%	100.0%
Total		Count	43	57	100
		% within Q3 grew up in…	43.0%	57.0%	100.0%

There is a significant relationship between race and knowledge on ICT programs (x^2 (1) = 11.370, p=.001). A significant proportion of urban respondent's indicated that they have knowledge on ICT programs and respondent's in rural areas show that they have no knowledge of ICT programs.

4.23.4 Correlation between race and rating of your current ICT or web skills

Table 4.23.4: Correlation between race and rating of your current ICT or web skills

			Q16 How would you rate your current ICT or web skills?				
			Excellent	Good	Average	Poor	Total
Q3 grew up in..	Rural	Count	3	7	20	54	84
		% within Q3 grew up in…	3.6%	8.3%	23.8%	64.3%	100.0%
	Urban	Count	**5**	**4**	4	3	16
		% within Q3 grew up in…	**31.3%**	**25.0%**	25.0%	18.8%	100.0%
Total		Count	8	11	24	57	100
		% within Q3 grew up in…	8.0%	11.0%	24.0%	57.0%	100.0%

There is a significant relationship between Area of Distribution and ICT or web skills (fisher's = 18.142, p<.0005). A significant proportion of urban respondents indicated that they have excellent ICT or web skills as compared to the rural respondent.

4.24 Bivariate between Question 4 by Skills and (Q6, Q9, Q15 and Q16)

4.24.1 Correlation between the physical information access can be established (Q4 by skills) and level of expertise with computer.

Table 4.24.1: physical information access can be established and level of expertise with computer.

			Q6 how would you describe your level of expertise with computers? If non user skip the next question.				
			Non-user	Basic elementary	Average	Proficient	Total
Q4 The physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established?	Strongly agree	Count	17	22	10	12	61
		% within Q4 The physical information …	27.9%	36.1%	16.4%	19.7%	100.0%
	Agree	Count	3	11	**10**	4	28
		% within Q4 The physical information …	10.7%	39.3%	**35.7%**	14.3%	100.0%
	Disagree	Count	3	1	3	0	7
		% within Q4 The physical information …	42.9%	14.3%	42.9%	.0%	100.0%
	Strongly disagree	Count	**4**	0	0	0	4
		% within Q4 The physical information …	**100.0%**	.0%	.0%	.0%	100.0%
Total		Count	27	34	23	16	100
		% within Q4 The physical information access…	27.0%	34.0%	23.0%	16.0%	100.0%

Physical information access does not cover access to information via Internet only, but includes all devices that access information, allowing communication, such as internet connected computers, and television and radio sets, hence the concept is viewed as complex. Developed countries are technologically advanced, with a significant gap between them and African countries. Operating costs of computers and the price of internet connections amount to billions of dollars, with African countries unable to fund these projects. In addition, the price tag of training ICT related businesses makes ICT projects less desirable.

There is a significant relationship between physical information access can be established and the level of expertise with computers usage exists (fisher's = 16.813, p = .018).

4.25 Conclusion

In conclusion chapter four consists of analysis of the data obtained from the survey conducted. Descriptions of how the results were calculated and interpreted formed a crucial part of this chapter. Various factors that are perceived to impact rural communities' access to information were explored via analysis of Dibate Village statistics.

Based on the data presented, very high levels of illiteracy were found in Dibate Village. The majority of residents had very poor digital skills which resulted from lack of any previous computer training and no computer or Internet access. Moreover, the majority of the Dibate residents perceived a great need for ICT implementation in their area that would allow them to access computers and the internet and they would therefore be willing to support such an initiative.

According to Vroom's theory of expectancy, the current practiced behaviour determines future expected behaviour. The Dibate community behaviour is more likely to be repeated by the Ward sixteen community members. The awareness arising from the ICT centre, willingness to spend money and the

actual expenditure on communication say it all. The majority of community members spend more money on cell-phones, which is mainly used for communication to friends and relatives more than for business opportunities.

Figure 4.12 also present that 39 percent of the respondents use cell-phone to access information and management of business while only 11 percent of respondents use computers. Although cell phones can also be a good tool for business but most of the community members the researcher communicated with in the informal interview, stated that they own basic cell-phones not smart phones with access to the Internet.

The community respondents who believes that ICT facilities can have a positive effect equals 88.00 percent, familiarity with different technology only 10 percent, and more than 80 percent experienced difficulties in using technologies. The majority (80 percent) clearly stated that they need to be trained for computer use, which could account for the low rate of computer usage in Dibate, compared to cell phone usage (lack of training by respondents is highlighted).

The next chapter will consist of data analysed in chapter four, with comparisons to the study's main objectives, as well as available knowledge of ICT (Chapter 2), and draw conclusions and recommendations for this study with possible recommendations for future studies and research.

Chapter 5

Conclusion and recommendations

5.1 Introduction

Chapter five sets out the conclusions and recommendations of this research study, managerial guidelines and suggestions for future research in the field of access to ICT in rural areas will be provided.

The context of this study is that of access to information through the use of ICTs, especially in rural areas. This study further investigates the issues affecting access to ICTs in rural areas, in particular people living in the Dibate Village, which ultimately results in its people becoming digitally excluded, or as stated by Fuchs and Horak (2008: 107) it leads to a digital divide. With its purpose that of emphasising progress in the livelihoods of people who are resident in rural areas, through the introduction of ICT usage and facilities into their day-to-day living.

On the whole, this study's aim was to establish ways in which rural communities might, by the use of ICTs, be developed socio-economically.

The research questions addressed the following:
- The differing ICT skill levels and the manner of differences between specific citizen categories.
- Whether residents of Dibate Village have an adequate level of strategic, operational, informal, and formal skills to access and make use of the online services and information.
- The way in which the availability of ICT facilities can play a part in rural development.
- The manner in which public computer and Internet access point availability can aid in bridging the digital divide.

In developing countries, residents of rural areas experience difficulty in accessing information, according to Yu (2002 in Sikhakhane and Lubbe 2005: 63). This usually results from a lack of infrastructure in rural areas, which their urban counterparts consider as normal. Considered an important factor, access to information assists in fuelling development and promoting socio-economic growth as most residents of rural areas "continue to live below subsistence levels" (Sikhakhane and Lubbe 2005). Other factors include low sustainable income and literacy levels, along with a lack of understanding of ICTs and their advantages that must be addressed to develop rural communities and ultimately, create knowledgeable societies.

5.2 Summary of the study

The small rural Village of Dibate, which is located a few kilometres west of Mmabatho in Mafikeng, is the setting for this study. The village of Dibate is one of many areas in the Mafikeng district where basic ICT infrastructure access is still a luxury that many of the people cannot afford. The community is, through the lack, ultimately placed in a disadvantaged position when a comparison is made with urban counterparts. Issues that impede community information access are investigated by this study.

The aim of this research was to determine those issues that affect rural communities' access to information, in addition to emphasising improvement levels in the livelihoods of rural residents that can be realised through the introduction into their daily lives of ICT usage and facilities; resulting in the digital divide being negated. The research study's purpose is to examine and evaluate the use of ICT to facilitate the upliftment of the rural community in the Dibate Village for commercial activities.

The sub-objectives were:

- To establish the nature of the population in Dibate Village;
- To establish the physical access to information communication technology (ICT) for business applications;
- To investigate the application of ICT facilities in Dibate Village;
- To establish if the use of ICT facilities and the training in Dibate Village have an effect on the management and performance of businesses in Dibate Village;
- To establish the aspects which affect the physical information access such as motivation, language, resources and skills on business participation and empowerment in rural areas?

The study investigated factors affecting information access in the rural areas, with research conducted via questionnaires to ascertain the use of information access and ICT in Dibate Village. The study findings show that any number of factors, beyond mere material access, can influence access to information, such as skill usage access. Various other issues were also uncovered that ought to be addressed in trying to bridge the digital divide. These include several shortages, such as the lack of facilities, no awareness of the benefits of ICT facilities, , language obstacles in using the Internet, the non-availability of online government information, a shortage of information products for local languages, as well as no motivation to make use of ICT facilities.

It was also noticed from the study that while most residents of this community have anywhere from basic, elementary digital skills to no skills at all (Figure 4.5), a possible solution may exist. With the study summary presented, it is hoped that the findings will generate huge excitement and interest at the concept of having ICT facilities implemented in the community.

5.3 Response to Research Questions and achievement of objectives

A discussion of the main findings of this research is given in this sub-section, concerning individual research questions and their objectives. The research questions asked in chapter four will be reviewed and each will be followed by a discussion relating to the findings obtained from the data analysed. The response to each question is also an achievement of an objective, although it would not be stated on the sub headings, but it should reflect on the last paragraph of each response.

5.3.1 Do the skill levels differ between particular categories of citizens if so, in which way? (Question 4.21)

The different demographic categories, such as gender, income, age, and ethnicity, as well as education of the respondents, regarding their respective Internet and computer skills (although income and age was not included formally on the research questionnaires due to cultural/norm barriers) will be reviewed. Other facets which were access in this regard included knowledge of ICT Facilities, ICT program usage, and the computer training history of the respondents.

Of the people living in the rural area researched, 94 percent are Black. This supports Ryder's (2001 in Ali 2011) statement that White, Asian, and Coloured people are more highly urbanised and thus will more likely become computer literate, having been exposed to technology from an early age. Being exposed to ICT can lead to more usage, which the study finds, results in enhanced ICT skills. Therefore, it is concluded that White, Indian and Coloured people are, probably, more likely to have better computer skills than Black people.

Where race and gender are concerned (Table 4.2.1), rural communities' usage of computers is noted as remaining low, regardless of race or gender. Nonetheless, it was also observed and noted that computers are used more by

males than by females. Regarding computer training, the findings indicate that respondents who are better-educated had superior skills in computers than the uneducated (Figure 4.5 and 4.6). It was further found that regardless of the respondents' race, poor computer skills were in evidence. It has also been shown that more Asian (66.7B percent) respondents who reside in rural areas have improved computer skills than any other race (Table 4.21).

The first objective was to establish the nature of the population in Dibate Village. The evidence from this study suggests that this objective was achieved, as the results in section 3 also compared well with the findings of literature.

5.3.2 Do the citizens of Dibate Village have a sufficient level of operational, formal, informal and strategic skills to use the online information and services?

There is tendency for rural communities to be excluded from the digital arena due to inadequate literacy levels and geographical limitations, as stated by Razak (2012: 425). A study by Van Deursen and Van Dijk (2009: 339) reveals that once the motivation to use computers exists and there is actual, physical access to online computers, learning how to use both hardware and software is possible. The obstacle to the use of ICT is determined as a lack of skills, such as digital or computer skills, or DL, which are needed to make use of the Internet and computers.

A direct proportional relationship exists between computer use, the web and the expertise level one has or will have (Figure 4.5). In other words, the more you use computers the better you will become in their us). More than 44 percent of the respondents who are resident in Dibate have never used computers or received computer training (Figure 4.6).

Evidence from this study suggests that the objective two: "to establish the physical access to ICT for business application" has been achieved, as the little

to no ICT facilities available in the Dibate Village; this is proven by section 2 and 3.

5.3.3 How can the availability of ICT infrastructure contribute to rural development?

Almost half (44 percent) of the respondents have never attended any computer training (Figure 4.6), with the majority of community members in rural communities in South Africa and other African countries still living below the poverty line, without any advancement or intervention by external parties. These conditions are associated with a lack of infrastructure, service provision and expertise, according to the study by Herselman (2012).

ICTs can become more than just tools for empowering people when used and implemented effectively, according to Zanello and Maassen (2011: 382). can assist Rural communities can be assisted through addressing their technological and socio-economic needs by having awareness, information, and knowledge concerning opportunities and challenges that present themselves (Maghsoudi et al. 2010: 584). In addition, the authors add that providing training to the entire population is the beginning of building a great nation.

From figure 4.12 in chapter 4, 23.7 percent of the respondents used the internet to access information, while 39 percent of the respondents used cell phones to communicate. During information access, primitive, limited methods such as word of mouth and newspapers to access information are still being used. The stat in figure 4.17 was gathered from the informal interviews conducted during the data collection process.

5.3.4 How can the availability of public computer and Internet access points help bridge the digital divide?

New world of knowledge and opportunities by the introduction of ICT's in rural communities contributing to poverty eradication and community socio-economic development to bridge the DD Tella and Olorunfemi (2010: 115). Computer and Internet access areas (ICT facilities) were not accessible to more than 73 percent of the community (Table 4.16), while the minority without access to these resources, were able to gain access at work places, Internet cafes, and schools. The majority of respondents who reside in urban communities have better access to resources that can be used to access information (Table 4.23.1).

The informal interviews, done by the researcher in the process of data collection, revealed that a minority of the respondents without access to ICT resources have to travel long distances to gain access to these resources. Having public computer and internet access points available in a rural community can assist in closing the gap created by the digital divide in a cost effective manner. More users can be attracted to the local availability of ICTs by awareness of such resources in their areas.

5.4 Recommendations

The following recommendations can be made from the study findings regarding the manner in which ICTs can be used in developing rural communities:

- ICT awareness of benefits should be increased as indicated in table 4.3 - chapter four (page 41), data showed that 89 percent of the despondent agrees that physical information access can be established in the Dibate Village which will uplift the socio-economic wellbeing. It has been found that the majority of the people may be aware of the existence of ICT facilities but not being aware of the benefits of such facilities does not help as users do

not know how it can help them on their daily activities, hence awareness is recommended as part of the solution to the challenge.

- Computer and internet access areas must be implemented in the community. Due to the distance some communities are situated in, in relation to the town with computers and internet access, people with ideas who intend to sell it to the world are hampered. This is a key reason that the study recommends public access and the introduction of computers and internet access facilities in rural areas.

- ICT related subjects and training should be introduced in rural primary schools. Training in ICT is very crucial as people tend to do things in the old fashioned manner that are not familiar with ICT. The result of this is generally extra energy is spent, with smaller results whereas ICT use will save on the wastage of one's energy to obtain higher results. Hence training on ICT as a school curriculum is recommended in rural communities at an earlier age.

- Teachers that are qualified and experienced need to be employed to enable acquiring ICT skills. Inadequate and poor resource access and expertise hinders learners from rural area schools in. Rural areas are normally far from any new technology or ICT development, the study recommends that experienced teachers be hired and provided with the required resources, as this can be a deciding factor in dealing with most of these areas' lack of resources.

- Community members' needs should be considered regardless of their understanding. These needs include availability of ICT facilities for the upliftment of their skills and knowledge. Before any implementation of any project, in this case ICT facilities in rural areas. The understanding regarding the facility by community need to be taken into consideration to ensure the facilities are used effective once in place.

- Businesses and members of the community need to be encouraged to participate and be positively involved in ICT implementation. Just as community understanding is crucial, the involvement of community towards the project is very crucial towards its success and sustainability. Lack of interest from community will be one of the main factor that can lead to failure hence it is recommended that community be involved.

- As part of implementation, adequate and appropriate participation in and support of initiatives can assist with community development and improvement of livelihoods. The majority (98 percent) of the respondents are shown in Section 4.17 of the study, to support establishing Internet and computer access areas in their community, as well as active participation in these resources.

5.5 Conclusion

The study's aim was to identify and examine those matters that impact rural communities' access to information. With the purpose of this study to investigate how rural communities can develop socio-economically by means of the use of ICT facilities, the study also endeavours to assist in closing the existing DD between rural and urban communities. Secondly, the study highlights the use of ICT facilities to attain an improvement in the lives of people in rural areas.

A crucial role can be played by introducing ICT facilities to improve the empowerment of the Dibate village residents, as can an increased awareness of the benefits of ICT. The study suggests establishing facilities where the Dibate community members can access information and be motivated to use the facility. Consequently, any ICT implementation should address the needs of its users. In order for ICT to be a success, involvement and participation by members of the community is vital, even though access to such technology

does not necessarily guarantee success it is, nonetheless still proposed by this study.

4.20.1 5.5.1 Conclusions drawn from informal focus group discussion

A group of 40 community members gathered for an informal discussion based on the schedule of structured questionnaires. The researcher did not plan to include any interviews and group discussion as means of data collection, but an unplanned discussion took place as the researcher was trying to explain the content letter to Dibate community. Hence the findings of group discussion are not, mentioned in previous chapters but valid for the conclusion. ICT is a sensitive subject for the Dibate community the researcher observed. They wanted discussion to take place before there were given a piece of paper (Questionnaires) to complete.

The researcher recorded data by taking notes only on points that five and more candidates agreed on. Focus of the interview was on the available ICT facilities in the area. Focus group meetings and interviews were held in Dibate Village Ward sixteen during the municipality councillor meeting, one week during the Month of May 2015.

- What is the difference between using private phone and public phone?

A private phone can be a cell phone or a landline installed in a house. Using a private phone is very convenient: privacy, availability and the status counts. The main problem is the cost therefore it is not readily available to every community member. "My house phone was cut off because of high bills and I could not pay for the phone" a Dibate resident stressed.

Public phones are cheaper, but very scarce, busy, noisy, lines faulty and take a long time to be repaired. Distance from home is the problem. Public phones, however, are very useful to the community.

- Why do people use communication devices?

The main reason for using information communication devices is to receive and send messages, especially information that is important e.g. reporting a death, sickness in the family, organising family feasts and gathering information. We need to know where information comes from and what you can do with the information. Information is a way to success, and a means of communication, but only if it is clear, efficient therefore good information communication technology is important. Once informed one gains knowledge that can be applied to improve one's life skills.

There are a number of sources of information such as television, radio, newspapers and the internet. Telephones are more convenient than any other technology because one is directly in touch with the other person. You hear the voice; feel the tension or joy and stories are most of the time personal e.g. finding a job, reporting a death in the family, talking to a loved one.

- What information is important in your life?

Educational information we get from schools. It helps us to master skills - doing something to improve lives. One gets information from reading books and magazines, newspapers and novels. There are workshops, conferences, and meetings in the community like this one and then we get some new important information.

Environment and culture provides information, like in summer we know that it rains more. Road signs, television and the radio also provide information that we use all the time. Social workers provide information to elders, the community at large, the church and peer groups.

The type of information depends on what you need to do with it maybe ones need information about a disease (SARS or TB). One gets this from the nearest clinic, reads pamphlets and hears from radio and television. We do not have a library or access to the Internet locally, only in town and it is expensive. Computer knowledge, since it is one of the most used and important tools for daily life e.g. for banking, office work is certainly done on computers.

Access to government information is important, now we have to go to town to the municipality if we need that information. We always have to go into town when we need to get information; computers and the internet could help with this.

I owned a small business, but achieving success was difficult because I was unable to control the profits and to manage correctly, so for me business information is needed. I studied computer courses in town, I can do a spreadsheet and word processing but I do not have a computer to start my own business to make a living and assist small business people and the community.

- What are the benefits of computers and the Internet?

They are a means of transmitting information and knowledge and they speed up the spread of information, like government information. We would welcome the Internet in our rural areas! It provides a larger band of information than any other source. The computer can store information for a long time.

We can communicate with institutions, do banking and buy groceries. The computer can be used for educational purposes, storage of information, compiling memo's, CV's, programs for events, calendars, business cards, student cards, graphs etc. It is safe; you can save money by shopping on the Internet. It has privacy so it is safe from criminals. You can use computers for clear legible letters. Also, it is useful for keeping records, and it can remind you of what you have done. Typing of CV's and job applications is important. They

can save time and energy, provide quick communication, you get information as you need it and you can get the latest information. You can also store information, print CV's, invitation cards and wedding cards.

The computer is like a diary and you can use your computer for any information that you need. Most work is now done on computers so you have to be able to use them. You can type CVs. Computers provide an improved standard of living for people because everything is simpler and faster. There would be no need to buy the newspaper everyday so it can save money, and pupils could get practice with matric questions. Crime can be minimised as you can do your shopping without having to go there with money in your hands. You can also watch television and movies. Computers and the Internet are useful for choosing a career because you can learn about what jobs already have too many qualified people.

We can communicate using technology no matter where the person is. It saves time and it gives more information from around the world, like politics, education, donors for projects, games and trackers for security. It can help with job opportunities. Banking services and other trading on the Internet would be useful.

They save time; most of the time is spent looking for jobs and instead you can put all your information on the Internet. You can use the computer for compiling CV's and to store information. Family information can be stored e.g. dates of birth. You can also play games and use the computer for scanning and enlarging identity photos.

- What are the problems with computers and the internet?

The lack of technological information can cause problems with tertiary education, especially for rural scholars who have not used a computer before. Also, electricity is a problem as it runs out often and is expensive. There are not enough teachers with IT skills.

Most of the community members are "computer illiterate", (figure 4.8 and 4.15 qualifies the stated answer) so we can't make use of the computers. There is a high crime rate through the use of the Internet. There is a problem for people to acknowledge that they don't know how to use a computer. Computers are programmed with the human mind so they can make mistakes, but people think that they are always right. You need to have computer skills to get a job nowadays and that makes finding work much more difficult for many people.

The cost is also a problem. Using computers is very expensive and people, especially here in the rural areas, can't afford to use them. It would be better to know the parts of the computer before you pay for training. We need notes or maybe a model to see how the computer works before we try to learn to use it.

The last problem is that all the information is in English and not all people speak and understand English. It is not easy to use if you don't know how to use a computer. Computers get viruses. You get emails and you don't know who they come from. Broken computers take time to be repaired. No electricity, no computers. The community has to keep track of new technologies. Also, computers minimise work opportunities, but research has proven otherwise.

- How can computers and the Internet be used for community development?

It is hard for people here to look at the importance of computers because we were excluded from using them until 1994 so this is why training is especially important. It is not that we rural people can't use computers or are scared to use

them; it is that we are not given the chance to do so. People here would really appreciate computers because they have problems with getting jobs, they need training and computers are also needed at schools. It is expensive to go to town to learn to use computers, so we need training in the community.

We need to make sure that people get information about attending workshops whenever possible. Access to information is problematic. We need to ask teachers to provide information about how to visit Internet sites. People can pay for training rather than paying bus fair to get to town. Even people who are employed risk losing their jobs due to inadequate computer skills so training is very important. After-hours training is needed for those who go to work during the day.

Computers are also good for children; it keeps them busy, rather than them wasting time or loitering around. At the beginning, free training should be provided, and then people can pay for the training. The demand for the training will determine the price.

Potential solution on the discussions will be: An Information and Communication Technology Centre are currently commonly known as a Telecentres. This potential solution is ideal for community development. Community involvement, government and private companies should play an important role with different input by organising, implementing and evaluating the project.

With help from private companies, government departments, non-governmental organisations in collaboration with Dibate Village community members, the dream can be realised. The community can be encouraged to take advantage of and use technology. Most people fear technology because they do not know how to use it or for any other reason that can be overcome. This problem affects even well educated people like teachers, lecturers and directors.

Establishing telecommunication centres also encourages people to spend their social time seeking for information, transmitting information, broadening information knowledge and enhancing technology usage and getting familiar with different means of electronic interaction.

5.6 Recommended Future Research

The study recommends that future research should focus on analysis of community involvement, in changing the current state of Dibate Village by means of the use of ICT. More research has to be done on the manner in which ICT can be used to develop the state of rural communities with recommendations. Future studies need to show more actions/ implementation research to reflect past research findings results.

Livelihoods of the rural poor communities through ICT can improve by increasing their empowerment and giving them a voice nationally and internationally. The study of residents in Dibate village brought to light that people are also empowered by ICT's in making decisions that have an effect on their lives, which was also evident in the informal discussions with the researcher. ICT facilities, such as radio and television remain the most dominant tools of communication, since technology's early days. ICT facility usage will benefit rural people in communicating important information more effectively and faster.

5.7 Future research on awareness campaigns:

The approach and behaviour of leaders of rural communities towards ICT facilities need to change and awareness raised regarding the opportunities of ICT and the information revolution. This can be achieved through civil society, the private sector, and policy makers. Educating people on the significance of ICT knowledge, including the use of and manner of use of ICT facilities/ tools has become crucial in empowering the disadvantaged and those living rurally.

The study findings indicate that the school curriculum should incorporate ICT education at all levels.

Further research should be undertaken to establish government's role as stakeholders in subsidising ICT expenses, in addition to alternative solutions being developed. The study revealed that the introduction of ICT is not the only barrier or challenge to development of rural areas. Development of the human being is crucial for empowerment and community upliftment.

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APPENDICES

APPENDIX A: TABLE OF CONSTRUCTION

OBJECTIVES	QUESTIONS
To establish the nature of the population in Dibate Village.	Q1 What race are you?
	Q2 Gender?
	Q3 I grew up in:
To establish the physical access to Information communication technology (ICT) for business applications.	Q4 The physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established?
	Q12 Do you use the ICT programs on the management of the business?
	Q13 If yes: which one do you use often?
	Q14 How often do you use the ICT programs?
To investigate the application of ICT facilities in Dibate Village.	Q5 Do you think the use of ICT facilities can have positive effect on the management of business in Dibate Village.
	Q17 Do you have public ICT facilities in your community?
	Q18 Do you think implementations of such access points are necessary /needed in your area?
To establish if the use of ICT facilities and the	Q6 How would you describe your level of expertise with computers? If non-user skip the next

training there in Dibate Village have an effect on the management and performance of businesses in Dibate Village.	question.
	Q7 Have you attended any computer training courses?
	Q8 Do you think the training on computer programs can improve the turnover in the local business?
	Q9 If yes: How will you describe your knowledge and skill in the computer programs?
	Q11 In your own opinion do you think that the use of ICT (Information Communication Technologies) have an effect on the management and performances of businesses in Dibate Village?
	Q19 Do you think the use of ICT can have the posetive impact on the management of businesses in Dibate Village?
	Q20 If yes: which area will it benefit the business the most?
To establish the aspects which affect the physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas?	Q10 It is becoming increasingly important to have access to computers and internet in order to develop and lift one's economic and social status in today's world
	Q15 Do you have knowledge on ICT (Information Communication Technologies) Programs?

APPENDIX B: TABLE OF CONSTRUCTION

RESEARCH QUESTIONS	INSTRUMENT QUESTIONS	VARIABLES
Do the skill levels differ between particular categories of citizens if so, in which way?	What race are you	Asian, Black, White, or Coloured
	What gender are you?	Male, or Female
	I grew up in:	Rural area, or Urban area
Do the citizens of Dibate Village have a sufficient level of operational, formal, informal and strategic skills to use the online information and services?	How would you describe your level of expertise with computers? If non-user skip the next question.	Non- user ,Basic elementary user, Average and Proficient User
	Have you attended any computer training courses?	Never , more than once, or Once
	Do you think the training on computer programs can improve the turnover in the local business?	Yes, or No
	If yes: How will you describe your knowledge and skill in the computer programs.	Excellent, Good, average, or Poor
How can the availability of ICT infrastructure contribute to rural development?	The physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established?	Strongly Agree, Agree Strongly Disagree, or Disagree
	Do you think the use of ICT facilities can have positive effect on the management of business in Dibate Village	Yes, or No
	It is becoming increasingly important to have access to	Strongly Agree, Agree Strongly Disagree, or

	computers and internet in order to develop and lift one's economic and social status in today's world	Disagree
	In your own opinion do you think that the use of ICT (Information Communication Technologies) have an effect on the management and Performances of businesses in Dibate Village?	Strongly Agree, Agree Strongly Disagree, or Disagree
	Do you use the ICT programs on the management of the business?	Yes, or No
	If yes: which one do you use often?	Internet, cell phone, telephone, or email
	How often do you use the ICT programs?	Daily, once a week, twice a month, or never
	Do you have knowledge on ICT (Information Communication Technologies) Programs?	Yes, or No
	How would you rate your current ICT or web skills?	Excellent, Good, Average, or Poor
	Do you have public ICT facilities in your community?	Not at all, A little, or A lots
How can the availability public computer and Internet access points help bridge the digital divide?	Do you think implementations of such access points are necessary /needed in your area?	Yes, or No
	Do you think the use of ICT can have the posetive impact on the management of businesses in Dibate Village?	Yes, or No
	If yes: which area will it benefit the business the most?	Skills, Networking, Communication, or Other

APPENDIX C: QUESTIONNAIRES

APPENDIX C: Permission to use your responses for academic research: *Part: 3*

I hereby give my permission that my responses may be used for research purposes provided that my identity is not revealed in the published records of the research.

Initials and surname: _____   Postal   Address:

_____

_____Postal   code: _____   Contact   number:

_____

Cell: _____   Signature: _____

No. Part 2: General personal Particulars			
Please tell us a little about yourself: Please mark only one option per question below			
1	What race are you? ☐ Asian ☐ Black ☐ White ☐ Coloured	11	In your own opinion do you think that the use of ICT (Information Communication Technologies) have an effect on the management and Performances of businesses in Dibate Village? ☐ Strongly Agree ☐ Disagree ☐ Agree ☐ Strongly Disagree
2	Gender? ☐ Male ☐ female	12	Do you use the ICT programs on the management of the business? ☐ Yes ☐ No
3	I grew up in: ☐ Rural area ☐ Urban area	13	If yes: which one do you use often? ☐ Internet ☐ cell phone ☐ telephone ☐ emails
4	The physical information access such as motivation; language; resources and skills on business participation and empowerment in rural areas can be established? ☐ Strongly Agree ☐ Disagree ☐ Agree ☐ Strongly Disagree	14	How often do you use the ICT programs? ☐ Daily ☐ twice a month ☐ Once a week ☐ never
5	Do you think the use of ICT facilities can have positive effect on the management of business in Dibate Village ☐ Yes No ☐	15	Do you have knowledge on ICT (Information Communication Technologies) Programs? ☐ Yes ☐ No
6	How would you describe your level of expertise with computers? If non-user skip the next question. ☐ Non- user ☐ Basic elementary user ☐ Average ☐ Proficient User	16	How would you rate your current ICT or web skills? ☐ Excellent ☐ Good ☐ average ☐ poor
7	Have you attended any computer training courses? ☐ Never ☐ more than once ☐ Once	17	Do you have public ICT facilities in your community? ☐ Not at all ☐ A Little ☐ A Lot
8	Do you think the training on computer programs can improve the turnover in the local business? ☐ Yes ☐ No	18	Do you think implementations of such access points are necessary /needed in your area? ☐ Yes ☐ No
9	If yes: How will you describe your knowledge and skill in the computer programs. ☐ Excellent ☐ Good ☐ average ☐ poor	19	Do you think the use of ICT can have the posetive impact on the management of businesses in Dibate Village? ☐ Yes ☐ No
10	It is becoming increasingly important to have access to computers and internet in order to develop and lift one's economic and social status in today's world ☐ Strongly Agree ☐ Disagree ☐ Agree ☐ Strongly Disagree	20	If yes: which area will it benefit the business the most? ☐ Skills ☐ communication ☐ Networking ☐ other………………………

Concepts	Article number	Digital divide	Telecentres	Bridge	ICT	Digital literacy	Quality of life	Information diffusion	Digital libraries	Rural development
Empowering the rural communities via the Telecentres	1	✓	✓	✓	✓	✓		✓		✓
Digital divide research, achievements and shortcomings	2	✓		✓	✓			✓		
Preliminaries into problems to access information–the digital divide and rural communities	3	✓	✓	✓	✓	✓				✓
Digital Libraries Creating Environmental Identity Through Solving Geographical Problems	4				✓	✓		✓	✓	✓
An innovative ICT solution to steer rural communities to global understanding: a case study from Durban, South Africa	5	✓		✓	✓	✓	✓	✓	✓	✓
Digital divide: how can digital libraries bridge the gab	6	✓		✓	✓	✓	✓	✓	✓	✓
Dimensions of information and communication technologies (ICT) diffusion in rural	7	✓			✓	✓		✓		✓
Empowering strategies for Iranian rural people to use information and communication technology services: the case of Isfahan province	8				✓	✓	✓	✓		✓
Telecentres in South Africa	9	✓		✓	✓	✓	✓	✓		✓
Information Technology in rural communities	10		✓	✓	✓	✓		✓		✓

Title	No									
Information needs in developing countries: how are they being served by public access venues?	11		✓		✓	✓	✓	✓	✓	
Digital divide and economic development: case study of Sub-Saharan African	12	✓		✓	✓	✓	✓	✓		✓
Investigating perception of the role of ICT towards the quality of life of people in rural communities in Uganda	13				✓	✓	✓	✓		✓
Rural communities in developing countries: an explorative review of the contribution of ICT on quality of life	14				✓	✓	✓	✓		✓
Rural digital library: connecting rural communities in Nepal	15	✓		✓	✓	✓	✓	✓	✓	✓
Social development in Indian rural communities: Adoption of Telecentres	16		✓		✓	✓	✓	✓		✓
Strengthening citizen agency and accountability through ICT	17				✓	✓	✓	✓		
Who uses ICT at Public Access Centres?	18		✓		✓	✓		✓	✓	✓
Improving digital skills for the use of online public information and services	19	✓	✓	✓	✓	✓	✓	✓		
Information Access for Development: A Case Study at a Rural Community Centre in South Africa	20	✓		✓	✓	✓	✓	✓		✓
The future of ICT in developing world: Forecasts on sustainable solutions for global development	21	✓	✓	✓	✓	✓	✓	✓		✓
ICT in Rural Areas in South Africa: Various Case Studies	22	✓		✓	✓	✓	✓	✓		✓
Rethinking Telecentres sustainability: how to implement a social enterprise approach	23		✓		✓	✓		✓		✓

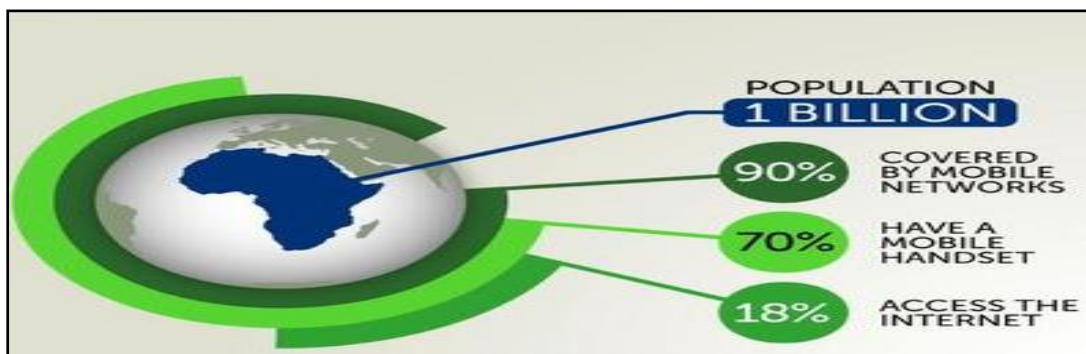|											
Africa and the digital divide	24	✓	✓	✓	✓	✓		✓		✓
E-Conference final report on Telecentres sustainability in developing countries	25	✓	✓	✓	✓	✓		✓		✓

Addendums

Source: African Undersea Cables (2016)

Figure 2.1 Closing DD with mobile broadband
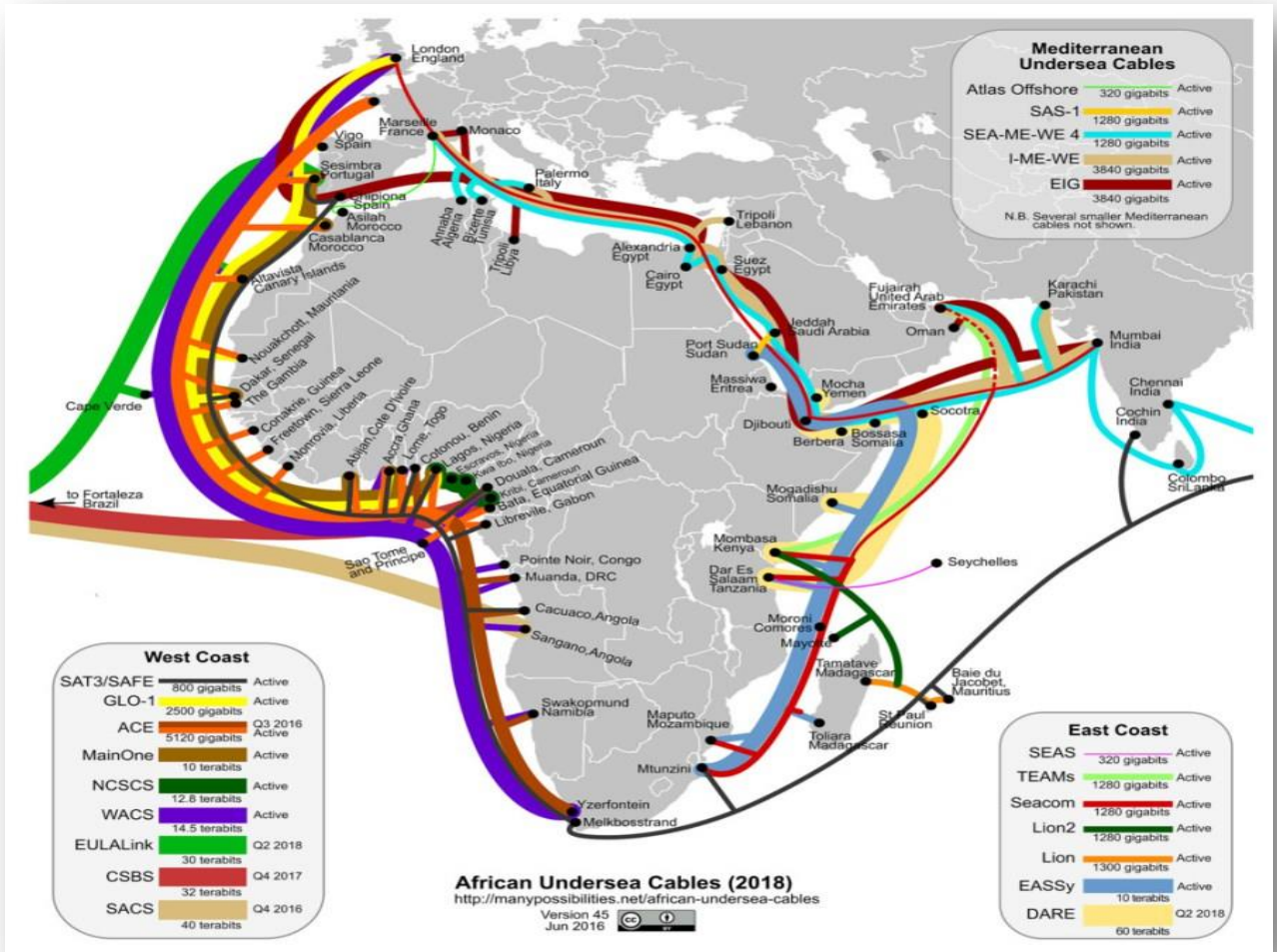
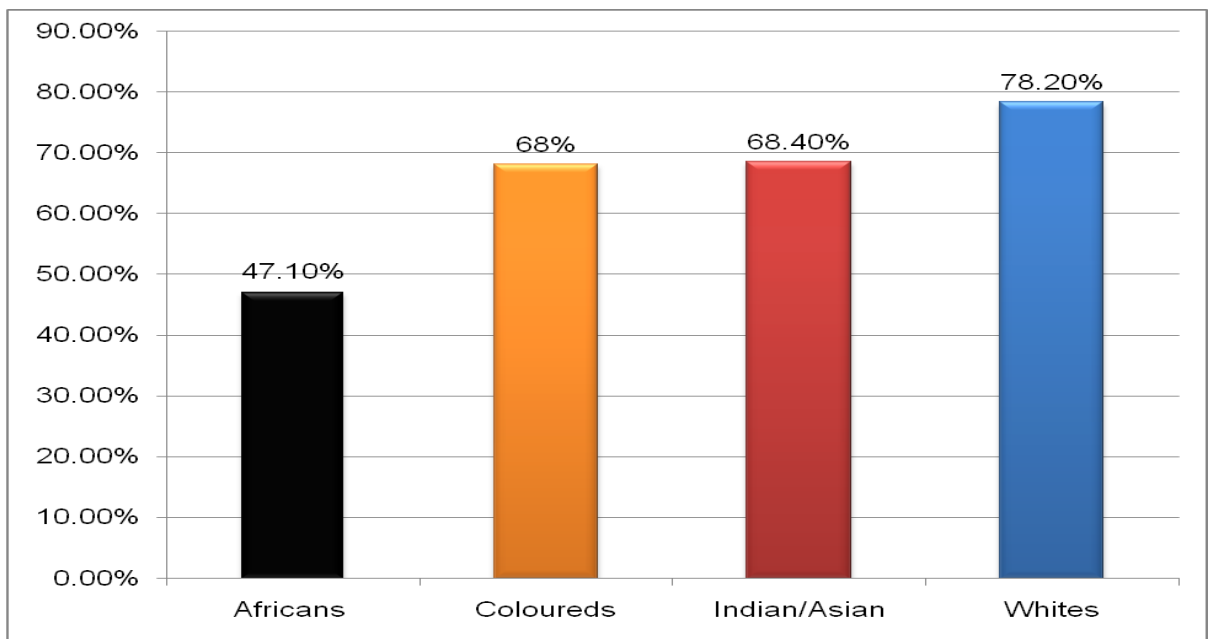**Source:** Africa Technology (2014)

Figure 2.2   The internet in Africa

Figure 2.3   Teaching depends on improvising ICT in rural Senegal

Figure 2.4   Internet uses per day by population

Figure 2.5   Tele-monitoring of patient using mobile phone decision support
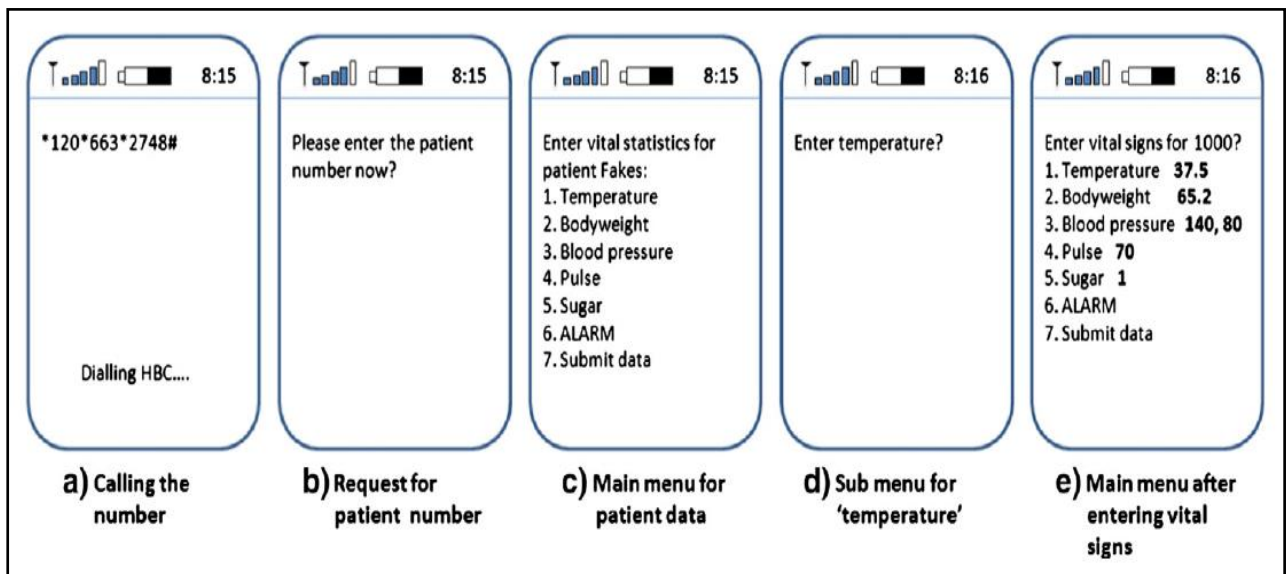
Figure 2.6   Online shopping behaviour in South Africa

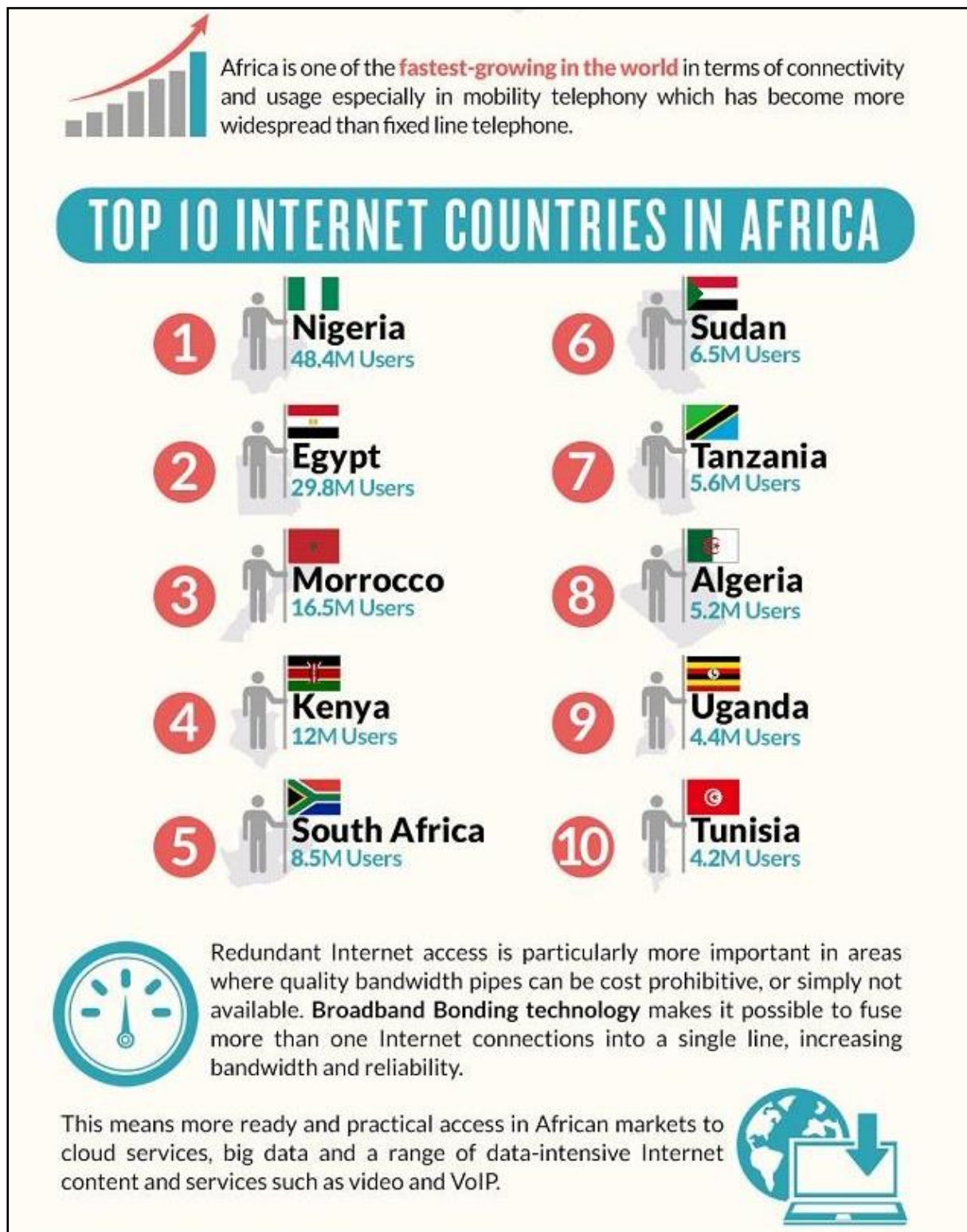**Figure 2.7   Internet penetration in Africa**
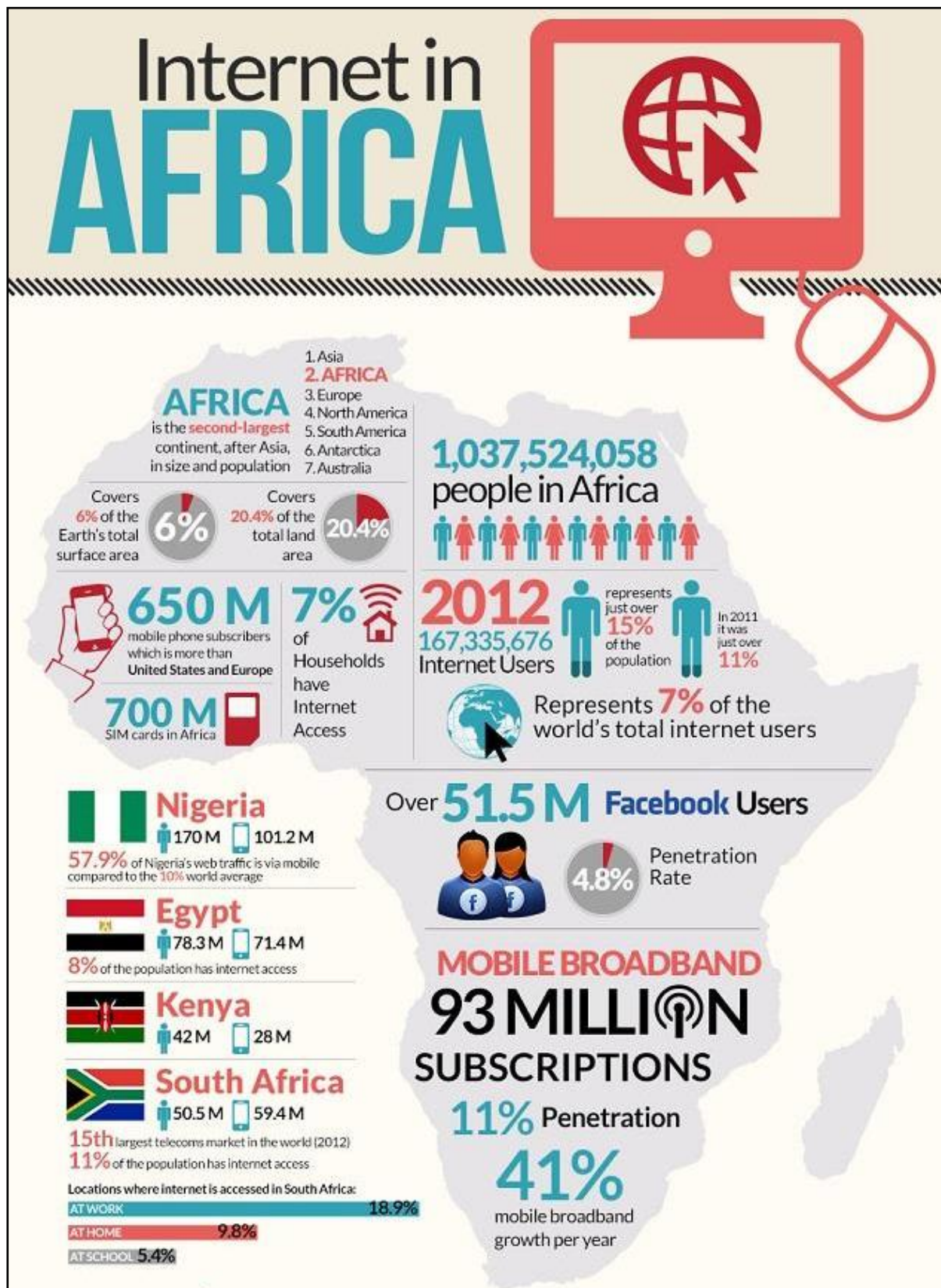
Figure 2.8   Top 10 internet nations in Africa

Figure 2.9   Mobile Payments in Africa
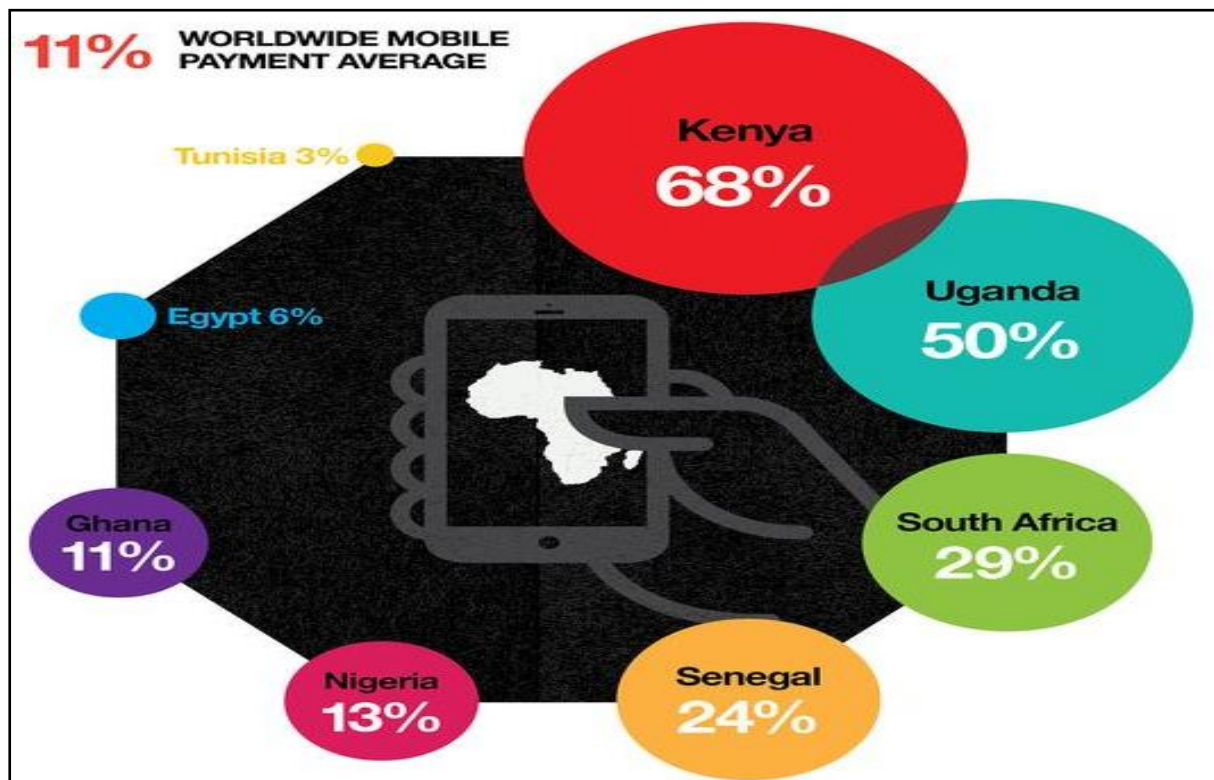
Figure 2.10 Conceptual framework to determine land scarcity