PROVISION OF INFORMATION FOR IMPROVING LIVELHOODS AMONG COMMUNITIES IN ARID AND SEMI-ARID LANDS (ASALs) IN KENYA: THE CASE OF MAARIFA TELECENTRES

By

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DECLARATION

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To Almighty God, for bestowing the gift of knowledge and intellect to human race.

ABSTRACT

Telecentres are established to provide information to bridge the information and digital gap, foster development and address the needs of the poor in remote and isolated rural areas in developing countries. The purpose of this study was therefore, to explore the provision of information through Maarifa Telecentres, to improve livelihoods of communities living in arid and semi-arid lands (ASALs) in Kenya. The specific objectives were: to establish the information needs of ASALs communities served by Maarifa centres; to explore information services provided by Maarifa centres to ASALs communities; to examine access and use patterns of information by ASALs communities benefiting from Maarifa centres in Kenya; to determine policies in place that facilitate development and utilisation of Maarifa centres in Kenya, and to analyse the challenges and prospects of Maarifa centres in provision of information to rural communities in Kenya, to make recommendations and develop a framework for improving information use for sustainable livelihoods among communities in ASALs regions in Kenya. The study employed a multiple case study research design as an overall strategy and drew upon multiple data sources to develop a triangulation of methods. Qualitative research was used as a dominant paradigm. Data were collected through interviews from a sample of 80 respondents from five Maarifa centres, namely: Nguruman in Magadi, Mutomo in Kitui, Isinya in Kajiado, Ng'arua in Laikipia and Marigat in Baringo. In addition, five focus group discussions were conducted with the users of the telecentres. Key informants included directors and programme coordinators of Maarifa centres, members of the Communication Authority of Kenya and ICT Board of Kenya. This study was informed by two theoretical frameworks namely: the DFID's Sustainable Livelihoods Framework Approach and Roger's Diffusion of Innovations. These findings of the study indicate that Maarifa centres are points of Arid Lands Information Networks (ALINs) engagement with communities living in ASALs. People appreciate Maarifa centres as places to access information, acquire ICT skills, do business through Sokopepe, a mobile phone and online based knowledge management platform for agricultural information. It features among others: a payment solution, agricultural commodity prices, inputs and outputs information; tips on good husbandry; post-harvest practices and enhanced agricultural practices. The study contributes to knowledge because it adopts a community-centred approach that focuses on the views of users of Maarifa centres. The challenges are mainly infrastructural which slow down connectivity and internet access. This study revealed that Maarifa centres have solved most of the community's information related challenges through access to e-government services, e-commerce and agricultural development and knowledge creation, resulting in improved livelihoods. The study also revealed that these developments were realised due to collaboration between partners such as government ministries, funding agencies and community participation. The study concludes by confirming that Maarifa centres have improved ASALs communities lives by facilitating access to information relevant to their livelihood needs an bridging the digital divide. The study proposes a framework dubbed "Human-Techno interface for telecentre services" that applies lessons obtained from the findings of this study. Stakeholders can use these findings to foster sustainable livelihoods for communities living in ASAL regions in Kenya.

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ABBREVIATIONS AND ACRONYMS

ALIN	Arid Lands Information Network
ASALs	Arid and Semi-Arid Lands
ATLA	Access to Learning Award
CAK	Communications Authority of Kenya
CCK	Communication Commission of Kenya
CD-ROM	Compact Disc-Read-Only Memory
CKC	Community Knowledge Centre
CLC	Community Learning Centre
DFID	Department for International Development
GPRS	General Packet Radio Service
HIV/AIDS	Human Immune Deficiency Syndrome/Acquired Immunodeficiency Syndrome
IAP	Information Access Point
ICT	Information Communication Technology
ICT4D	Information and Communication Technologies for Development
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IPDC	International Programme for Development of Communication
IPDC	International Programme for Development of Communication
ISDN	Integrated Service Digital Network

ISP	Internet Serve Provider
ITU	International Telecommunication Union
KALRO	Kenya Agricultural and Livestock Research Organisation
KICD	Kenya Institute of Curriculum Development
LACKIN	Laikipia Centre for Knowledge and Information Network
LAN	Local Area Network
LCD	Liquid-Crystal Display
MCT	Multi-purpose Community Telecentre
MRTC	Maasai Rural Training Centre
NGOs	Non-Governmental Organisations
OKN	Open Knowledge Network
PIPs	Political Institutions and Processes
PPP	Public Private Partnership
SIDA	Swedish International Development Co-operation
SLA	Sustainable Livelihoods Approach
SLF	Sustainable Livelihoods Framework
SMEs	Small and Medium Enterprises
SMMEs	Small, Medium and Micro Enterprises
TVAS	Telecentre Value Added Services
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development

UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNESCWA	United Nations Economic and Social Commission for Western Asia
WCED	World Commission on Environment and Development

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CHAPTER ONE: INTRODUCTION AND BACKGROUND TO STUDY

1.1 Introduction

Information has been identified as one of the factors of production as well as a source of society's development. Adequate access to information results in social and economic improvement in a society. Modern society has embraced reliance and increased exploitation of information. Islam & Hoq (2010) correctly emphasise that information that is not used has no inherent value. Consequently, use and impact of information depends on access to it. Mtega and Melakani (2009) argue that poverty is caused by among other factors, insufficient information framework and means to facilitate optimum exploitation of information.

The introduction of telecentres in Kenya and other African countries was intended to facilitate information accessibility. Bailey and Ngwenyama (2009) concur with Mtega and Melakani's (2009) statement when referring to telecentres. They state that the aim of telecentres is to serve people living in rural areas with Information and Communication Technologies (ICTs) for communication, e-governance, and several other socio-economic agenda.

Most parts of Kenya are mainly rural and agro-based. While information provision is considered central to the success of rural development initiatives, these rural societies are characterised as information-deprived. People in rural areas especially the experience constrained access to important information that can improve their lives. These rural societies can only be empowered if relevant information is made available and accessible.

Communities in rural areas of Kenya were for a long time excluded from the rest of the world due to uneven distribution of ICTs. The reason being, while Kenya and most other developing countries struggled to provide citizens with basics necessities of life such as food and houses, the developed world mainly focused on becoming an information society. Development partners saw the need for poor nations to embrace ICT tools (telecentres) to help them get out of poverty. The introduction of telecentres such as Maarifa centres constitute a promise to improve the quality of lives particularly among the low-income, underserved communities to help them realise universal access and narrow the digital gap or digital divide. Digital gap in this study is taken as a situation portraying the uneven distribution of computers and the internet and having skills to access and use ICTs facilities (Reitz, 2003). Digital divide may also refer to differences that exist between those who have the competencies to operate and exploit ICTs adequately due to different levels of proficiency and technological expertise. Digital divide has a correlation between social segregation and inequalities of chances to use ICTs for their livelihood activities (OECD, 2001).

The government of Kenya through the Communication Authority of Kenya (CAK) and Kenya ICT Board rolled out a major drive of establishing telecentres around the country. The initiative was dubbed Digital Villages Project (DVP) or “Pasha” villages. Some include Chwele in Bungoma, Eldama Ravin, Mukuru, Kagundo to mention some (Obara, et al. 2014). Out of the 63 digital villages opened across Kenya, most of them have closed down because they were unable to break even (Shisoka and Karume, 2017). In addition, most of the digital villages are located in

urban centres, aggravating problems of digital divide. However, Maarifa centres have recorded tremendous success that is highlighted in this study.

Poverty is a common characteristic in rural areas. A number of studies conducted by some researchers such as Heeks, 2003; United Nations Development Programme [UNDP], (2011); Sein et al., (2008) note that "... the poor are that way because they are not only needy of basic means and societal prerogative to life ; they also experience insufficient exposure to information." Telecentres are supposed to provide affordable access to ICT especially basic computer competencies and familiarity with the World Wide Web. Kumbo (2014) while opening a telecentre in Malawi commented that, "Much of the deficiency in our midst, much of lack of knowledge among the population, much of the seclusion in our communities, can be addressed when people access information that could help them tackle issues affecting their lives." In Kenya, Arid Lands Information Network (ALIN) has established telecentres to facilitate information and knowledge exchange to and between communities they serve. ALIN works through established community knowledge centres (telecentres) called Maarifa Centres (Nguo 2015). This research focused on these Maarifa centres.

The primary objective of telecentres is to address the marginal and rural societies' huge demand for information and communication. Proenza et al (2001) and other scholars of Information Science such as Islam & Hoq (2010) emphasise that telecentres enhance accessibility to information among marginalised communities. Telecentres provide access to information by the public since they are shared facilities. ALIN has established Maarifa centres to help rural people in ASALs access

information. These community (Maarifa) centres are equipped with computer facilities, and are involved in training people in computer competencies.

Rural development can make a major contribution in national development. Therefore, providing easy access to information is necessary to the developmental activities of the rural societies. Easy access and flow of information is facilitated by ICTs. Many rural populations cannot individually access information technology due to marginalisation, isolation and the fact that they cannot afford to buy such facilities. Access to information in the rural areas using ICTs is made possible through the telecentres. Telecentres enable rural marginalised communities to use modern information innovations for their development (Mahmood, 2005).

Telecentres are main strategies of providing universal access to telecommunication facilities and other office equipment such as computers, fax machines, furniture and information services as a medium of bridging the digital gap. The situation is however changing fast due to mobile telephone boom even in the rural areas. Because of the many advantages offered by Telecentres, they have been described as a vital response to continual lack of access to ICTs and information services in most rural areas in the developing world.

The concept of Telecentres was conceived in the 1980s in a small Swedish rural farming community. The purpose was to provide information services, offer ICT training and provide job opportunities to the local community using computers and modern technological equipment (Mohamood 2005). Townsend, et al. (2001) notes that telecentres offer an intriguing approach to overcoming disparities of access to

information in this information age. Telecentres provide opportunities for developing societies and disadvantaged areas to participate in the emerging economic order.

It is unfortunate that many telecentres that are established fold up as soon as donor-funding ends. The questions posed in this study relate to the establishment, sustainability and the environment in which the telecentres operate so as to succeed in Kenya.

1.2 Background to the Study

Many nations have in the 21st century been involved in providing access to information by the public using Information and Communication Technologies (ICTs). ICTs are seen as an important tool that can alleviate digital exclusion for socio-economic development, (Coward, Gomez & Ambikar, 2008). ICTs enhance access to information and knowledge to help build social capital for development (Baily, 2009). ICTs assist in making information available in diverse areas such as healthcare and education which lead to civic dialogue and public participation in socio-cultural development processes (Qureshi & Trumbly-Lamsam, 2008; Davison et al., 2000; Harris, 2001).

The United Nations Conference on Trade and Development (UNCTAD) report on information economy of 2007-2008 discussed the new information paradigm in different dimensions. The report attributes knowledge creation and diffusion to ICTs and goes further to show how developing nations exploit technology to generate innovations to improve people's livelihoods and give enterprises a competitive edge. It also examines the impact of ICTs on economic growth in developing countries.

Information and communication are important elements of rural development activities which are generally characterised as information-poor. Provision of relevant information is central to the success of rural development initiatives. Chapman and Slaymaker, (2003) explain that rural people lack access to information which they need to improve their lives and livelihoods.

Information flow to and from rural areas is important for national development and eradication of poverty. People living in urban areas benefit from the available ICT-based economy while rural folks are disadvantaged and marginalised. This is because they do not have access to ICT facilities; they are unable to meet their information needs. Inadequate information infrastructure is a common characteristic in most rural areas which are isolated and cannot afford information facilities.

For these reasons, governments and non-government agencies have established telecentres to enable communities living in rural areas use modern ICT innovations for rural development (Mahmood, 2005).

Information Communication Technologies for Development (ICT4D) is a movement that links increased access to ICTs to economic development. There are many success stories of ICTs and rural development centred on deployment of telecentres that encourage ICTs participation in the promotion of education, social, and economic development, (Rothenberg-Aalami and Pal, 2005). Kiplang'at (2001) explains that Multipurpose Community telecentres employ ICT infrastructure to enable rural societies solve economic problems and establish mechanisms that build upon processes to propagate equitable, sustainable development and social growth.

ICT was in 2002 announced as a formal tool for enabling socio-economic development by the Okinawa charter of the G-8. This research acknowledges that ICT is an actual force used in shaping the 21st century and widely impacts on the way people live, and the way the government relates with civil society and other stakeholders in development. It is this same Okinawa Charter that created a call to bridge information gap.

Information Communication Technologies particularly computer and the internet have gained popularity for socio-economic progress in developing countries (DOT force 2001; World Bank, 1998). Emerging nations in collaboration with partners from the developed countries acknowledge the role that telecentres play in boosting economic development, curbing poverty and realising sustainable livelihoods, (Gerster and Zimmermann 2003).

Telecentres' infrastructure improves livelihoods of poverty stricken people in rural areas by accelerating access and use of information that leads to improved agricultural development. Farmers are able to access marketing information for their products resulting in improved farmers' income. Without telecentres, poor people would find it hard to access information due to lack of modern information technologies, they would not get free internet and technological gadgets are very expensive; furthermore they lack information retrieval skills. It is important to mention that quality information is not cheaply accessed, thanks to the existence of telecentres that facilitate access to information.

ICTs improve access to many livelihood information requirements such as education, health, and institutional services including e-government and finance, (Mathur and Ambani 2005). Additionally, telecentres avail information that provides opportunities for improving diversification of traditional crop production as well as production of market-oriented agricultural products. This in turn has an effect on improved rural livelihoods such as increased and diversified incomes of small-scale farmers. Farmers will use ICTs to explore and exploit new market opportunities as well existing market niches.

The concept of telecentres and ICTs as amenities for socio-economic development has influenced various international organisations to make huge investments in initiating telecentre projects to make computerised information services accessible to poverty stricken people living in rural areas in economically developing nations. A stream of projects such as Multipurpose Community Telecentres (MCTs), the International Development Research Centre (IDRC), International Telecommunication Union (ITU), United Nations Development Programme (UNDP) and United Nations Educational, Scientific and Cultural Organisation (UNESCO) have played a major role in the telecentre movement (ITU, 1998). Kenya participates in hosting pilot telecentres through ITU/UNESCO/IDRC initiative. The aim is for multinational movement intervention in telecentres as a pilot project to experiment and come up with strategies for management and planning how application of these new technologies enhance development and reduce poverty.

Telecentres, in many developing countries are the centres for rural connectivity. They are the only places that provided internet services, computer literacy programmes and other ICT related services. In Kenya and other countries in Africa, mobile phone services have grown widely and tremendously. Mobile telephony has contributed a great deal in bridging the digital divide in rural areas and has played a significant role in propelling Kenya to be an information society.

Chhachhar and Hassan (2013) explain the new approaches offered by the mobile phone for farmers to access information. Farmers who own mobile phones subscribe to applications in their mobile phones to access markets, healthcare and other services provided through the telecentres. Telecentres repackage information for farmers and disseminate them through mobile phones.

From the foregoing, telecentres have improved provision of information in developing regions. Studies carried out in Tanzania, Uganda, Ghana, South Africa and Bangladesh have depicted improved provision of information through telecentres. The governments have gradually provided the necessary information infrastructure where most of them have embraced mobile devices as tools for distribution of information.

1.3 Role of Telecentres in Bridging Digital Divide

In the past, there has been, poor information distribution among developing nations leading to the phenomenon referred to as information gap (Mtega and Melakani, 2009). Lack of, and uneven distribution of information and ICT infrastructure as noted earlier in this chapter resulted in the digital divide (Kiplang'at 2002). The

United Nations (UN) in a statement on Universal Access to Basic Information Services noted that:

> *Technology has brought forth a new threat of widened gap between industrialised and developing nations: UN referred to it as a new type of poverty, which is information poverty, a problem that looms. Most developing countries are not able to share in the communication revolution .....(p.10)*

Fink and Kenny (2003) have given four gaps of digital divide:

1. *In the use I(CTs – this is measured by the number of web-enabled computers*
2. *In the ability to use ICTs – gauged by the skills applied*
3. *In actual use – Reasons for use of ICT resources*
4. *The number of users and time taken online, the number of internet hosts engaged in the communication and the type of electronic service engaged in e-commerce.*
5. *The impact of use – in terms of financial and economic returns. (p.2)*

Hauenstein (2010) provided the following statistics to show the differences in either end of digital divide.

1. *While 71% of the population in developed countries is online; only 21% of the population in developing countries is online.*

2. *Penetration by online users in Africa was at 9.6 % in 2010 compared to 21% in other developing countries and 30% world average.*
3. *Mobile cellular growth is reaching saturation levels in developed countries while, though increasing; the share of mobile subscriptions is at 73% in developing countries (Hauenstein, 2010).*

This digital divide has implications in the gap in other resources that affect people's lives such as; access to health services, education, food, shelter, employment and clean water (Harris, 2001). This is because the digital divide is viewed more as inaccessibility to information than lack of access to technology. Information is a prerequisite for the social and economic enterprise that influence the development process. Since information is critical to development, ICT is seen then as a medium of sharing information. ICT is therefore a critical link in the chain of the development. ICTs like the internet offer immeasurable benefits in terms of improved flow of communications among rural people, development agencies and decision makers. This in turn improves the quality of decisions that affect rural societies especially in agriculture and marketing.

Etta and Parvyn-Wamahiu (2003) asserts that;

> *Telecentres bridge the digital gap among rural and urban communities. Telecentres provide opportunities for progress that are based on enhanced access to information for communities. They introduced Acacia, with the aim of enabling the local disadvantaged*

> *and isolated communities with the proficiency to apply ICTs to their livelihood activities (p.153).*

The introduction of a telecentre into a rural community in Kenya represented substantial innovation for that community. It would not be surprising that for many people living in rural areas in Kenya, a telecentre was their first encounter with a computer. Most telecentres' initiatives in Kenya and many parts of rural Africa were established as pilot projects which were believed to be the answer to the problem of digital divide. This study will establish the extent to which Maarifa centres have contributed to narrowing down the digital divide.

1.4 Background Information to Arid Lands Information Network (ALIN)

The Arid Lands Information Network (ALIN) is a network of grassroots Community Development groups of workers drawn from non-governmental organisations, community-based organisations and government departments. The groups that form the network offer extension services in different fields of expertise. ALIN acts as a source of information and knowledge for communities they serve. ALIN is knowledge-driven society whose aim is to enhance livelihoods of communities by means of information exchange.

ALIN facilitates information and knowledge exchange to and between extension workers or infomediaries and arid land communities in Kenya, Uganda, Tanzania and Ethiopia. The information exchange activities focus on small-scale sustainable agriculture, climate change adaptation, natural resources management and other livelihood issues. Maarifa centres are an initiative of ALIN which came to be because

of an increased demand for telecentre services and the need to document local knowledge (www.alin.or.ke).

1.4.1 ALINs' Activities

The role and activities of ALIN include the following:

Agricultural Information – ALIN targets grassroots communities who require information that can promote their livelihoods. It serves these communities with information that stimulate practical approach as well as information that can be easily used. This is achieved through use of multimedia tools such as magazines and books that help build knowledge. Community participate in discussions and information exchange with stakeholders ALIN helps disseminate information that promotes sustainable farming, addresses issues of hunger and poverty and how to overcome them. It also disseminates information that helps prevent environmental degradation and climate change that may affect poor people. Access to information and knowledge is enhanced by use of web 2.0 tools.

Climate Change – ALIN recognises that climate change affects the poor people. Its networks work towards improving access to quality information and knowledge so that people can adopt good practices and avoid the vagaries of the weather.

Market Linkages – ALIN supports farmers to access ready markets for their produce. ALIN has embraced Sokopepe (www.sokopepe.co.ke), an integrated supply chain commodity exchange platform that support farmers to access reliable markets by making their products more visible and easy to find at the national level. Information is disseminated to the end users through short message service (SMS), wire application protocol (WAP), e-mail and the Web. It has an integrated payment

mechanism where users can pay for commodities bought through mobile money transfer,

Enhancing competencies – ALIN is building the ASAL community's capacity to adopt and use improved farming technologies like drip irrigation to water plants. Community members especially young people are trained on computer literacy to enable them use ICTs.

Free access to information – ALIN is built on the principle of availing free access to information because it is a basic human right. Members of the community who live in remote areas receive information and knowledge from ALIN's Maarifa centres. Information is offered free of charge. Information is repackaged to suit the users as necessary; services are offered to all users without discrimination.

1.5 The Maarifa Centres

"Maarifa" is a Kiswahili term for "knowledge". The Maarifa centres main activity is to offer r information related services such as directly disseminating relevant information resources to the communities living in arid and semi-arid lands Maarifa centres are also centres for local knowledge documentation, they are equipped with ICT equipments that facilitate information generation, and use. Maarifa centres were established with objectives such as: To consolidate information resources and knowledge for the communities in ASALs and help them add value on the existing knowledge when they turn documented past experiences into lessons; and, to boost documentation of local content and create network points with other organisations. Maarifa centres act as referral points for communities. The map below shows areas where Maarifa centres are located in East Africa.

S.NO.	Telecentre	Location
1	Isinya	Kajiado
2	Marigat	Baringo
3	Mutomo	Kitui
4	Ng'arua	Laikipia
5	Nguruman	Magadi

Figure 1.1: Map Showing where Maarifa Centres are Located in East Africa

Maarifa centres in Kenya were established about ten years ago. Mutomo, Isinya and Nguruman telecentres were all established in 2007 while Ng'arua was set up in 2006. All the telecentres started as "access points" for making available information resources and were managed by community development workers from public and private sectors. One field officer is appointed to run each centre and is assisted by an advisory committee from the community.

ALIN began as a network facilitating knowledge sharing among people involved in extension (agricultural and livestock) work in sub-Saharan Africa. Information was shared through *Baobab Journal*, a magazine produced in both English and French and circulated across the Sahel (1987–1999). Thereafter in (2002), ALIN used satellite radio (World-Space) to deliver information to remote places. These were information

nodes in Kenya, Uganda, Ethiopia and Tanzania. When the internet became widely available, some of the information nodes evolved into permanent centres where computers with internet access could be installed and operated safely. This is how the Maarifa concept came to be, beginning 2006. The information network is set to serve small-scale farmers by enabling agricultural sustainability strategies, tackle climate change challenges and natural resource management among other livelihood issues. To achieve effectiveness and increase its viability, ALIN started collaborating with governments, Community Based Organisations CBOs) and Non-Governmental Organisations (NGOs) who acted as a source of information to targeted beneficiaries.

1.5.1 Mutomo CKC

The Mutomo Maarifa centre is one of ALINs information centres located in the Eastern region of Kenya, in Mutomo sub-county, some 260.4 km on C17 and 252.4 km via Mombasa Road from Nairobi. The centre is hosted by Mutomo Mission Hospital in the Youth Office known as “Mutomo Youth Peer Education Project”. Mutomo area is arid and experiences frequent droughts resulting in crop failure. As a result, the residents are confronted by hunger, poverty and diseases. The people’s main source of income in Mutomo is livestock trade. Their main information requirements are water harvesting and agriculture.

The Mutomo Maarifa Centre is a joint undertaking of ALIN, Mutomo Hospital and the government’s Communications Authority of Kenya (CAK) on a public private partnerships (PPP) model associated with “ICT infrastructure development”. This PPP

model aims to promote connectivity and information access as seen in figure 1.2 below, competence building and local content generation in rural areas.

Mutomo Maarifa Centre just like other Maarifa centres is equipped with some computers, and internet connectivity. The centre is solar powered to complement the hospital generator.

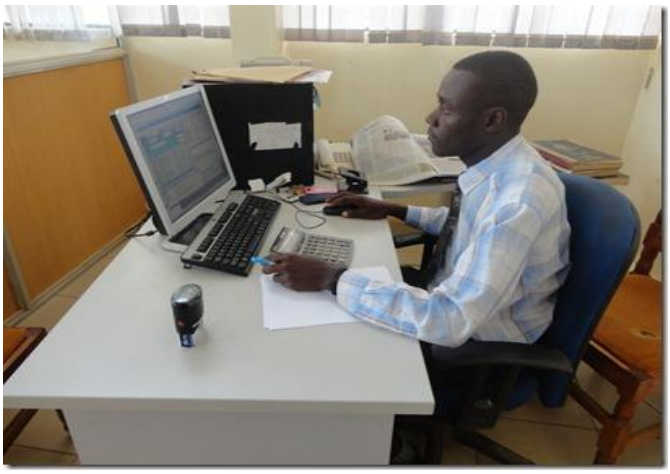

Figure 1.2: A User Accessing Internet service at Mutomo CKC

Mutomo centre offers internet access to the hospital administration officers, communities and visitors to Mutomo who require internet services. It conducts IT skills training, typing and printing services. For example, Mutomo Community Information Volunteer (CIV) and Community Knowledge Facilitators are offered training on how to use Web 2.0 tools including topics such as uploading and downloading of content and synchronising content on iPod nano (a multimedia portable player with features similar to a smart phone), creating and updating of blogs, among others. They in turn train community members who visit the telecentre.

Mutomo CKC has CIV who help in local content generation and uploading via the multimedia platform. The centre has publications on various progress issues including agriculture, environment, health and HIV/AIDS which the communities make reference to. Mutomo Maarifa centre faces two main challenges: poor internet connectivity signals and lack of a stable power supply.

1.5.2 Isinya Centre

Isinya centre provides the community with knowledge and also trains them on application of ICT programmes such as internet, Web 2.0 tools and video production.

Isinya Maarifa centre is situated in the Rift Valley, Kenya, in Isinya sub-county, Kajiado County on the Nairobi-Namanga highway. It is approximately 60 km from Nairobi and 15km North of Kajiado town. The centre was set up by ALIN in collaboration with the Maasai Rural Training Centre (MTRTC).

The centre facilitates access to development oriented information to Isinya community members; facilitates the organisation and sharing of indigenous knowledge in different areas in arid and semi-arid environments through other Maarifa centres. It trains users as shown in figure 1.3 below. Through this kind of information exchange, the centre is involved in competence building and empowering members of the community through training on issues such as ICTs, agriculture, climate change, health among others. The centre provides free access to information to everyone regardless of their age, gender or status.

Figure 1.3: User Training at Isinya Maarifa Centre

1.5.3 Ng'arua Maarifa Telecentre

Ng'arua Maarifa centre is located in Marigat town, Laikipia sub-county. Ng'arua is a comparatively dry place and is a multi-ethnic area where different communities have settled. The main activity for the inhabitants of Ng'arua is farming and rainwater harvesting since the place experiences relatively long periods of rain deficiency. Human-wildlife conflict between people and elephants is a conspicuous phenomenon in Ng'arua and poses a threat to the residents. Ng'arua Maarifa centre was set up in 2006 by ALIN for use by the rural societies to access free internet such as e-government services including filing Kenya Revenue Authority (KRA) tax returns and "Huduma" like services where one can receive government services, multimedia content including online reading materials, online market information using Sokopepe platform, library materials, advisory services especially government offered workshops and ICT training as shown in figure 1.4 below.

Figure 1.4: Ngárua CKC

Ng'arua Maarifa Centre (NMC) is a fast growing Maarifa centres located among rural societies of Laikipia County. NMC has proved to be a very vital service provider to the people they service.

It started as an "Access Point" (AP) managed on Private Public Partnership (PPP) model consisting community development workers and private sector. It serves the indigenous people of Ng'arua as well as other development workers. The AP was later taken over by ALIN and changed name from AP to Community Knowledge Centre (CKC) in 2007. Ng'arua CKC is accommodated by Laikipia Centre for Knowledge and Information (LACKIN). Community Information volunteers were deployed by ALIN to oversee the day–to-day running of the centre.

Ng'arua Maarifa Centre projects as the only local computer centre that serves local populace and connect these people to the rest of the world through internet connectivity. Other services offered at NMC include ICT training services, access to

information and knowledge. NMC serves up to 50 community members in a day. Their needs range from ICT training in information access through books, CD-ROMs, iPods (a multipurpose pocket computer) to internet – blogs, websites and e-mails). People also come to the centre to create new e-mail addresses for communicating with friends and relatives far away, youths treasure it for the social networks like Face book, Twitter and other social media platforms.

The centre is vital for community groups and other development agencies who explore for resources and funding opportunities from development partners. The centre provides access to e-government services like Kenya Revenue Authority (KRA) tax returns, application for Personal identification numbers (PIN), among others. Some people visit the telecentre to book air flights, while students from institutions of higher learning are able to book for accommodation and apply for loans from the Higher Education Loans Board (HELB). Students, distance learners visit Ng'arua CKC to do academic researches.

A field officer runs the centre with the help of an advisory committee from the community. One of the key activities of the centre is documentation and distribution of information through blogs, magazines, films, journals, word of mouth and posters.

The centre links communities with news sources and brings together farmers and small business people to share their stories promote their brands and sell their products and services online through Sokopepe platform; an online marketing facility, that assists local farmers to access better markets and earn value for their produce.

Since its inception, NMC has evolved in many ways, about five hundred people have acquired ICT skills, and several thousand members of communities have accessed vital information through field days, farmer to farmer exchange visits, open days and information resources available at the centre.

Information services at NMC are entirely free of charge to communities and community development workers. In addition, NMC serves as a meeting place and also, as a vital social networking resource for local people, news reporters and other stakeholders.

1.5.4 Nguruman CKC

Nguruman is situated in arid and semi-arid land, 40 kilometres from Magadi town near the foot of Nguruman escarpment, in Magadi division and approximately 170 km southwest of Nairobi. Magadi Division is considered the poorest in Kajiado County with 57% of the population living below poverty line (Kajiado District Vision and Strategy, 2005). Nguruman is occupied by the Maasai community but is also indigenous to many different ethnic groups and also the Maasai from the neighbouring Tanzania.

The area has been characterised by immigration and settlement of various groups of people in the last four decades (Musyoka, 2007). The Maasai are however still the dominant lot. The community has a mixed composition of pastoralists and agro-pastoralists. They depend on the spring water from the escarpments for irrigation of their lands, use by animals and also for domestic use. The climate is hot with an experience of cool fresh air.

The Nguruman Community Knowledge Centre (CKC) is accommodated by World Corps Kenya, a non-profit making NGO interested in poverty alleviation. It was established to improve the livelihoods of the Nguruman community. Nguruman experiences underdeveloped infrastructure, such as poor communication, constrained and unreliable electricity supply from the national grid; relying more on solar power, transport system is inefficient, and the community has problems with marketing their livestock and farm produce. The community lacks information on markets and, pest and diseases management. They also lack technical computer competencies. Nguruman CKC acts as a centre where the community can access computer knowledge (Maruti and Mwalili, 2003).

The Nguruman community needs information that will satisfy their livelihood requirements. Nguruman CKC came in to address these problems and satisfy the community's information needs. The community is mainly involved in farming. Therefore, they are interested in information on good agricultural practices and marketing of agricultural produce. The information interests of youth who form the bulk of the population are HIV/AIDS, reproductive health as well as resources on leisure and entertainment.

Figure 1.5: Nguruman CKC

Nguruman community is still confronted by cultural and social conflict of female genital mutilation (FGM), Moranism (Maasai warrior groups who practice traditional pastoralism) and early marriages that affect growth and education.

1.5.5 Marigat Maarifa Centre

Ilg'arua Maarifa Centre, now Marigat Maarifa Centre was initially a dissemination centre. It is located near Marigat town about 6 kilometres apart. Marigat Maarifa centre has a similar management model to the other Maarifa centres, It has several sets of workers; a field officer appointed by ALIN, he/she oversees the day to day running of the centre, a trainer and a community knowledge facilitator (CKF). There is also an advisory committee to ensure that community information needs are met, they also offer advisory support to the Maarifa centre. Marigat Maarifa centre is hosted by Ilng'arua Hospital Committee.

Members of the Marigat community receive training on ICT and access internet services at Ilng'arua Maarifa centre as shown in figure 1.6 below.

(a) (b)

Figure 1.6: (a) A User Accessing Information (b) Training at Marigat Maarifa Centre

1.6 The Role of Telecentres

Telecentres are commonly associated with ICT for development projects; they are seen as a means of promoting diffusion because they mainly increase access to ICTs particularly to the disadvantaged people living in isolated and remote rural areas. Mbangala (2014) explains that telecentres play an important role by helping people, organisations, nations and even the world at large.

Chapman and Slaymaker (2002) assert that ICTs present new opportunities that break down barriers of knowledge and information exchange; it helps people to acquire new knowledge, skills and attitudes that help them achieve socio-economic success. Various studies have proved the vital role of telecentres. Samah et al (2013) proved through a study in Peninsular, Malaysia that revealed that telecentres participate in community building especially for the youth since youth are at the forefront of adopting new technology. Technology presents new opportunities for new better skills

and knowledge to help young people become successful. Telecentres in Malaysia and many parts of the world provide physical space,

facilities and offer training services with an aim of improving the community's knowledge and provide skills while linking them to relevant information resources in regard to healthy living, good agricultural practices, commerce and trade, improved education, and general improvement and good governance.

Telecentres promote community involvement the use of ICTs to do business and commerce, and access to government services online. Telecentres empower rural societies to develop trough the use of ICT (Norizan, 2009). Tokali and Wanas (2007) intimated that telecentres enable users to increase their productivity. For instance, farmers in Tanzania who use telecentres were able to enhance their agricultural output through investing in better methods of production and farm inputs.

Mishra (2013) explains the role of telecentres in promoting democracy and empowering citizens in Gujarat, India. This research established that citizens use telecentre facilities to empower themselves in a way that people became more socially, economically and politically involved in development because of access to relevant information obtainable through telecentres. Information services are pivotal in empowering people. Information facilitates decision making and exchange of ideas and improves the quality of life of a community. Availability of information enables people to make informed decisions and rescue people from vulnerabilities and uncertainties (Jerome and Theresa, 2009).

1.7 Challenges and Opportunities of Telecentres in Provision f Information

Several challenges prevent telecentres from effectively supporting the subsistence of rural dwellers, slowing down the efforts of these centres to improve economic opportunities in rural areas. This section discusses these challenges and also details how telecentres can overcome the limitations and assist people to improve their livelihoods. It also highlights the role of the government at various levels in the elimination of these barriers.

Zahurin, et al. (2009) explains that setting up telecentres in remote rural locations comes with many challenges such as lack of infrastructure, human resources and logistics. Accessibility is limited due to the rugged nature of the terrain, limited income, unreliable power supply especially from the national grid, forcing them to depend on alternative electricity supply such as solar and generators. Other shortcomings include lack of trained personnel, lack of awareness and resistance to change; and, community's failure to readily accept new technology. These are the challenges that normally face telecentres as they promote economic opportunities and enable telecentres to support livelihoods.

One of the challenges experienced in access to information in the rural areas is that telecentres are few and scattered. For instance, ALIN centres have only an estimated eight telecentres yet a large proportion of the population in Kenya lives in rural areas. It is challenging for the majority of the population of 74.8% (World Bank, 2014) to explore the opportunities of these few telecentres. Another challenge is sustainability. Telecentre operators are perpetually faced by insufficient funds to run the telecentres

and also buy enough ICT facilities. Conversely, they cannot send their staff for training to upgrade their skills; they can also not be able to market their services and also meet costs for electricity

The challenge faced at the initial stage of setting up telecentres relate to convincing the community to participate in establishing and running of the telecentres. Planning for a telecentre calls for telecentre project organisers and the community to work in collaboration. Human resource component of the telecentre is very important because it determines the sustainability of the telecentre. Active participation by the community means capitalising on local strengths and resources to develop the telecentre. Involving the community in the project gives them a greater sense of ownership. The local champion has to be someone from the village with motivation who can mobilise the community in the project. The telecentre should have a community centred-approach which focuses on the community needs rather than technologies.

The technological component which involves selection of appropriate hardware and software, network access and equipment helps in improving the technological environment. The problem of obsoleteness of computer software, paying electricity bills and logistics for transporting the computer systems interferes with the provision of service to clients. The aim of this research was to find out how this problem is addressed by the telecentres under study.

Low bandwidth is a challenge for most telecentres. The availability of wireless technology is yet to reach many parts of the rural areas; they rely on VSAT

technology which was earlier believed to be the most efficient. Low bandwidth results in slow internet connectivity; this may discourage users to use the internet. This is supported by Yonah and Cons (2005) who assert that "a pre-requisite for effective information distribution and accessibility includes connectivity, affordability and capability".

Infrequent and exorbitant power supply is another big challenge. Telecentres connected to the main grid power supply accrue huge bills. People experience frequent power interruptions especially during rainy seasons. This interferes with effective service delivery. Most telecentres use solar photovoltaic (PV) systems and standby Genset (Engine-generator, used to generate electricity) but this are also expensive to maintain. Telecentres will also benefit from the government initiative of rural electrification.

Telecentre establishment in remote areas in Kenya is usually novel. This situation faces the problem of lack of proper guidelines for the establishment and operation of the telecentres. Questions have been raised as to how telecentre innovations can bring about equitable and sustainable availability of information resources amongst the most disadvantaged sections of Kenya's population.

It is necessary to pay attention to local needs, capacities and preferences. Most telecentres are set up with little concrete knowledge about information needs and preferences of local populace. Information needs analysis should be done before setting up most operations so that whatever is introduced will be geared towards these needs.

Content generation and competence building are key telecentres movements to make sense to her users who are mainly from the local environment. Some telecentres operate with little or no focus on local or indigenous content and lack of local content presents a major problem. There is need to repackage some information to suit the local environment and to make it more user-friendly. Information provided should focus more on the main occupation of communities served by the telecentre.

Literacy: The issue of literacy is looked at as both formal and functional. Digital literacy is a core factor as it facilitates widespread access to ICTs by all stakeholders in the community, be they farmers, small scale entrepreneurs and traders among others.

This research focused on these challenges alongside the problems stated below to establish how Maarifa Centres have addressed them and give suggestions and at the same time expose these issues to other stakeholders for them to take action.

1.8 Statement of the Problem

Mtega and Melakani (2009) explained the relationship between telecentres and information flow. Etta and Wamahiu (2003) emphasise that telecentres play an important role in improving circulation of information and accessibility, and responding to information requirement of the communities they serve, as well as promoting computerised information services to bring about socio-economic development among the rural marginalised communities.

Telecentres are potential service providers and are expected to improve information accessibility. The benefits of telecentre services have been experienced in many countries such as India, Malaysia and Bangladesh. In Kenya however, there are limited studies that confirm the potential and actual benefits realised from the existing telecentres in Kenya. There are also few studies that have been done to establish the challenges facing the telecentres and how those who operate them can overcome the challenges.

For example, Evusa (2005) conducted a case study of Huruma Community telecentre. She extensively discussed the hindrances to an environment conducive for ICT uptake and development; issues of inadequate infrastructure; and inadequate universal access law. Githinji (2011) based her study in Kajiado, Nguruman e-centre where she focused on the effective application of ICTs in rural areas. This study was therefore carried out to establish Maarifa centres' role in the provision of information in arid and semi-arid lands (ASALs) in Kenya, their use pattern; their benefits to rural societies and challenges currently experienced in accessing information

Maarifa centres are located in ASALs. Drought is a recurrent problem in dry areas and has profound effect on the large proportion of Kenyans. Floods occur during the rainy season in arid lands and affect livestock production. Maarifa centres are expected to assist the communities to strengthen their resilience to drought and reduce the likely loss of assets experienced due to the negative impact on their livelihoods in events of droughts and floods. ASALs communities do not have scientific means of countering climate problems. Telecentres promote use of ICTs in remote and

underprivileged communities; this study looked at how ASALs communities are benefiting from Maarifa centres since telecentres are used as channels to distribute relevant information to mitigate the effects of extreme weather conditions drought.

Maarifa centres are donor-funded and it is not known and it may not be known when that funding would be stopped. Therefore, if proper sustainability strategies are not put in place, the telecentres might close down. Sustainability is one aspect that this study sought to establish from the management of Maarifa centres.

This study investigated Maarifa centres that are located in ASALs. Communities in ASALs are pastoralists by occupation; they are mobile societies who move from place to place looking for water and pasture for their livestock. Therefore, they are not frequent users of Maarifa Centres. Such lifestyle renders Maarifa centres less functional due to unpredictable presence of users. This study aimed at establishing how Maarifa centres manage to connect with such communities.

To gather the required information, an in-depth probing was conducted from various stakeholders like managers of Maarifa centres, users and the partnering agencies. The study was particularly interested in discovering the success story of Maarifa centres and how they are managed in the midst of the aforementioned challenges and problems.

1.9 Aim of the Study

Aim of this study was to assess how to and to what extent Maarifa centres are providing information to communities in arid and semi-arid lands with the view of

establishing the challenges and proposing a framework for improving information provision.

1.10 Objectives of the Study

This study was guided by the following objectives:

1. To assess and identify gaps in the provision of information services, access and use by Maarifa centres in rural communities of ASALs in Kenya.
2. To examine the policies that facilitate development and utilisation of Maarifa centres by rural communities.
3. To identify analyse the challenges experienced in the provision of information in rural communities in ASALs in Kenya.
4. To make recommendations and propose a framework for improving information provision to rural communities in arid and semi-arid lands in Kenya for the purpose of improving their livelihoods.

1.11 Research Questions

The study addressed the following research questions:

1. What strategies have Maarifa centres embraced to ensure information services, access and use to the rural societies in Kenya's ASALs communities to satisfy their information needs?
2. How do users of the selected Maarifa centres access and use information resources and how has information access helped the local populace and organisations achieve their goals?

3. What policies facilitate the development and utilisation of Maarifa centres' services and resources?
4. What challenges are experienced by Maarifa centres in the provision of information in rural Kenya?
5. What recommendations can be made and what framework can be proposed to improve the provision of information services to rural societies in ASALs?

1.12 Assumptions of the Study

The study had three basic assumptions as indicated below:

1. That telecentres are useful and setting them up is key to rural development and improved livelihoods.
2. Physical access to telecentres is necessary and important but this does not guarantee adequate and effective use of services provided therein.
3. If obstacles to sufficient application of telecentres for development and improved livelihoods in ASALs in Kenya are distinctly inferred and their effects well-expressed, the process of working on those barriers and mitigating on the negative effects will be easy.

1.13 Significance of the Study

Telecentre initiative is important for a nation's socio-economic development. There is limited documentation regarding government participation in telecentre development in Kenya. This study was set to gather evidence and lessons learnt through Maarifa centres, identify information gaps and suggest approaches to fill some of the gaps. The study from the onset emphasised the importance of ICTs in communities'

telecentres as tools for development of rural societies. Maarifa centre initiatives seek to bring people together, to establish a communication centre from where information resources are made available to the underprivileged communities. The centres mobilise and motivate the community to take collective actions for planning and initiating development interventions.

Information is critical for good governance; it can be used to influence high-level political decisions. Kenyans living in the ASALs can hold their leaders accountable if they have access to information, they can express their views openly and freely if they are aware of their rights.

Those who were interviewed from the selected Maarifa centres and the various stakeholders provided immeasurable information into the potential for, barriers to ICT facilities development, implementation and use in Kenya and beyond. Establishing the use pattern of telecentres provided an important baseline that would help in planning out strategies for further development and use. Policy makers can use such knowledge in making future decisions based on users' needs in order to ensure relevance of information content, format, language and specific uses.

From the findings, the government will be encouraged to take a pro-active role in partnering with NGOs and other development partners in setting up many telecentres all over the country to encourage social inclusion, bridge the digital gap, and hence facilitate rural development as depicted in vision 2030.

Besides, in the process of assessing the role of information provision by these telecentres, factors affecting the use of these telecentres were identified and they will probably be addressed by stakeholders before more money is committed for similar projects. Failure to do this, other mistakes would be introduced and duplicated and these new initiatives would fail to meet the desired needs of communities that this information provision has been designed for. This study was undertaken within this context.

The study provided a concrete understanding of the subject of this research, realised from the evidence from the research. A great deal of information concerning telecentres/ICTs and socio-economic progress has been provided in theory; this study collected reliable data on the rural ICT facilities herein referred to as Maarifa Centres and provided tangible evidence on how they could contribute to socio-economic progress.

This research can have positive contributions to offer in discussions on ICT for socio-economic development. This study will be of specific interest to Information providers and ICT policy-makers who want to build a coherent information society. Other ICT stakeholders involved in issues of socio-economic progress in rural areas, particularly in progressing countries will also find it useful. It will also serve as a guide to other stakeholders interested in ICT for development (ICT4D), and also contribute and strengthen the debate on the exploitation of ICT for economic and social transformation.

1.14 Scope and Limitation of the Study

This study focused on rural societies who access Isinya, Mutomo, Nguruman, Marigat and Ng'arua community knowledge centres regardless of age and gender. It is expected that from this diverse representation of population studied, a pattern of telecentre usage would be established. Besides, information needs cut across gender and age divide. Furthermore, the purpose of establishing telecentres was to provide service to all within a community. Rural people engage in activities like farming, business, education and training, employment and self-help groups. All these activities are information driven, hence no reason to discriminate.

The choice of these Maarifa centres was motivated by their location which provided a population with diverse cultures and information needs. For example, although Mutomo knowledge centre is in the Eastern region while Isinya is the Rift Valley, both ensured a wide variety of characteristics; the users' household circumstances, information needs and information seeking behaviour, their use of telecentres and their attitude towards them. What telecentres had for them in their daily lives; how helpful they were for their social, economic and knowledge gathering purposes differed significantly.

In investigating promotion of livelihoods through telecentres, the study covered only selected ASALs of Kenya where telecentres are established. The study was therefore confined to ASALs which have telecentres, and more specifically telecentres managed by ALIN. This means that the situations and participation with the use of telecentres for socio-economic progress and improved lives in other rural areas which

do not have telecentres may be different. In other words, other rural areas located remotely and do not have telecentres are beyond this study.

In establishing the relations between services offered by the telecentres and economic development, this study looked at the broad livelihood activities of these communities. This study did not focus on the quantitative calculations of measurements to evaluate the economic or financial impact the telecentres have on people living in these areas. The study used observable variables such as improvement in farming methods, increased output and enhanced access to information, among others. The study examined only the collective economic significance of telecentres on the lives of people.

Telecentres offer several services for socio-economic development. This study was confined to internet and computer services offered by telecentres in these communities; the other ICT service that was discussed was mobile phone services; services offered by radio and television were not included in this study. The study broadly discussed Kenyan policies, and strategies for the development of computer based information services and its utilisation for socio-economic progress and sustainable livelihoods. It was however not possible to evaluate the impact of these ICTs on lives of the people in the rural areas due to the nature of this study.

1.15 Definition of Operational Terms

1.15.1 Development

Development is the process of coming up with enabling environment to expand economically and socially. Development is involved in improving production,

satisfying livelihood needs and desires. Furthermore, development is expanding choices that enable people to lead healthy lives that they value and enjoy. Development, according to UNDP (2002) is building people's basic capabilities of acquiring education and resources to improve their standard of living and be able to participate in community welfare.

1.15.2 Digital Divide

Digital Divide is the gap between communities that have access to ICTs and those who do not have (Reitz, 2007). Digital divide also refers to different groups' ability to use ICTs effectively due to varying levels of technical and literary skills. OECD (2001) explains the circumstances that brings digital divide as the socio-economic differences of geographical areas, households and individuals that influence access and use of ICTs. Three main keywords come to the fore; ability to use, access and socio-economic catalyst)

1.15.3 Information and Communication Technologies

Information and Communication technologies (ICTs) refers to combination of micro-electronics such as hardware and software and telecommunications as involved in information processing, manipulation, storage and electronic distribution in digital forms through communication networks (UNDP, 2001).

1.15.4 Rural Areas

Rural areas are areas characterised by scarce and limited public facilities and infrastructure such as reliable electricity supply, roads, water, transport system, technical skills and difficult terrains with hills, valleys, rivers and lakes that make

implementation of telecommunication networks very complicated and costly. Economic levels of people living in rural areas are low due to difficult weather conditions that affect their livelihood activities such as agriculture. In most cases, rural areas have poor social amenities such as education and health (ITU, 2000)

1.15.5 Sustainable Human Development

The DFID (1987) defined sustainable human development as the promotion of integral human development of people today as integral human development tomorrow. This integration require both physical and psychological for the good of every person's economic social political wellbeing. It also means development that satisfies present human needs and sustains abilities for future generations to meet and satisfy their needs. Sustainable human development is anchored on economic growth.

1.15.6 Sustainable Livelihoods

Sustainable livelihood is when a livelihood can withstand unprecedented occurrence that can destabilise a normal life. Sustainable livelihoods should also maintain and enhance its capabilities and assets, currently and for future. DFID's Sustainable Framework modelled the development objectives that meet the needs of the vulnerable poverty stricken people in terms of projects undertaken and policies that at in place.

1.15.7 Telecentre

Telecentres are special information centres, located mainly in the rural areas among the underprivileged communities. Main agenda for telecentres is to help overcome

digital disparities among communities in urban and rural area by providing broad ICT services free of charge or at a very affordable rate.

1.16 Chapter Summary

Chapter one sets the stage for conducting the study and describes the enquiry as an attempt to investigate information services provided by telecentres for economic and improved livelihoods. Several issues are discussed in this chapter. These include background to the problem, statement of the problem, objectives of the study and research questions. Other issues include assumptions of the study, scope and limitations of the study as well as operationlisation of term as used in this study

Chapter one concentrated more on the issues of telecentres' application of ICTs as key tools that can foster development and bridge the digital gap among marginalised communities and particular in ASALs. Furthermore, chapter explained that information on telecentres development in Kenya is scanty and therefore this research intended to bring out more information on ALINs' Maarifa centres initiative that have participated in transforming people's lives in ASALs.

Chapter one shows that there are strategic efforts being made by NGOs to improve people's lives in ASALs through deployment of Maarifa centres and application of ICTs in the effort of fostering development and alleviating poverty.

Chapter two will dwell on the literature of telecentre trends in different parts particularly in developing countries.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews related literature in an effort to provide insights into the study area. Several researches have been conducted on the services offered by telecentres and their contribution to socio-economic development in sub-Saharan Africa countries some which are Ghana, South Africa, Tanzania, and Uganda, Nigeria as well as the Asian continent. Much has also been discussed on the contribution of telecentres in poverty alleviation as well as relating telecentres to information needs and services for rural communities/societies.

Creswell (2003) explains the purpose for writing a literature review is to share the results of what has been studied by other researchers in the related field and what is closely related to the findings of the current study. Literature review consolidates what is being discussed that is related to the topic under study. It also attempts to fill the gaps pointed out in previous studies. Bryman (2008) adds that, by doing a literature review, researchers are able to explore different theories and methods that may be appropriate to their study and can help the researchers come up with an analytical framework they may consider to apply in their study. Literature review is an eye opener that may influence researchers to consider for inclusion in their research that they may not have known or thought about. It broadens their research questions and also helps with the interpretation of the findings and even gives verification to the findings.

Literature review also helps to confirm and legitimise an argument, meaning better understanding of the area of study. Recognition of telecentres and further studies about telecentres came to be seriously thought about 40 years ago. More recently they have become attractive to researchers. This chapter looks at the literature published about telecentres; highlights research findings and trends and, identifies the gaps filled by this study.

2.2 Brief History of Telecentres

Telecentres have for about two decades been considered as an institution that aims to provide access to ICTs in developing countries (Benjamin, 2001). The establishment of telecentres started in early 1980s. They were first established in Denmark. They were referred to as "social experiments" and were used to promote the use of ICTs. The first telecentres were started with a three year public funding and were used for learning experiences for people to experiment with various ICTs. The targeted user groups were farmers. After Denmark, the telecentre concept spread in to Europe and North America where similar projects were later established (Cronberg et al, 1991).

Molnar and Karvalics (2002), explain that the first community telecentre was opened in Harlem, USA in 1983. The primary aim was to bridge the digital divide between the upper and lower levels of society. They were referred to as community technical centres. They offered free access to technologies and concentrated more on training. These community technical centres offered access to ICTs to those who did not have them.

The International Telecommunications Union (ITU), a component of the UN has since the 1980s endeavoured to provide access to ICTs throughout the world. By 1992, ITU had implemented the pilot telecentre project in a number of countries in different regions, at different stages of development and with different geographical, social, economic, and cultural conditions called telecentres (Ernberg, 1998). In the 1990s, ITU established and supported telecentre projects in developing countries. Other international donors came in the mid 1990s and joined ITU in this endeavour.

Today, there are many similar projects established in many countries now referred to as Multipurpose Community Telecentres (MTCs). The International Development Research Centre (IDRC) established a replica of MTCs and called them runs PAN in Asia and Latin America; and Acacia in Africa. These pilot projects aimed at advancing "access of disadvantaged communities in Africa to modern ICTs and to apply them to their own development priorities".

The World Bank being a development agency has been providing ICT infrastructure. Its World Development Report of 1998 was devoted to "Harnessing Information for Development" which focuses on telecentres. It described them as a "powerful engine of rural development and a preferred instrument in the fight against poverty" (World Bank, 1998). Corporate donors to telecentre projects include Siemens, Sagem, Ericsson and Daimler Chrysler. Governments also assist through partnerships with ministries and institutions of higher learning, communication service providers and non-governmental organisations (NGOs). Local partners who get into partnership

with telecentre initiatives are community organisation or commercial managers who manage and fund the centres beyond the pilot stage.

Fillip and Foote (2007) developed a three period timeline for telecentres. They defined the three periods optimistically looking into the future as:

1. **The Past (1990s):** This was described as the incubation phase, a period characterised by few isolated pilot telecentres that were fully funded by donors such as IDRC and ITU, they were organised and led by development players;
2. **The Now (2000–2010):** During this period, telecentre networks were reinforced and the initiative was characterised by a host of new participants: governments, institutions of higher learning and the private sector. Better internet connectivity opportunities and hardware and software technologies were tried out. Governments in many countries had developed a reasonable and favourable regulatory environment.
3. **The Future (2011–2020):** This is a period when common policy and regulatory frameworks will be adopted across the world and regularised supply of services, coupled with delivery of connectivity and the socio-economic impact of telecentres demonstrated.

Table 2.1 Evolution of the Telecentre Movement by Fillip and Foote (2007, p.13)

1990s	• *Isolated pilot studies, primarily donor funded, often lacking long-term sustainability, each trying to deal with all aspects of telecentres on its own* • *Led by NGOs and development agencies* • *Limited services, content and applications* • *Challenging policy and regulatory environment*
2000-2010	• *Emergence of networks and telecentre ecosystems* • *Large-scale pilot studies in some countries, increased geographical reach* • *New connectivity and hardware technologies and new business and organisational models* • *Increased involvement of government, the academic community and the private sector* • *Broader range of services and applications across sectors* • *Improved policy and regulatory environment (in many countries)*
2011-2020	• *Fully developed and dynamic telecentre ecosystem at national, regional, and International Levels* • *Large-scale capacity building* • *Documented socio-economic impacts (increased economic opportunities, access to health, education, government services, etc.* • *Self-priming pump* • *Top-down delivery of connectivity and bottom-up approach to the supply and demand of relevant services* • *Extensive partnerships and the unbundling of services* • *An enabling policy and regulatory environment in all but a handful of countries*

Harris (2007) upholds Fillip and Foote's (2007) argument who demonstrates that the telecentre initiative has progressed from the pilot phase to Telecentre 2.0 phase. Harris (2007) explains that the Telecentre 2.0 phase in the telecentre ecosystem which include; "a network of telecentres, information providers and support institutions that serve to strengthen the movement towards widespread enjoyment of the benefits that telecentres bring."

Gurstein (2010) writes about Next Generation Telecentres (NGTs) as telecentres whose technological ecology has evolved. NGTs have gone beyond providing specific kinds of services and support; they are implemented to provide more sophisticated services such as small business support, farming support, access to e-government, e-health services in low income areas, multi-media training and production opportunities to low income areas and agricultural zones. Gurstein (2010) also distinguishes NGTs from the first generation telecentres; the first generation telecentres concentrated on popularising the internet since it was a new facility. The first generation telecentres were also concerned with providing access to computing to populations that had no access due to cost, lack of infrastructure and knowledge.

Gurnstein (2010) further explains that the subsequent generations of telecentres are modified products of the first generation telecentres. They are built on the recognition that technological ecology telecentres have evolved. NTGs demonstrate the need to embrace emerging technology to facilitate continuity and progress of technological knowledge to the otherwise excluded segments of societies. The disadvantaged population needs to effectively access modern technology in order to support national

economic and social development and to provide a threshold on which telecentres can develop in tandem with ICT developments and national development.

2.2.1 Characteristics of NGTs

Gurnstein (2010) further characterises NGTs in the following:

1. They should be based on the initial platform of affordable access or even free access to ICT facilities which support application (both hardware and software) that are beneficial to telecentre users. For example, provide business support systems for small businesses and farmers. They should have training facilities for support staff and users.

2. Sustainable linkages to external resources and networks that will support a variety of business models.

3. Established "social" sustainability which will support long term "financial" sustainability.

4. A hybrid model to support business-entrepreneurial model both for profit and non-profit making activities.

2.3 Telecentres; Typologies and Trends

Telecentre typology classifies telecentre establishments into categories. Categorisation of telecentres allows in-depth understanding of how telecentres are managed and enables a researcher to answer questions about various telecentre

models, sustainability, socio-economic well-being and improved livelihoods of the communities served by telecentres (Mukerji, 2008).

The term telecentre has been defined and classified by many authors based on the consumer community and the purpose of setting up telecentres. Telecentres have been referred to by different names such as; from public access point to telecottage, from info centre to digital clubhouse; from community technology centre (CTC) to community access centre; from multi-purpose community centre (MPCC) to community learning centre (CLC); from electronic village hall to tele-village or cybercafé (Colle and Roman 1999; Phillip and Foote 2007; Rega, 2010).

This section reviews the names given to telecentres. All the definitions include terms like “internet” and “training” as a key service offered by telecentres. Discussion about telecentres in the Kenyan context of socio-economic development subsequently follows.

In the classification and definition of telecentres, among the first attempts to classify was made by Gomez, Hunt, and Lamoureux, (1999); They based their classification on criteria such as location, services offered and type of hosting organisation. Gomez, Hunt, and Lamoureux, (1999) described a number of classifications such as:

Basic Telecentre: This is a type of telecentre located in a rural area that is marginalised. The people live in marginalised locations, have limited access to basic services such as internet and other means of communication and the population is highly illiterate. Basic telecentres are entities with small operations funded by

international agencies and implemented by non-government organisations (NGOs) or other non-profit groups. They have only a few computers and often weak connections. The rooms in which they are setup are tiny. Sometimes they are forced to come up with internet innovation on access solutions involving radio and wireless connectivity. Given the nature of the situation, the main activity in these telecentres is training of telecentre operators and potential users from the local societies. Basic telecentres face the challenge of financial sustainability especially when donor support is terminated.

Telecentre Franchise: Telecentre franchises are telecentres that are independently owned and operated but are centrally coordinated. A local organisation usually facilitates the creation of individual, networked telecentres through technical and/or financial support. The organisation funds the early stages of implementation and also provides technical support. After establishment, each individual telecentre is run like a small business, eventually becoming independent both financially and technically. They are equipped with a few computers for public use. Such telecentres operate like businesses owned by individuals.

Civic Telecentre: Civic telecentres are established in universities, schools, public libraries, community organisations, and civic institutions such as hospitals, churches etc. They offer access to internet services. These institutions offer telecentre services in addition to other core services they are mandated to offer. Civic telecentres do not regard themselves as telecentres. This makes their involvement in telecentre services difficult. Civic telecentres offer limited services; they do not concentrate on training potential users like other conventional telecentres; they do not publicise or market

their services and they do not offer their services outside their immediate community. Their priority is to serve their hosting institution. They depend on internet connectivity from their host organisation, e.g. public libraries, or community centres. Sometimes they depend on internet connectivity from the dedicated lines in schools and university or sophisticated local area networks (LANs).

Multi-purpose Community Telecentre (MCT): Ernberg (1998) explains that MCTs are a form of telecentres introduced as pilot projects by the International Telecommunication Union (ITU). MCTs offer more services than basic ICT services. Services offered include tele-medicine, tele-education, postal and banking services. Other services offered by MCTs are communication services, vocational training; SMEs support services help to sustain and market MCTs. MCTs may use leased lines or Integrated Services Digital Network (ISDN) and LANs connecting about 20 computers, making them accessible to the public. Other advanced services such as video conferencing and tele-medicine are offered as well. It is important to note that e-mail and internet access improves the sustainability and increases the impact of MCTs due to the high demand.

Townsend et al (2001) describe a different classification approach. They describe telecentres in terms of size such as micro-telecentre, macro-telecentre and standard telecentres.

Mini-Telecentre: This is a one-person business enterprise with several accessories such as a telephone line, one computer and internet access.

Tele-shop or Micro-telecentre: This is a micro-business teleshop that operates like a public pay phone.

Standard Telecentre: This offers a variety of services with facilities such as two computers, dedicated fax line and internet access, a liquid-crystal display (LCD) projector, a printer and a photocopy.

ICT Cooperatives: These take the concept of rural cooperatives available in developing countries. They are more or less owned by the community. They offer advanced computerised information services similar to those offered by MCTs.

Ernberg (2001) defines multi-purpose Community centre in a more exhaustive approach:

> *"[Telecentres are] are for use by all members of a community in a rural setting or in a deprived urban area. The main objective of such a facility is to provide a broad range of ICT services such as e-government services, e-learning, simple information service, e-commerce, community services, tele-medicine, user training and support. Besides e-services, they also offer library services, community development service forums and business support (p.3).*

According to Roman and Colle (2002) telecentres provide a variety of communication services. They include;

Cybercafés: These offer telecentre users access to computers and the internet. In most cases these cybercafés are established in urban centres where clients are the

educated and economically endowed. They also provide computer training and web use.

Information Access Point (IAP): These focus on access to any information and have narrow focus on internet and concentrate more on public service.

Owen and Darkwa (2000) did their research on telecentres in Ghana. They categorised telecentres into two broad categories:

Commercially-Oriented Communication services which included services such as computer-based services, photocopying, telephone and fax and secretarial; and

Community/education-oriented communication centres that offer basic services that address the needs of community. According to Owen and Darkwa (2000), the aim of these centres is:

> *" […] to tap the untapped potential of the people they serve; to organise resources and expertise nationwide; to foster the emergence of local capability; and to promote a unique and comprehensive approach to serving the multiple needs of people they serve through the innovative use of ICT." (p.2)*

Etta and Parvyn-Wamahiu (2003) while working for IDRC focused on Multi-Purpose Community Telecentres which they referred to as "the modern type of telecentre":

> *"A telecentre is a facility that houses ICT equipment that serves the community in one way or another to satisfy their information needs.*

> *The main items housed in a telecentre include computers, computer hardware and software with internet connectivity, video, telephone and books, among others. The facility offers services that benefit the community for development economically, socially and culturally. Services in a modern telecentre are more sophisticated and advanced. The main aim is services for development." (p. 13).*

Etta and Parvyn-Wamahiu (2003) and Gomez, Hunt and Lamoureux, (1999) demonstrate a clear distinction between "simple telecentre" and more complex "Multi-Purpose Community Centre". Provision of free or almost free information to deprived communities is one of the most important characteristics of a telecentre. This formed the key basis of this thesis. From the foregoing definitions, technologies have been taken as the main description of telecentres. Oestmann and Dymond (2001), for example give the following definition:

"Telecentres may be defined as strategically located facilities providing public access to ICT-based services and applications. They are typically equipped with some combination of telecommunication services, computers and their accessories and, hardware and software. Other services include trainings and meeting spaces for local business or community use."

Jensen (2001) classifies telecentres according to the technology in place:

A Full Service Telecentre These are telecentres containing telephone lines, internet access, printers, overhead projectors, meeting rooms, conferencing rooms, digital and video cameras.

The taxonomies presented in the above definitions and classification of telecentres, the concept of telecentre by Colle and Roman's (2001), Gomez, Hunt and Lamoureux, (1999), Ernberg's (2001), and Owen and Darkwa's concept (2002) have some common attributes, that is:

1. Telecentres are Community Development Instruments and their purpose is community development for people living in rural and disadvantaged areas:
2. Telecentres provide Communication Services relevant to the local community;

   Telecentres offer communication services, basic computer training and even sophisticated services like information and education.
3. A much more elaborate model was described by Hudson (1999) in terms local context, services, organisation and policy environment.

2.4 Constraints to the Development and Utilization of Rural Telecentres

Adewole and Sofoluwe (2006) quote Anderson et al (1999) warning that lessons learnt from implementing other information technology projects need to be applied when introducing new ICTs. Otherwise the hurry to introduce new innovations in rural areas may fail and slow down development.

Also, there is a general tendency to neglect and deprive rural societies' access to relevant information to boost their productivity and conduct market survey for their products. Many other factors hinder access and use of information provided by

telecentre facilities and services. These problems need be sorted out to enable telecentres to contribute positively to the perennial problems of food security by acting as catalysts to increase in agricultural production and general rural development. These problems include:

Infrastructure limitation: Most rural areas lack communication lines, have low bandwidth problems, congestion and high cost of telephone communication. Prado (2009) explains that infrastructural constraint is a major telecommunications constraint because of unreliably connectivity. Even where the above constraints have been addressed, another problem is that of scarce skilled personnel to operate and maintain the new technology.

Power limitation – lack of and unreliable power supply is a primary constraint. However, solar energy or generators can be used if power is not available; inadequate or insufficient equipment.

Poor roads – these limit access to telecentres by communities who are geographically isolated. People are unable to access not just physical markets but also market information. Because of poor road network, Munyua (2000) states that initial ICTs installations are expensive when it comes to expanding rural information systems.

Illiteracy: Mansell and When (1998:35) observe that "illiteracy is a fundamental barrier to participating in information societies". Illiteracy presents a problem because most of the target population in rural areas is illiterate; they not only lack formal education but also have low levels of computer literacy. This adds on to the other problem of slow uptake of technologies by agro-pastoralists served by the Maarifa

centres. Also, language barrier hinders access to information especially if information is in a scientific language. Besides, information on the internet is mainly in English which is not a common language for the rural communities/societies.

Lack of information skills: Buhigiro (2013, p.42) cites Alfonso and Ghani (2002) who referred to limited education and inadequate or no technological skills as socio-individual factors that make effective use of sophisticated ICTs impractical in rural communities. Training is important to equip farmers with the concepts and criteria with which to assess the information they receive or find especially agricultural information systems.

Limited utility value: Ngowi, Mwakalobo and Mwamfupe (2015) established that the agro-pastoralists user communities in Tanzania may access information but the information may not add value because agro-pastoral inputs like chemicals are expensive and are known to have negative effects on humans, water resources and the environment. Furthermore, communities in ASALs cannot afford these chemicals.

Social limitation: The role of women in many societies impedes their access to and use of ICT initiatives (Githinji, 2011). These barriers exist widely and more severely among African women, Asia and Latin American society where they are more resistant to change (Roman and Colle, 2002b). The Maasai women in Kenya for instance are not allowed to mingle with men. They are constrained and so cannot exploit resources offered by Maarifa centres. Perceptions are also another barrier; many people view new technology as a preserve of another class such as the educated, the young and the rich.

2.5 Theoretical Framework

The main aim of studying the role of telecentres in the provision of information is to establish the extent to which telecentres have reached their desired audience, and to see how information services have improved livelihoods. Such an evaluation will reveal to the telecentre project stakeholders how telecentres' penetration has taken root and their resultant effects on community well-being.

Rothenberg-Aalami (2005) explains that IDRC embarked on a worldwide establishment of rural telecentre projects to boost the socio-economic status of communities being served by these telecentres. The purpose of establishing telecentres is to facilitate access to information because IDRC believes that information will manifest empowerment and eventually lead to development. As mentioned earlier, there are several factors that hinder access to information among them level of literacy which determine the way people access or are unable to access information and how they utilise or are unable to utilise information for improved livelihoods.

Telecentres are the common facilities that provide information resources and environment for rural communities to access information using computers and other ICTs. This study was influenced by two theories; first, the Diffusion of Innovations (DOI) theory, commonly referred to as Rogers' theory and second, DFIDs Sustainable Livelihoods Framework Approach, also referred to as an approach to poverty reduction.

2.5.1 Diffusion of Innovations (DOI) Theory

Diffusion of innovations (DOI) theory was first developed to assist in the promotion of agricultural practices that were meant to assuage hunger in developing nations by spurring a "Green Revolution" (Rogers 2004). The emphasis of DOI is on the process of social change which according to Nelson and Winter (1977) leaves room for the diversity and complexity of the change process.

Telecentre initiatives introduce ICTs to rural communities and DOI provides a useful framework to demonstrate adoption of ICTs in the rural communities.

Rogers' DOI theory provides a theoretical foundation for conceptualising the introduction and adoption of new innovations. Diffusion of innovations explained that individuals go through several stages prior to adopting innovations at different speeds depending on personal characteristics, temperament, and experiences. The classical model of diffusion of innovations represents a new paradigm. Rogers (2003) described innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p.12). The innovation is an idea that comes or is thought about because of a problem experienced and the innovation arises from the fact that it might solve that problem (Rogers 1995). The innovation can therefore be described as a problem-solving mechanism. Rogers goes further to say that the 'problem' is a performance gap between the current and the expected performance of an organisation, individual or community. For instance if an information gap exists in a community, what innovation can be adopted to fill that existing information gap?

Adoption is the decision made either to accept an idea or not. Such is a key factor in the diffusion process because unless the idea is made known or disseminated, it cannot be adopted. Adoption is the process through which an organisation decides to accept and acquire systems or technology (Lee et al 1999). Rogers (2003) defines diffusion as dissemination of an idea about a technology through a process of communication using certain communication channels to explain the innovation over time among members of a social system. Communities take time to appreciate and embrace new innovations like new information systems. Communities need to learn new computer knowledge and how to operate new software and apply them to improve their livelihoods. The diffusion model divides the process of technology adoption into five stages as follows:

1. **Knowledge,** an individual requires to have some information about an innovation in order for them to understand and appreciate that innovation. It is therefore during this stage that the individual develops interest and searches for information about the innovation he has been exposed to. He seeks the practical and theoretical understanding about the innovation.
2. **Persuasion,** after gaining knowledge about the innovation the individual forms an opinion towards the innovation; if it is favourable, he/she is persuaded to seek more information about it.
3. **Decision,** after gathering enough information about the concept of an innovation, the individual weighs the advantages/disadvantages of the innovation. He/she is then well informed and can make the decision as to whether to adopt or reject the innovation.

4. **Implementation**, is the process of putting the decision into plan, the individual therefore puts an innovation into use.
5. **Confirmation,** the individual endorses the decision to continue using the innovation and can now use the innovation to the maximum. The explanation provided by DOI is in synchrony with the objective of this study which set out to investigate access and usage of information resources in Maarifa centres through diffusion, adoption and use of new innovations in improving livelihoods. Once members of the community start using new innovations, they discover the potential benefits and use them to enhance their livelihood practices like farming, education, and information exchange.

Variables Determining the Rate of Adoption of Innovations

The variables indicated in figure 2.1 below show the influence technology has on people's lives. Rogers' DOI theory was one of the preferred theories for this study because of its emphasis on the process of social change. According to Aji (2016), growth in ICT has informed people of ICTs ability to transform their lives and mitigate poverty. Technology adoption and DOI theory can be used to assess the effectiveness of telecentres through interpretation of Rogers' variables that determine the rate of adoption of innovation as shown in figure 2.1 below.

There are five variables that affect an innovation's rate of adoption. Rogers (2003) outlines them as: perceived attributes of an innovation; the type of innovation-decision; the nature of communication channels diffusing the innovation at various stages in the innovation-driven process; the nature of the social system in which the

innovation is diffusing; and, the extent of change agents' promotion efforts in diffusing the innovation.

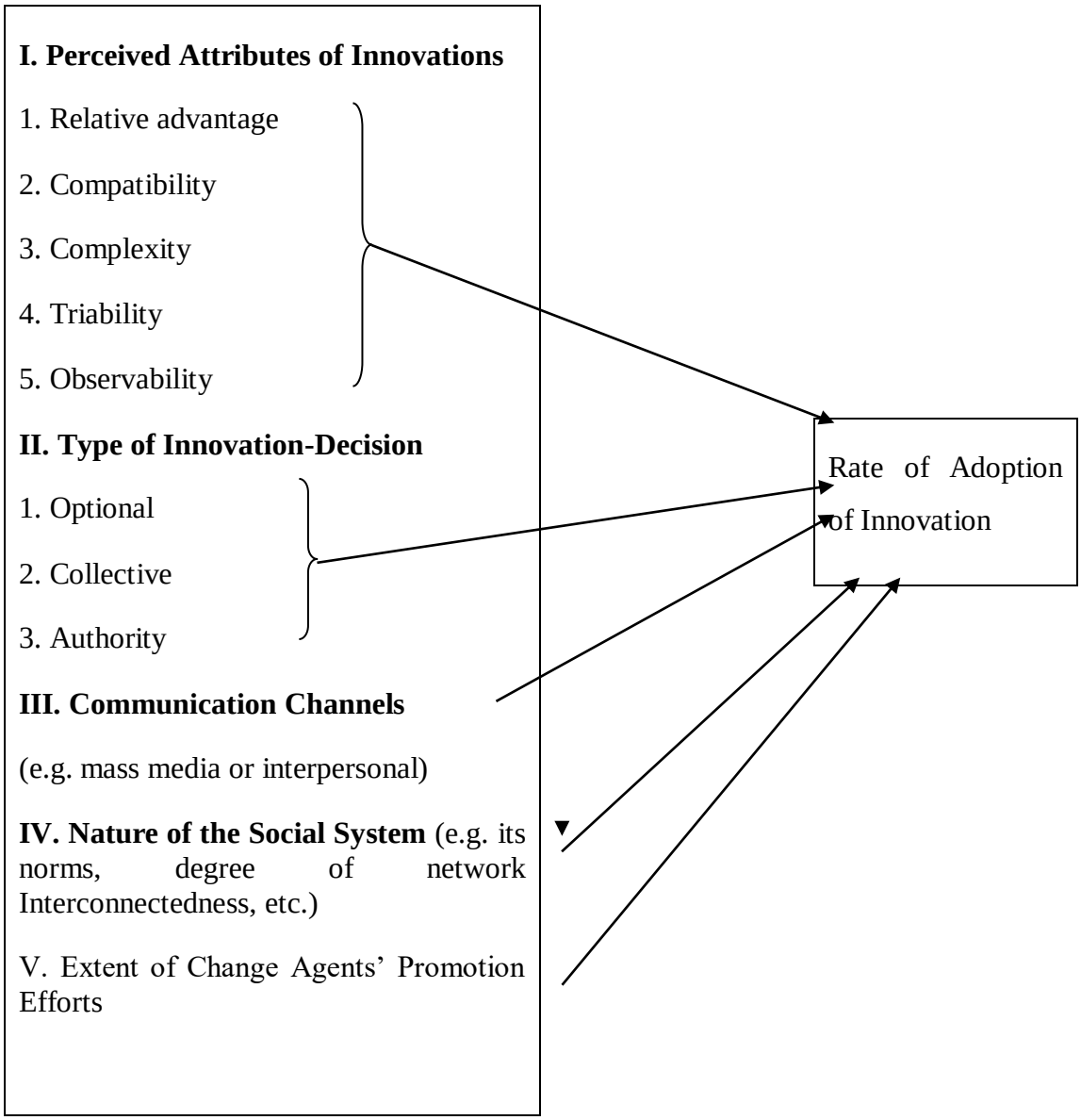

Figure 2.1 Variables Determining the Rate of Adoption of Innovations (Rogers, 2003)

According to Rogers (2003), an individual's persuasion to adopt an innovation is influenced by the five perceived elements that contribute to its adoption which include:

1. *Whether they find that it provides relative advantage when compared to existing technologies,* i.e. whether the innovation is better than what it replaces, for example, does it save time and money?
2. Whether the innovation is compatible and consistent with current usage, values, and practices, i.e. is the innovation compatible with existing values, beliefs and needs?
3. *Whether it is simple to use and not complex*, i.e. is the innovation simple such that it can be easily used by all?
4. Whether or not one can first try it free of risk – Triability, i.e. possibilities of trying out the innovation on a limited basis.
5. *Whether the results are visible* – i.e. the visibility of being a user of the innovation (p.15).

Each of these elements integrates aspects of the economic, social and psychological environment in which the innovation is introduced, and each innovation adopts and influences the context in which it is placed. This is because the rate of adoption is observed within a social system of the perceived attributes of innovation against the extent of the changes realised. Telecentres are seen as change agents of individuals and households of relatively lower socio-economic status. Rogers theoretical framework predicts that the results observed after adoption will have improved social and economic standing from those who have not accessed services of a telecentre. The consequences of adoption according to Roman (2003) and Rogers (2003) may be widened socio-economic inequalities within the targeted social system.

Types of Innovation Decisions

The Decision as to whether to adopt an innovation or not is made first, after seeking background knowledge (information) about that innovation. If the innovation looks good, the second stage is to find out more details about the innovation and then develop a deep interest in the innovation. Thereafter one is persuaded to continuously seek more related information. The third stage is to weigh the advantages and disadvantages of using the innovation and decide whether to adopt or reject the innovation. This is the decision making process that according to Rogers and Singhal (1996) leads to the adoption or non-adoption of an innovation.

There are three types of innovation-decisions:

1. **Optional innovation-decisions**: is when an individual makes the decision as to whether to adopt an innovation or not. Other members of a system are not involved in this decision making. The individual goes ahead and introduces the new innovation. Decision making in this case is individualised.
2. **Collective innovation-decisions:** is where the decision to adopt or reject an innovation is made by consensus. Members of a system are involved in the decision making process, for example members of a rural community may decide to adopt or reject telecentre services.
3. **Authority innovation-decisions:** members of a system who are in high authority are involved in making the choice to adopt or reject an innovation. These are individuals who possess power or technical expertise.

Communication Channels

For innovations to achieve the objective of closing the digital and poverty gap, communication channels must be well thought out. Roman (2004) asserts that communication is the heart of DOI theory and quotes Rogers (1995: 18) stating that the diffusion process relies on information exchange. An individual communicates a new idea to a stakeholder(s), who may be an individual or a group of people. The communication channel used will determine the effectiveness of that communication. Some effective channels include:

Mass media: is the best channel to create awareness about innovation. Mass media channels engage transmission through a mass medium, e.g. newspapers, radio, television, etc. that enables one or few individuals to broadcast to a large audience.

Interpersonal channels: they influence society very much especially where two parties communicate to persuade people to adopt new technology; e.g. intermediaries are used to link technology (innovation) and the potential beneficiaries, such as self-help groups and other local organisations. Rogers (1995) sees this as an equally effective communication channel because such individuals share a high degree of homogeneity. This brings out the crucial roles of local telecentre champions and telecentre staff – as people who share homogeneous traits with the rest of community members in promoting telecentre adoption. A mix of mass media and interpersonal channels can therefore be taken as the most effective communication approach for diffusion of information through telecentres.

Roman (2003) suggests that Diffusion and Innovation theory is an important starting point for researchers and practitioners: "Diffusion of Innovation has been considered a useful framework because of:

1. It has a predictable potential of DOI theory that makes it useful for planning and designing telecentres.
2. DOI theory provides an ingenious motivation to invigorate telecentre research – research that in a round way, can contribute to further developments in the theory.
3. DOI theory is multifaceted and can be adapted to fit the needs of a multidisciplinary inquiry (p. 55).

Telecentres are located in rural areas with an intention of increasing people's means of accessing information and enabling them to become part of the information society. The diffusion effect of community telecentres is expected to provide benefits to people in the communities served by the telecentres. Technologies provided by the telecentres spread the capacity skills to people in schools, health institutions, agriculture and product marketing. This is realised from the services received from the telecentres.

Recent studies conducted by researchers working in the field of Information and Communication Technologies for Developments (ICT4D) have augmented these concepts in ways that address the peculiarities of ICT adoption in remote and rural communities. Scholars like Kumar and Best (2006) explain elements of this theory with regard to kiosks set up under the SARI project in rural India; Chigona and Licker (2008) applied the same framework to describe the adoption patterns of communal

computing facilities in poor urban areas in Cape Town, South Africa. It is such studies that motivated the research questions this study sought to answer for Maarifa centres in Kenya.

2.5.2 DFIDs Sustainable Livelihoods Framework Approach

The objectives and scope of Sustainable Livelihoods Framework Approach are pegged on development priorities for the poor and vulnerable people. Policies and institutions are formulated and implemented from the poor people's point of view. This framework was developed from pro-poor and participatory ideologies arising within the development field in the 1980s and 1990s. It contends that lives of the poor must be understood as the poor themselves understand their own lives (DFID, 1999 in Heeks and Molla, 2008). The framework also helps in assessing the effects of ICTs on individuals and communities: their activities, support and context, assets, institutions, strategies and outcomes (Heeks and Molla, 2008).

Community telecentres are expected to provide access to information for poor rural areas and since this is the theme of this research, sustainable livelihoods approach fitted well as a theoretical framework. ICT is a powerful engine for rural development and a preferred instrument in the fight against poverty (Soriano, 2007).

Livelihood approaches are deeply rooted at the micro-level where individuals, families, households and groups create their own coping within a context of vulnerability. Vulnerability is caused by lack of access to resources and opportunities to generate these resources (Ahmed and Lentz, 2008). The focus of this study was to understand the role of information in support of sustainable livelihoods. Livelihood

approach provides a useful, logically consistent framework for thinking through the complex issues influencing the lives of the poor.

Livelihood approaches draw attention on ways in which policies, institutions and decision making processes influence resource access and ownership, and determine strategic livelihood options available to poor households. Information is crucial in this regard, both in generating information required by the rural poor to make decisions on livelihood strategies, and in generating information required by institutions responsible for making decisions about policies and processes that affect those strategies. It is through information that individuals and institutions can make informed choices.

Central to information for making informed decisions is specific information needs for those involved at different levels including those living in Arid and Semi-Arid Lands (ASALs). Different categories of people in communities have different specific information needs. Information needs assessment is essential in order to effectively support users and their decision making at different levels. Information needs assessment will also facilitate dissemination of relevant information. Enhancing the quality of information relies on attention to the flow of information, such as means of communication, format and content all of which must be reliable.

2.5.2.1 Sustainable Livelihoods and the Role of Information

Information is critical as a livelihood asset. Odero (2003) explains that information should be considered as a core asset in the sustainable livelihoods framework in order to enhance understanding of people's livelihoods. According to DFID (2002), the

sustainable livelihood framework (Figure 2.2) has been developed to help understand and analyse the livelihoods of the poor. Knowledge of the framework can be used in planning new development activities and assessing how existing activities contribute to livelihoods sustainability. Information is therefore such a critical component that it is impractical to discuss sustainable livelihoods without referring to information known about livelihood assets. A report by DFID (2002) explains that one of the core objectives of Sustainable Livelihoods Approach (SLA) is to improve (poor) people's access to information because information provides a strong leverage that can be used to access and assess livelihood assets. Information acts as a unifying asset.

Information constitutes a basic foundation for policy making. It is used for decision making in pursuit of their livelihood objectives. Diffusion of information plays an important role in improving agricultural productivity (Odero, 2003). The *World Development Report 1998/99* argues that information is the lifeblood of every economy. World Bank Report (1999) notes that:

> *"...the poor often suffer most from the consequences of information failure...it is the poor who are impoverished in many ways, not the least in their lack of access to information which contributes to their sense of isolation." (p. 80).*

The poor must be adequately informed about benefits of policies that affect their livelihoods. It is important that they are knowledgeable enough to overcome exploitation from those who are more knowledgeable than them. Access to relevant information will propel the poor to the desired livelihood outcomes. For example,

agricultural market information services/system empower farmers and traders who in turn make informed decisions concerning best market for their products, such as which market to sell their products to (Shepherd, 1999).

According to Odera (2003), information is an asset when integrated with other livelihood assets; it enhances appreciation and understanding of ways in which people live their lives. Information is a major factor that facilitates the process of poverty alleviation. Odero (2003) goes further to explain that information and knowledge makes vulnerable people understand the language of policy makers, it also makes them (poor people) express important elements of their livelihoods to various service providers.

According to Chapman (2008), the sustainable livelihood framework is people-centred; it places rural people, at the centre because they influence how they create their household assets and livelihoods. SLA is also used in establishing how other existing activities have contributed to existing livelihoods. Figure 2.2 below conceptualises the appropriate perspectives and realities of poor people. The figure highlights the process which contributes to the elements of livelihood outcomes. According to Parkinson, (2006) SLA is a multi-dimensional framework that may need to be interpreted and adopted to fit a specific context.

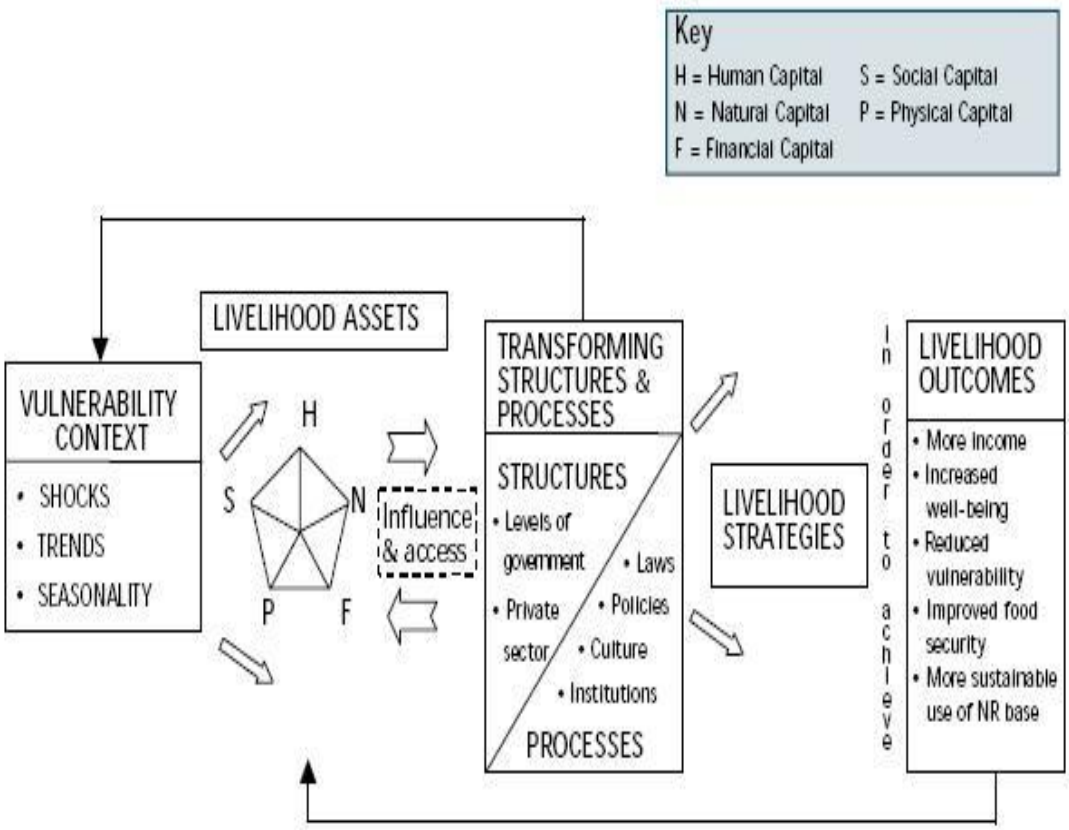

Figure 2.2: Sustainable Livelihoods Framework (DFID, 2002)

Figure 2.2 above shows that people have access to and use resources and livelihood assets that are closest to them. These resources include, natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support. Accessibility to these assets is influenced by their vulnerability context.

Vulnerability context includes; economic, political and technological factors; shocks such as epidemics, natural disasters and civil strife, and seasonality such as prices, production and employment opportunities. Access to resources and livelihood assets

is affected by the environmental factors including institutional, social and political. These environmental factors affect user behaviour of the livelihood assets for them to achieve their goals. It operates under the assumption that poor people are more susceptible than wealthy people to stress and shocks that diminish their livelihoods. Institutions, policies and regulations (transforming structures and processes) influence people's skills of interacting with livelihood activities that enable them make informed choices (livelihood strategies) in order to achieve certain livelihood outcomes.

The aim of SLA is to equip stakeholders with varied objectives to engage in knowledgeable discussions concerning various livelihood factors, their relative importance and how people interact with livelihoods assets (DFID, 2001). The framework is of particular relevance to ICTs because it embraces multiple-dimensions that are interrelated in a dynamic manner. SLA represents a systematic process that promises to assess the outcome of the livelihood activities; the outcome being improved livelihoods. Telecentre services aim at improving lives which is their ultimate objective. The framework acts as a kitty to guide people develop projects and formulate how these development projects can influence the decisions people make and the vulnerabilities that accompany these projects (Bryden, 1994; Parkinson, 2006).

SLA framework helps people to think about telecentre projects in a more systematic manner, in a more 'bottom-up' direction; the positives, negatives or even the neutral ways of telecentre projects. It also helps to observe how the projects engage with

different livelihood strategies like demographic factors. For instance, which age group is likely to use and benefit from the telecentre project? Who is likely to benefit from the telecentre project and in what ways? People make choices based on the resources and their entitlement.

The sustainable livelihood framework presents a diagrammatic presentation that collates ideas and knowledge from pre-existing theories. The intended beneficiaries of telecentres are participants in development and in particular making choices on how to pursue their designated ways of making a living. The resources from where choices are made are based on the availability of entitlements and resources such as human, social, natural and physical capital. Parkinson (2008) suggests that a telecentre is an additional tool for use by its intended beneficiaries. The main purpose is for the telecentre projects to facilitate development. Individuals are trained to be skilled enough to utilise the telecentres, meaning that they will benefit by improving their quality of life and increasing their well-being.

Telecentres are normally established into an existing and already complex web of mutual causality. People are seen as actors who are seeking to make their livelihoods and to maintain, increase or minimise loss to their existing asset base. Most people are likely to use ICTs when they can do so in a way that provides a net benefit to these goals.

The concept of “access” in SLA framework has various implications: access means that people are able to use telecentres. It also means that people are able to apply what they learn from the telecentres to their existing livelihoods (Parkinson, 2008). On the

other hand, Mardle (2003) argues that universal access policies may not be realised in terms of geographical scope because of the way people are distributed in the rural areas. The policy defines an accessible telecentre as one that is within five kilometres reach of all people.

Telecentre beneficiaries may not realise the net benefit s in rural areas due to distance from where telecentres are located. People may not be willing to spend time and energy travelling to the telecentres. Also, poor people may not see the benefits telecentres are extending to them. Only the educated and slightly rich people within a setting may know the benefits accrued from the telecentre. Sustainability of these telecentres among the poor people in rural areas may pose a challenge. Many people will not afford to pay user fees to help maintain the telecentres.

In this research, the sustainable livelihoods framework provided a window to focus attention and structure information to benefit ASAL communities given their context, and the role of Maarifa centres within them. The research focused not just on identifying who uses the telecentres, but also on how their use contributes to their livelihood strategies, and thus how they are likely to benefit them from a developmental perspective.

2.5.2.2 Livelihood Assets

DFID's sustainable livelihoods framework (1999) provides five types of assets as indicated in figure 2.3 below. Just like corners of a pentagon, it emphasises their interrelatedness. In the model, livelihoods refer to the means used to make a living and comprise the following assets:

1. **Human capital** such as knowledge, the ability to work, good health that enables people to pursue different livelihood strategies and accompanying skills;
2. **Social capital** considers the social resources that people can use to help them while pursuing their objectives. These social resources can be developed through vertical and horizontal networks, meaning that networks can be established within the same community or family group at the same socio-economic level;
3. **Financial capital** including constant availability of money and stocks for people to use to meet their livelihoods objectives;
4. **Physical capital** including the basic infrastructure and producer goods (or tools and equipment) used to function more effectively to support livelihoods; and
5. **Natural capital**, which is the natural stocks that can be used in developing livelihood strategies, such as land and water used by people for their livelihoods and services such air quality, protection against storms, nutrient recycling and erosion protection (Ashley and Carney 1999).

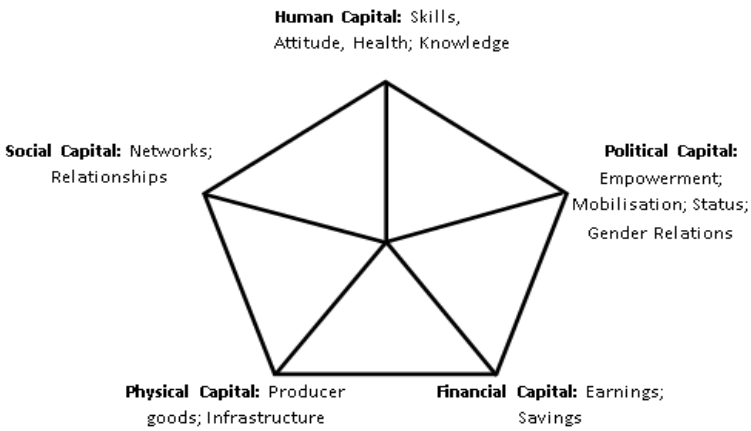

Figure 2.3: Social Outsourcing: Creating Livelihoods (Heeks, 2006)

People work within these livelihood assets/strategies to manage their lives culturally, socially and economically. They also interact with the livelihood assets to engage with the systems of government and private sector to enable them realise livelihood incomes and improve their well-being as well as accelerate development. As a result, people will develop resistance to vulnerability and risks so as to expand their livelihood options. People will become economically self-sustaining through regular replenishment of natural resources. The term sustainability refers to the ability to survive context changes and shocks. It does not follow survival strategies that destroy the context in the long term (Chambers, 1987).

2.5.2.3 Livelihood Strategies

In order to increase choice, opportunity and diversity in their livelihoods, people choose a variety of activities and strategies to facilitate productive activities and reproductive choices as well as organising investment strategies, (DFID, 2001b). In rural communities, livelihood strategies may include diversification, migration and agricultural intensification. Agriculturally, livelihood strategies include methods of increasing yields in the short-term and methods to ensure soil improvement so that it does not deteriorate in the long-term, (Twomlow et al, 2002).

The aim of the SL approach is to enhance livelihood strategies, rather than change them. By understanding the factors that direct people's choices towards particular strategies, it is possible to then reinforce the factors that promote flexibility within these strategies (DFID, 2001b). Negative influences or constraints, such as inadequate market access, degraded natural resources, climatic risks or uncertainty can be

mitigated. This approach helps to develop sustainability and flexibility within livelihood strategies.

2.5.2.4 Livelihood Outcomes

Improved livelihood outcomes and the output of livelihood strategies are the goals that people pursue. As with livelihood strategies, the SLA aims at not changing the outcomes of the community but rather identifying and strengthening the priorities within people's lives. For example, where a community prioritises increased education, the SLA will not aim at merely to providing electricity, but will also ensure that electricity is available at appropriate times and locations to enhance learning opportunities. Below are examples of SLA livelihood outcomes:

1. More incomes;
2. Increased prosperity;
3. Reduced susceptibility;
4. Improved food security; and
5. More suitable exploitation of the natural resource base.

Information is a key component that can enhance the benefits of this process. For poor people to use information and ICTs they must be relevant to their needs; information must help them make informed decisions and choices. The whole process is expected to be interactive and user-centred. The form of messages should be a two way process to enable the local community participate in the generation and sharing of knowledge.

Interactive communication reveals what information is needed to contribute to food security and uplift people's lives. This is achieved by availing information that satisfies information needs of poor people. It can also be achieved by enhancing the quality and quantity of information to those charged with service provision to the poor. Timeliness of information is vitally important. For example, information on market prices should be accessed by farmers immediately they start harvesting so that they are not exploited by middlemen. It is necessary that information to the rural community especially the semi-illiterates be repackaged to make sense to the consumers and directly benefit farmers (Chapman and Young, 2003).

One limitation that was observed by Parkinson (2008) is that the approach has the risk of overlooking direct benefits such as cultural and social realms arising from telecentre use. However, the common justification of telecentre projects is that their purpose is to improve poor people's lives, i.e. to empower them economically and to open up more livelihood options. It is important to note that if access to ICTs through telecentres is denied to poor people, they will remain economically marginalised. Other weaknesses that this approach neglects or downplays include social cultural factors such as gender, influence of power relations, markets and private sector roles and behaviour (Ashley and Carney, 1999).

Access to ICTs enables citizens to join the information society. People will apply ICTs in literacy and training, accessing healthcare information and also in e-commerce where farmers and other producers can sell and purchase products online.

2.6 Rural Activities and ICT4D Model

Chambers and Conway (1992) explain that, a livelihood comprises the capabilities, assets and activities required for people to earn a living and, sustainability to enable continuity even when these capabilities are affected by shock and stress (Thirumavalavan and Garforth, 2009). Considering the stated fact, this study mainly looked at how information contributes to improved livelihoods of rural communities in ASALs region of Kenya. It specifically examined adoption of technology as a tool for accessing information and sustainable development of computerised information services provided by telecentres.

Thirumavalavan and Garforth (2009:3) model informed the study as presented in figure 2.4. The model shows that rural communities indulge in various activities especially agriculture. ICTs are seen as the facilitating agent to foster improved methods of farming; telecentres are seen as facilities that aid access to ICT and therefore results in community and sustainable development formation. In a nutshell, ICTs are seen as an interface between rural people's activities and development thereby resulting in improved farming methods, increased agricultural production and therefore increased incomes. This is achieved through access to relevant information. Access to information means they acquire knowledge which improves the decision making process and take the right necessary course of action. Telecentres and ICTs are seen as important tools for rural development in developing countries and Kenya in particular.

There is a lot of literature on the importance of telecentres and improved livelihoods in Africa, Asia and elsewhere. The impact depicted in this literature is somewhat theoretical and has not been practically visible. Most telecentres in Kenya have been developed in partnership with donor agencies. These partners have put strategies and resources in place concerning the establishment of ICTs as tools for development.

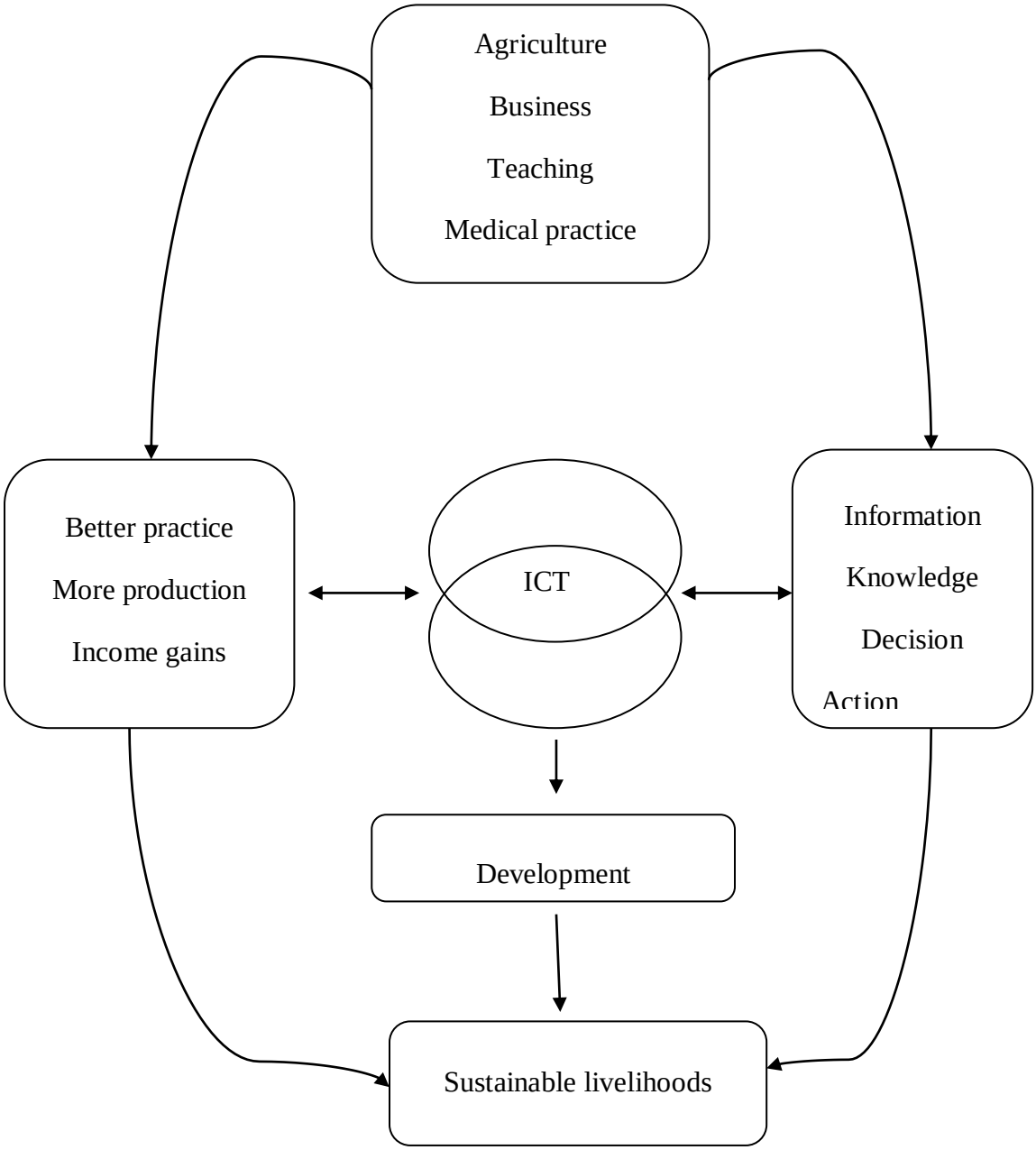

Figure 2.4: Rural Activities and ICT4D (Thirumavalavan and Garforth, 2009)

2.7 Telecentre Services

Different types of telecentres determine the services they offer. According to Proenza et al (2000), multipurpose community telecentres offer a broader variety of services than a basic telecentre. However, the main purpose of a telecentre is to provide information services to their user community to satisfy their livelihood needs.

2.7.1 Types of Content and Services

Different communities demand different information and, services may vary widely from one community to another. The type of activities carried out in a community also dictates the level of local demand for information and services for that community's livelihoods. People living in rural and remote areas have a higher demand for information because of the circumstances in which they live. They are isolated and experience restrained access to information. The telecentre serves the purpose of providing a wide range of information content and services. Hasan (2010) points out the range of information provided broadly relating to the following areas:

Agriculture: Rural areas are mainly agricultural-oriented, meaning that people living in the rural areas are engaged in farming activities. The population in rural areas are mostly illiterate or semi-literate. They are however very rich in indigenous knowledge. Farmers demand information mainly related to farming; such as types of pesticides needed, fertilisers and quality of seeds. They also need information on extension services, market prices for agricultural commodities, how to handle perishable products, among others.

Health: Information on health and healthcare particularly for children and women are a basic necessity to this category of people in rural areas. People in rural areas are keen on telemedicine services. They want to exploit both diagnostic and treatment follow-ups. Telemedicine services saves them time and money they would otherwise require to travel far to seek medical services.

Law and human rights: Issues of human rights abuses are more prevalent in rural areas because people are illiterate or semi-literate and the lack basic knowledge and access to relevant information about their rights. This uneducated population are likely to be exploited by the elites within the rural community. They therefore require information on their citizenry rights, legal representation and human rights organisations repackaged in the most accessible format.

Education: Telecentres in rural areas are useful for teachers and students because without such facilities they would not have access to quality educational materials. The youth rely on telecentre services to obtain higher education. Rural communities like it when they are able to access higher education materials. It is through telecentres that they access informational materials. Most adults in the rural areas grew up without formal education. Adult education is therefore an important component particularly for farmers whose main interest is to learn how to improve their farming. Use of audio-visual is effective as learners who cannot read or write learn through watching and listening.

Employment: Telecentres provide information on employment opportunities to in the rural populace. People create contacts at the telecentres since it is also a good meeting

place. They may search for jobs using informal means such as just talking to friends face-to-face. People use online resources provided at the telecentres to search for job opportunities. The e-training offered at the telecentres empowers people with skills that enable them acquire skills that make them employable.

Commerce, business including self-employment/non-farm economic activities: Businesses and commerce are enhanced using information obtained from the telecentres. They get information on where to sell their products, market prices, information about new business opportunities, etc. Farmers are given an opportunity to trade locally and internationally.

Disaster preparedness and management: People are able to access disaster-related information at the telecentre on how to mitigate disasters when they occur. They do early evacuation if they get a notification of likelihood of a disaster strike.

Government services: Government information resources can be accessed through the telecentres. E-Government services such as downloading official forms, certification and submissions are done at the telecentres. This saves users from middlemen exploitation that charges fees for an otherwise government free service.

Entertainment: Telecentres provide materials and resources for entertainment for rural communities. They provide electronic facilities such as access to satellite television and radio services for those who do not have them in the rural areas. Programmes such as cartoons for children, drama shows for the youth, movies and sports for adults are made available at the telecentres.

News: Telecentres purchase print newspapers and also avail online editions to be accessed by users of their telecentres. This is because access to newspapers and magazines in remote areas is otherwise limited.

Townsend (2001) also discusses the different types of services offered within different categories as follows:

Basic Services: These are services that are delivered using a common network infrastructure and software platform. Basic services focus primarily on the goals of increasing universal access to ICTs. Such services meet the basic needs of the community, and also become a foundation for economic development. Basic services provided by the telecentres should either be free of charge or at specific, affordable prices. Any small fee charged should contribute to the overall revenues to sustain the activities of the telecentre since they are not designed to be profit making. Townsend (2001) points out the basic services offered as shown in table 2.2 below:

Table 2.2: Telecentre Basic Services

Access to a working telephone 24 hours a day.
A functional facsimile for fax services, either self-service or with assistance of an attendant.
Facilities for basic technical support services, such printing, photocopying etc.
Computer services such as word-processing, spreadsheets, professional programmes e.g. agricultural programmes
Access to e-mail accounts provided by the telecentre.
Internet Access services
Voice Messaging services

Other services provided by telecentres are discussion and meeting rooms as well as access to regional, national and international databases (Qvortrup, 2001).

Multipurpose telecentre provide a wide variety of services such as to different user groups within a community. Jensen and Esterhuysen (2001), Townsend (2001) and Hasan (2010) confirms the services offered by multipurpose telecentres as education, health, community information service, business and e-commerce as well as e-government services.

2.8 Roles of Telecentres in Rural Areas

The following roles of telecentres in rural areas are generally discussed in various parts of this thesis.

- Create a community knowledge centre in rural areas;
- To educate and improve people's standards of living;
- To facilitate online access to global information;
- To open up markets for local products through the internet and e-commerce; and
- To provide e-government information services.

The main purpose of establishing telecentres in communities is to empower citizens and improve their social and economic development. Telecentres are seen as solutions to socio-economic problems because they provide access to information and communication technologies (ICTs) (Gómez and Hunt, 1999; Oestmann and Dymond, 2001). Telecentres have been established as pilot studies by various

governmental and development agencies across the globe with the aim of narrowing the “digital divide” in remote and disadvantaged communities.

Rural areas take advantage of the information economy provided by telecentres to access education, government information, healthcare and other services which results in social and economic development. The government of Kenya (GoK) is concerned about the growing digital divide between rural and urban areas. Therefore, to reduce this divide, the GoK has put in place programmes; starting with liberalisation of the ICT sector and freeing of air waves. There is also a National Policy Paper on ICT (KenTel, 2007).

There are different telecentre models of information and knowledge centres. Some are referred to as community resource and information centres. People visit these centres to interact, access knowledge and information on various livelihood needs, such as; agriculture, education, health, environment, politics, exchange ideas, among other needs. Urban areas in developing countries, Kenya included have in recent years witnessed a rapid growth of the ICT sector. Therefore, there is need to focus on rural communities in order to bridge the existing digital divide between urban and rural areas. Through the services they offer, telecentres play a critical role in mobilising rural communities and making ICT accessible to all (Litole 2007).

Telecentres are a powerful engine of rural development and a preferred instrument in the fight against poverty, (World Bank, 2005). Temu and Temu (2006) argue that ICTs provide farmers with an opportunity to improve their farming methods. For example, small scale farmers can through information; change from producing

traditional crops for domestic use only to production of mass market-oriented agricultural products. Soriano (2007) observes that in some countries and particularly China where 10% of the world's poor live; ICTs have been embraced for poverty alleviation by upgrading traditional agriculture and improving productivity.

Establishing telecentres and introducing ICTs for accessing information and other services has enabled farmers to intensify agricultural production. The only challenge for telecentres is to provide farmers with relevant content and services. Using an appropriate ICT medium can help motivate people in the rural areas to use information from the telecentres. Telecentre users can also exploit ICTs to access market information for their agricultural products. This will result in improved incomes. The new market opportunities will translate to increased and diversified incomes for small-scale farmers; a boost on their livelihoods and status. Knowledge acquired from the telecentres will enable farmers form or join existing agricultural cooperative unions, welfare groups or consortiums and participate effectively in their activities. People who acquire knowledge from the telecentres are even able to start small scale enterprises in the rural areas. Through access to ICTs, rural people are exposed to more entrepreneurship opportunities hence creating more sustainable livelihoods (Duncombe and Heeks, 1999).

Telecentres provide economic opportunities and value-added services which in turn support many livelihoods. Such services include connectivity, basic training in ICT skills, other skills development, and access to loans and financial services. Telecentres also support disadvantaged groups like women, children and people living with

disabilities by offering special services that support their socio-economic position in society. Policy makers and other stakeholders guide telecentres on how to support livelihoods and alleviate poverty in poor rural communities.

2.9 Telecentres and Development

Telecentres are established based on three principal pillars:

- That information plays a role in development; information that is relevant and timely can contribute to development.
- That ICTs are important tools that can facilitate access to information at a minimum cost or free of charge.
- That telecentres are important paths through which communities can access ICTs.

Jensen (1993) argues that the trend towards a monoculture is dangerous for a society as it would be for an ecological system. He further states that a monoculture cannot innovate, because it cannot see alternative ways and goals. (Therefore, telecentres as part of a global initiative grounded in the belief of creating and sharing of information and knowledge must have diversity. This approach leads to socio-economic development. International development agencies should direct their energies on issues related to bridging the digital divide. Access to communication services such as the internet will assist the disadvantaged sectors of society to prosper. Telecentres contribute to bridging the digital divide in developing countries between poor people who cannot afford a computer and the urban elite.

The July 2000 Okinawa Charter on Global Information Society stated that “access to the information society should be provided to everyone”. The charter helps in

bridging the divide in developing countries through creation of telecentres which are public access centres. The principle of telecentre initiatives in this case is connectivity including all infrastructural consideration and direct access to information with an aim of empowering, competence building and eventually achieving development.

Oestamnn and Dymond (2001) outlined the following goals of telecentres for transition and developing countries:

Expand access to ICT-based services and support; offer more public social services such as health and education; provide information on farming, business and propagate services offered by NGOs. Other services are access to infrastructure and advisory.

Colle (2000) quoted Kofi Annan at the 2000 UN General Assembly Special session declaring that:

> *"A wide consensus has emerged on the potential of information and communication technologies (ICTs) to promote economic growth, combat poverty, and facilitate the integration of developing countries into the global economy. Seizing the opportunities of the digital revolution is one of the most pressing challenges we face." (p.4)*

Telecentres have been designed to: first, promote and support wide availability of ICTs; second, make them affordable to all; third, to eliminate marginalisation of the poor especially in remote places, and fourth, to provide an opportunity for poor rural people to access ICTs and become part of the information society.

Although it is difficult to gather macro data relating to telecentres improvement in a nation's development index, individual stories of telecentre impact provided by Colle

(2000) are an important indication of the role of telecentres in development. For example, in Shanghe County, China, Colle et al (2000) had an encounter with an elated peanut grower who had just found out how to access the required information for doing peanut business. Similarly, her neighbour used the nearby telecentre to gather knowledge on how to improve her silk worm business. Yet another one was able to find help from a veterinary doctor to service her cow with artificial insemination. These are just examples of how timely and relevant information provided by telecentres can help families achieve desired improved incomes. It is important to keep in mind that telecentres are more than network connection; they offer a broad range of knowledge and communication services relating to the needs of the community as aforementioned.

2.10 Local Content

There is need for marginalised people to access locally produced relevant content, especially content that they can participate in producing. Local content has been regarded as a key element of ICT4D or digital inclusion. Local content is "the expression of the locally owned and adapted knowledge of a community – where the community is defined by its location, culture, language, or area of interest..." (Ballantyne, 2002). Holmes (2009) interprets this definition to mean applying information from the internet as well as older information presented in other formats, i.e. audio, video and print. However, the internet may not be a reliable channel for local content in many countries especially developing countries.

Local content also refers to: first, materials produced within a specific geographical location; second, material for a specific local audience; third, a programme produced locally, not imported and fourth, local content from a local group or individual. However, the problem may be that local content is narrow in scope because the message is only locally relevant. Therefore, only the local people use the content to interact, express own ideas, knowledge and culture (Ballantyne, 2002).

The recent overall trend for local content is the use of internet to capture, interact, collaborate, participate and generate local improved content. This has been necessitated by the interoperability nature of the internet. O' Reilly (2005) notes that Web 2.0 has brought forth "user-generated content." Users in this case are potential producers and, according to Holmes (2009), when this user-generated content focuses on specific neighbourhood needs, it is labelled *hyperlocal*. Humphrys et al (2008) note that Web 2.0 platforms are ideal for sharing, storing and aggregating local content. Stand alone and purpose built websites are not appropriate for user-generated content. Local content generation is easier said than done. Harris (2009) cites possible constraints that user-led content generation as explained by Hargittai and Walejko (2008) as follows:

> *It can be a time-intensive process and requires very particular cultural competencies. It also requires creativity and technical knowledge. (p. 253).*

Socio-economic status determines how local content is stored and disseminated/accessed. There is a group of people who can have their local content

published online, there are those who have rich content but cannot post their content online due to constraints such as: lack of technical competencies, the process is expensive, unreliable bandwidth (Van der Velden, 2008) and or policy constraints – what to publish and what not to publish is limited by the policies in place.

There could also be controversy in what constitutes local content and what does not. The way to determine what constitutes "appropriate" local content for marginalised groups is by paying attention to their "innovative, adventurous and pleasurable" appropriation of the internet and related technologies (Tacchi, 2005).

The creation and updating of relevant content to satisfy local needs is a key factor for the success of telecentres. This requires extensive consultations with participating communities through small group meetings. Small databases are then developed to fulfil the information requirements of the local community which are frequently updated. The content should be context-sensitive, language-sensitive, and on diverse subjects ranging from agriculture (animal health), financial information services, healthcare, nutrition, sanitation, employment, food prices and education. When a telecentre uses ICTs to satisfy such information needs of the poor, it becomes the centre of generating, archiving, exchanging and disseminating locally relevant knowledge in the language (local) that is understood by that community. Telecentres in this case are seen as sources of information and learning about alternative employment, and a breeding ground for new entrepreneurs and innovators (Swaminathan, 2004).

The key focus of local content endeavours is to have achievable and understandable outcomes because “harvesting is believing”. The local content developers should be trained to ensure that information products satisfy information needs of those it is intended for. Swaminathan (2004) suggests repackaging complex technical jargon into simpler terms; converting research output from villagers into more structured and validated forms for research organisations and policymakers.

The issue of value addition as regards local content should be diverse. For example, telecentres should create several databases to cater for the specific information needs of the local societies. The intranet web page should include information on local activities, various government information and initiatives, farming techniques, livestock information, health, employment news, audio clips related to agriculture, education, market prices, rural technologies, weather, information on different crops, etc.

The telecentre should also provide market intelligence on various commodities, stock availability and prices of the various fertilisers, pesticides and seeds. The telecentre should provide information on fundamental human rights and other constitutional rights. Financial information should also be availed especially on micro-financing and how loans can be availed to Self-Help Groups to start micro-enterprises.

2.11 Location and Access

The local populace should provide accommodation for the telecentre. A telecentre should be located in a central place where many people can gain access, a place where people frequent probably to do their shopping, attend meetings or visit hospitals. It

should generally be a high-profile location. Telecentres must be accessible to all kinds of people especially people with disabilities and the elderly. In some communities they may be located in schools or libraries, community centres, health centres or local government offices. Users may need to access the centres early evening after completing their daily chores. Some people may only want to use the centres on weekends. Entry should be determined by the users' needs and timing, but security issues should however be weighed against issues of accessibility.

In technical terms, access means permission and authority to use information (Prytherch, 1987). Roman and Colle (2002) distinguish between connectivity and access when they argue that connectivity is the

> *... physical availability of information and communication technologies" while access refers to"... the economic, sociological and psychological factors that influence persons' opportunities to use the technologies. (p.4)*

Roman and Colle (2002) further define 8 major obstacles to telecentre access, as follows:

Literacy: A part of rural population are not educated, users need to be digitally skilled to enable accessibility. Illiteracy impedes access

Relevance: services offered must meet the information needs of telecentre users. Furthermore, content should be relevant and reliable.

Culture: access to information may be affected by the people in the rural areas live; access to information can improve living conditions.

Cost of information: if telecentres offer expensive information services, poor people living in rural areas will not afford.

Technophobia: some people may be afraid or suspicious of the new technology hence a barrier to use of ICTs in telecentres.

Complexity of ICT protocols: computer procedures can be intimidating and hinders access.

Power: electricity unavailability and telephone lines or poor signal, a connectivity-related issue.

Gender: According to Hudson (2000) women enjoy to use the telecentre when there is a female staff on duty.

Another problem of access is, community power/authority, that is, who controls the ICT facilities? For example, those in position of power may discourage or obstruct the community from exploiting the technology believing that it could lead to challenges to their authority.

2.12 Sustainability of Telecentres

The World Commission on Environment and Development (WCED, 1987), explained that, “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development focuses on improving the quality of life for all of the Earth's citizens without increasing the use of natural resources beyond the capacity of the environment to supply them indefinitely”. Telecentre sustainability ensures the continuity of information provision and related services.

Harris et al (2003) argue that “Sustainability discourse has since extended beyond issues relating to the irreversible depletion of the environment and the inevitable exhaustion of finite natural resources”. Sustainability of development projects focuses on, “who will pay for the project after the implementing agent departs?” The role of the implementing agents is to provide seed inputs, including, but not limited to capital, that will get the project started and enable it to continue under its own impetus after the implementer departs.

Sustainability is not limited to the need of development to pay for itself. The International Institute for Sustainable Development lists three underlying common characteristics of sustainable development such as: concern for equity and fairness, long-term view and systems thinking.

Concerns for fairness and equity refers to the resulting benefits of development to reach those who are the least privileged, least endowed with resources and are most vulnerable, development efforts sometimes fail to achieve fairness. The long-term view encompasses strategic dimension in relation to short-term project orientations. Systems thinking in sustainability involve multi-dimensional perspectives including; identification of feedback loops, consideration of the consequences of actions, acknowledging the complexity of social life everywhere and their interrelationships.

The sustainability of telecentres has emerged as a key issue in the debate surrounding the use of ICT4D. Financial self-sustainability is the most considered in discussions because it is often regarded as a condition for continued existence of the centre.

Furthermore, Harris (2003) notes that experience from telecentre experiments suggests that four types of sustainability exist for telecentres:

1. Sustaining financial viability (Benjamin, 1999).
2. Sustaining staff capability (Baark and Heeks, 1998).
3. Sustaining community acceptance (Whyte, 1999).
4. Sustaining service delivery (Colle and Roman, 2001).

Financial viability refers to the capacity that a telecentre has for generating sufficient income to meet operational and maintenance costs as well as the cost of initially establishing it. The main source of revenue collection is directly from those who use the services of the telecentre, as well as other continuing sources of revenue, for instance, from government (Hudson, 1999). Mayanja (2002) suggests that telecentres should have financial assistance from the government or supporting sector. Finances are needed to cover daily operations of the telecentre like power bills, telecommunications costs, repair of facilities and salaries (Mtega and Melakani, 2009). Funds collected from users of telecentres are the only source of income; it is not the most reliable means because this method will depend on the number of users of the telecentre. These users are poor and vulnerable and may be discouraged from using the service if charged. Benjamin (2002) cautions that it is difficult for such telecentres sustain themselves without support from other organisations because rural people are poor.

Kumar (2004), Bailur (2006), Ali and Bailur (2007) and Bailey (2009) discuss four types of sustainability as follows:

Financial sustainability is realised revenue returns supersedes expenditure incurred in the project.

Social sustainability is the socio-economic impact telectres have on the local community.

Political sustainability is the support of policy-makers and regulators.

Technological sustainability is the equipment bought for the telecentre, they are expected to be fairly priced both in terms of implementation and running costs.

2.13 Chapter Summary

Chapter two looked at the literature on telecentre trends and typologies across many countries in developing zones. The chapter also described two theoretical frameworks relevant for this research in tackling the research questions and facilitate the research to meet its objectives; a conceptual framework was included to help in conceptualising the main subject of the study. Through the history of telecentres, chapter two revealed that alot has been done on development of telecentres in Africa and other developing countries; there is need to understand to understand development trends to fit them in them to the local socio-cultural, institutional and technological environment context. Other areas chapter two covered were telecentres services and content, access and sustainability issues.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this study was to explore the role of telecentres in the provision of information to rural communities in ASALs of Kenya. To achieve this aim, empirical data were collected on access and use of information in telecentre facilities used by these communities. The rationale was to relate the prediction of what telecentres can do for poor people and the reality of what they are actually doing. This chapter discusses the research methods embraced for this study and the instruments used to collect data. The aim of this study was also to understand the services offered by telecentres and also identify barriers that hinder access to information provided by telecentres centres.

3.2 Research Design

Research design is the 'plan' that outlines details of how the researcher is going to collect data that is relevant to look into the research questions (Muganda, 2010). It is a general 'plan' for the collection, evaluation and analysis of data, the central intention being to decide the researcher's problem.

Research design lays out the research activities starting from the assumptions of the study and its practical application and finally analysis of the collected data (Creswell and Clark 2007). Research design ensures that the data gathered from the data collection exercise will be sufficient in responding to the initial question(s) as precisely as possible (Muganda, 2010). Cohen, Mannion and Morison (2000) state that the research design is guided by the assumption of "fitness" for the intention and

therefore the intention of the research decides the methodology and the design of the research.

This research is a case study exploratory research design it investigated Maarifa centres as units that offer information services to people living in ASALs. Case study gives adequate information about a case through qualitative methods, in this case it facilitated precise information gathering about Maarifa centres. The study took up triangulation of multiple data sources of interviews, observations and FGDs to gather information and to do in-depth investigation of how information provided by Maarifa centres help to improve lives of people living in ASALs, challenges experienced and suggest solutions.

Case study research design was also informed by the fact that there are eight Maarifa centres in Kenya but this study selected five of them. Furthermore, there are other telecentres in Kenya like the Pasha Digital villages scattered at various locations, religious based such as the NCCK in Korogo informal settlement in Nairobi.

3.3 Philosophical Paradigm

Creswell and Clark (2007) pinpoint to many philosophical paradigms that base qualitative research. The research paradigm embraced for a study instructs the way the research creates the research objective, approaches used to conduct the study and finally presentation of the research findings. Myers (2007) suggests three categories: positivism, interpretive and critical world views.

Positivism is the philosophy of knowing; saying that only accurate understanding gained through observation, and measurement is reliable. Research in the positivism environment is limited to data collection and interpretation. Research findings are usually observable and quantifiable. The researcher is independent from the study; there is no human interest in positivism and, according to Crowther and Lancaster (2008) it usually adopts a deductive approach.

Critical research sees social reality as historically constituted and produced by people. It seeks to provide a social critique; it questions the conceptual and theoretical basis of knowledge and methods. Its main task is to challenge those conventional knowledge bases and methodologies whether quantitative or qualitative (Jupp, 2006).

This study adopted interpretive paradigm underpinned by qualitative research. Trauth (2001) states that interpretive paradigm is the lens that most frequently influences the choice of qualitative methods. It is a paradigm that aims at interpretation and understanding of data.

The interpretive paradigm guides the way research objectives are conceived, the way the research process is designed, and contributes to how research outcomes are realised. It enables research to be done in greater details by looking at the culture and how people live their lives; it gives a true representation and is more reliable because the researcher works with information gathered from people. The truth is arrived at through discourse. That is why interpretive approaches rely heavily on natural methods such as interviews, observation and analysing existing texts.

Through interviews, interpretive paradigm ensures an adequate discussion between the researcher and respondents with whom they interact in order to collaboratively construct a meaningful reality. This reality is experienced according to Angen (2000), through:

1. A careful deliberation and expression of the research questions.
2. Conducting inquiry in a courteous manner.
3. A combination of interviews, observation and human interaction produces in-depth results that are not generalised.

3.3.1 Qualitative versus Quantitative Research Method

According to Creswell (1994) and Leedy and Ormrod (2001), qualitative researchers barely attempt to simplify what is observed. They instead give comprehensive explanation of the phenomenon they are examining in its multifaceted form. Denzin and Lincoln (2005) differentiate qualitative and quantitative research by specifying that quantitative research value rich description of the phenomenon while quantitative researchers do not give much consideration of details in a phenomenon.

There is also notable differences in the assumptions, purposes and approaches in the two research methods. There are many philosophical paradigms that underpin qualitative research. They include interpretative, constructivist or naturalistic approach (Creswell, 1994; Oliver, 2004). These paradigms endeavour to understand the world in two dimensions; that is to understand the world as it is and understand it as an emergent social process (Denzin and Lincoln, 2005).

On the ontological point of view, qualitative researchers are convinced on the reality constructed by the individual conducting the research. Therefore, multiple realities exist in any situation (Creswell, 1994). On epistemological point of view, the qualitative researcher should interact with that being researched (Cohen, Manion and Morrison 2000; Creswell, 1994; Denzin and Lincoln, 2005; Oliver, 2004).

On the other hand, Oliver (2004) posits that the quantitative research can be more experimental and traditional and the subject matter can b approached from an objectivist point of view. Quantitative research assumes that social interactions should form the basis for gathering data through inductive procedures (Creswell, 1994; Oliver, 2004).

The ontological point of view, objective and independence of the researcher is viewed as the reality of quantitative researchers (Creswell, 1994). Positivist epistemology emphasises on distance and independence of the researcher from what is being researched (Creswell, 1994; Cohen, 2000; Denzin and Lincoln 2005).

The ontological and epistemological points of view therefore influence the option of the methodology and the data collection methods to be applied in a research project (Oliver, 2004). The main method of data collection for a positivist epistemology is the use of survey methods and questionnaires (Creswell, 1994; Denzin and Lincoln, 2005).

The non-positivist epistemology apply qualitative methods that influence use of unstructured interviews, observation technique, document analysis and ethnography for data collection (Denzin and Lincoln, 2005; Payne and Payne 2004).

In this study, the research methods adopted guided the way the researcher conceived the research objectives, approached the research process, and ultimately presented the research findings.

3.4 Research Strategy

Research strategy refers to the plan used in carrying out the research in order to achieve the purpose of the study. This study adopted various strategies: collecting qualitative and quantitative data, but focussing on a specific multiple case studies of five telecentres. This is because the research intended to systematically gather in-depth information on the communities using Maarifa telecentres in Kenya. The data gathering methods were interviews, observation and Focus Group Discussions (FGD) with an aim of obtaining a rich and detailed insight into the ‘’life’’ of those cases and its complex relationships and processes (Muganda, 2010)

Since this was a multiple case study, the research required a multi-strategy approach in data collection to investigate the research problem. A case study is investigates a phenomenon with a real life context. It uses multiple source of evidence in attempt to show the boundaries between phenomenon and context (Yin, 2004). Case study method analyses individual real life situation of a case for a group, society, community or a unit of social life (Kumar, 1996). Case study collects in-depth data

related to a case in order to establish what is unknown about a situation (Bryman, 2008; Creswell, 1994).

Therefore, the case study approach was especially useful in situations where the researcher had no control over the events as they unfold. According to Yin (2003) and Muganda (2010), a case study is characterised by:

1. Focus on depth rather than breadth because the researcher obtains as much details as possible about a case;

2. Natural setting because research is not done in a laboratory or other artificial setting. In other words, the case existed prior to the researcher arriving at the scene, and normally, continues to exist after the researcher has left the scene;

3. Holistic study because it focuses on the complexity of relationships and processes and how they are interconnected, rather than trying to isolate individual factors;

4. Multiple sources and methods because the researcher uses a wide range of data sources.

Muganda (2010) points out that a case study allows the researcher to gather in-depth information in a systematic manner by use of a variety of data gathering methods such as interviews, discussion and observation. The purpose of using varied methods of data collection to enable the researcher to obtain a comprehensive insight into the case. Bryman (2008) asserts that defenders of a case study often favour of qualitative

method because they facilitate intensive, detailed examination of a case. It is important to note that, both qualitative and quantitative methods of data collection are often used in case studies.

Kumar (1996) opined that a case study provides an opportunity for the intensive analysis of many specific details often overlooked by other methods since it provides broader range of research opportunity such as FGD interviews and observation which helps capture reality of events. It is comprehensive, a perspective that is important for this study because it will establish how communities in ASALs interact with the telecentres and the way ICTs and other services are used to support the range of social activities within which telecentres operate (Tacchi, Slater and Hearn (2003)) The use of specific case study helped to find out how the application of ICTs and related services help to improve ASALs communities' lives.

The use of case study gave the researcher an opportunity to gather in-depth data on the effects of Maarifa centres and linking them to development taking place in the communities where telecentres are located. It is for this reason that the case study approach was considered appropriate for this study. In this research, the case study was the five Maarifa centres and the communities around them. Noor (2008) observes that case studies are concerned with what and how things happen, allowing the investigation of contextual realities and the differences between what was planned and what actually happened. This study investigated how services provided by Maarifa centres with emphasis on ICTs were utilised and how the services participated in improving livelihoods of the people living in ASALs. Use of mobile

phones to offer service by Maarifa centres was discussed due to their heavy penetration in rural areas, they are considered as the most convenient means of delivering information by ALIN through Maarifa centres.

The use of theory in case study approach has been explained as two-fold by Willig (2001); to test an already existing theory of to come up with a new theory. This research, case study was preceded by existing theory of sustainable livelihoods and Diffusion of Innovation. These theories directed and guided the researcher's awareness of what was being investigated, the study's framework (Yin, 1994). Yin (1994) agrees that constructing of a case study should incorporate a theory relevant to what being studied in enable the researcher follow a clear and accurate theoretical path.

3.5 Research Approach

The data collected were both qualitative and quantitative. The choice of qualitative method was because of its inductive path that stresses the qualities of units and processes and meanings that are a socially constructed nature of reality.

According to Bryman (2004) the qualitative method also allows for close relationship between the researcher, what is studied and the circumstantial limitation that affect enquiry. The qualitative method fitted well with this study whose aim was to gain an understanding of access and use of information by rural communities in ASALs. Furthermore, the factors affecting the provision of information in Maarifa centres were sought with a purpose of developing a framework for ICT for information

services for rural communities based on their experience, perception, and priority information needs (Bryman, 2004).

The study endeavoured to gain understanding into the complicate processes of ICTs and information services in rural communities through close associations with the users. This is a subjective process that can effectively be achieved through a qualitative research design where the researcher adopts an interpretive philosophy position that stresses the need for comprehending the social world through scrutiny of the interpretation of that world by its participants.

Qualitative approach involves adopting a constructionist ontological position that views social properties as outcomes of the interactions between individuals, rather than phenomena 'out there' separate from those involved in their construction (Bryman, 2004). Qualitative research allowed for capturing the changing and emerging reality about phenomena and processes which offered insights into information-seeking experiences, as the study sought information from respondents regarding the barriers to and enablers of ICT adoption in improving livelihoods of rural communities.

This study was inclined to use qualitative methods because as much as DOI is to do with technology, the issues this study intended to look at where majorly managerial and organisational. Denzin and Lincoln (2005) explain that the expeditious social change and the resulting variety of life worlds increasingly encounter social contexts and views cannot be adequately captured by deductive methodologies. That is why this study adopted inductive strategies.

Bryman (2004) asserts that an inductive strategy of linking data and theory is typically associated with a qualitative research approach that is based on in-depth, semi-structured interviews that produce qualitative data in the form of respondents' detailed answers to study questions. The aim of this study was to establish factors that affect Maarifa centres in the provision of information to rural communities in ASALs. The centres mainly use enablers to facilitate adoption of ICT in provision of information. Therefore, qualitative approach was justifiably the most suitable research design in this study.

Qualitative design was also appropriate for this study because although there is a lot of research done on the role of telecentres in other parts of the world, there has not been a documented report of a comprehensive qualitative research on telecentres in Kenya. The flexibility of the qualitative design also enabled the study to collect raw data using induction to derive possible explanations from respondents' views and personal observation. Data was collected in the context of contribution of telecentres in improving rural livelihoods in Kenya as highlighted by the researcher. This position is supported with views of qualitative research proponents such as Bryman (2004), Creswell (2003) and Denzin and Lincoln (2005).

The study was descriptive in nature because the researcher's main interest was also to establish the perception of the respondents using Maarifa centres. The descriptive design enabled the researcher to document the characteristics of the variables of study. For instance, the age group and gender of those who heavily rely on Maarifa centres, the level of education of the managers at the centres and the positive

attributes accrued from the Maarifa centres' services. A descriptive study enabled the researcher to understand the characteristics of the Maarifa centres. This was done by describing in detail the profiles of users and relevant aspects of the phenomena of interest from individual to community levels.

In the research design, two research methods were adopted; qualitative and quantitative research approach. First, the qualitative research method helped to understand the factors affecting adoption and use of ICTs by rural communities in ASALs in Kenya to improve their livelihoods. Qualitative research method also helped in finding out users' views and perception of the selected telecentres. It was also selected because it would help stakeholders understand the socio-economic effects of telecentre projects in those areas as well as if information needs of users were being met. Through interviews, ordinary poor people were able to describe their lives and how they adopted and used technology available at Maarifa centres to improve and sustain their livelihoods.

Second, quantitative method was used to collect data in the form of statistics for analysis.

As discussed in Chapter 2, Diffusion of Innovations theory and Sustainable Livelihoods Approach (SLA) were adopted as the frameworks to guide this study.

3.6 Study Population

Population refers to the entire group of people, events or things of interest that the researcher wishes to investigate (Sekaran, 2003). A study population can be defined

as the entire collection of cases or units about which the researcher wishes to draw conclusions (Kothari, 2004). One of the major steps in formulating a research design is to define the study population based on the stated objectives of the study.

This study involved five categories of units of analysis, as follows:

(a) Five Maarifa Centres from among the 8 telecentres in Kenya.

(b) Managers and other personnel (if any) responsible for managing Maarifa centres in ASALs in Kenya.

(c) The staff of Arid Lands Information Network (ALIN), an NGO.

(d) Managers of the Communication Authority of Kenya (CAK).

(e) Managers of the ICT Board of Kenya.

The study therefore targeted 232 respondents. The following section explains the sampling methods and procedures that were used in selecting the sample population that was studied.

3.7 Sampling Procedures

It is important that a researcher collects data that are representative of the general population. This is achieved through sampling. A sample is a model of the population or a subset of the population that is used to get information about the entire population. This study used a non-probability purposive procedure because the researcher had no access to statistical data of Maarifa centre users. This is attributable

to the fact that Maarifa centres are public places where people of all walks of life are encouraged to use.

3.7.1 Sampling of Telecentres (Cases)

The researcher applied a purposive sampling to select the telecentres that were relevant to the goals of the study. The selection criteria of the telecentres is as outlined in 3.2.

Table 3.1 Sampling of Telecentres

S.NO.	Criteria	Condition used
1	Location	The telecentres involved in this study were those located in Arid and semi-arid lands of Kenya.
2	Services	This study focused on telecentres that offer a full range of ICT services such as internet, e-mail, social media communication, computer training, business support services and outreach services.
3	Age of the Telecentre	The selected telecentres were those that have been in operation for more than, to justify their effect to the communities they serve.
4	Mode of operation	The selected telecentres were Maarifa centres operated by ALIN.

All the Maarifa centres listed in their web page were scrutinised using the above criteria for selection. This was done through online literature searches. The researcher communicated with the managers of the selected telecentres (Isinya, Mutomo, Nguruman, Marigat and Ng'arua knowledge centres) to clarify some of the information gathered from their website.

3.7.2 Sample Size

From the possible 216 target population of telecentre users, random sampling was used to select the respondents from the target population. The study obtained a sample of 65 respondents from the pool of users. The researcher therefore picked a random of 13 from each telecentre. This was thirty percent of the total population, hence representative. Kotler et al (2001) argue that if well chosen, samples of about thirty percent of a population can often give good reliability findings. This study purposively selected 16 key informants as indicated table 3.1.

Purposive sampling is used when the researcher has identified specific characteristics of a population that match well with the purpose of the research. The researcher concentrates on respondents with particular characteristics who will better be able to assist with the relevant research. Purposive sampling enabled the researcher to obtain information from specific target groups who provided the desired information (Sekaran, 2003).

The managers of the telecentres, Director ALIN, ICT Board and CA officers constituted the key informants who were identified as information rich cases. The key informants also conformed to a selection criteria set by the researcher; at the same time, the researcher selected interviewees in a strategic way depending on the research questions (Bryman 2008).

Table 3.2 Sample Used in the Study

S.NO.	Unit/ Category	Population	Sample	Sampling technique
1	Communication Authority of Kenya Officers	5	5	Purposive
2	ICT Board officers	3	3	Purposive
3	Arid Lands Information	3	3	Purposive
4	Network officials			
5	Managers of the 5 telecentre	5	5	Purposive
6	Users of the 5 telecentre	216	65 (30% of population)- 13 from each telecentre.	Simple random
7	**Total participants**	**232**	**80**	

3.8 Validity and Reliability of the Study

Validity and reliability of data are crucial elements in all research studies. This is because accuracy, dependability and credibility of the data collected depend on how valid and reliable the information given by the respondents is. Validity and reliability in qualitative research carry a different connotation from that of quantitative research because of the different worldviews of the two paradigms.

On the other hand, there is no replication connotation in qualitative research (Bryman, 2004; Creswell, 2003). The researcher used a multi-case and mixed research approaches, the most prevalent being qualitative design. Reliability and validity engages factors of quality of data and appropriateness of the methods used in carrying out the research (Cano, 2005). Morse et al (2002) explain that validity means to investigate, to check and to question. Lincoln and Guba (1985) state that research must have “true value”, “applicability”, “consistency” and “neutrality” in order to be

considered worthwhile. The specific criteria for addressing validity in qualitative research is “trustworthiness”, the parallel term in quantitative research is “rigour”. Rigour according to Morse et al (2002) is the desired goal that is met through specific verification strategies. Morsel et al (2002) warn that without rigour, research is worthless. Gion (2002) warns that research must be “certain” in that the findings must be backed by evidence.

Lincoln and Guba (1985) provide the alternative to validity and reliability in qualitative studies as “trustworthiness” which has four aspects; credibility, transferability, dependability and confirmability.

Validity and reliability were ensured through different data strategies such including triangulation, verification and instrument pre-testing and approval.

3.8.1 Triangulation

Multiple triangulation methods were used in this study. Triangulation validates results of a study when different research methods are used and the outcome produces similar result; hence enhance reliability (Sekaran and Bougie, 2016). Blumbery (2011) confirms that the purpose of triangulation is to verify validity and reliability of information gathered through multiple sources vis-à-vis description of what is observed. Triangulation is crucial when studying human behaviour. Multiple sources of data collection enhances rigour of the research (Robson, 2002). Ngulube (2005) agrees that triangulation method provides a “complete” picture of a situation, which cannot be achieved through a single method. Application of triangulation in research

is justified because each method has its disadvantages and can only balance by applying another method to help counteract these disadvantages.

Cohen, Manion and Morrison (2007: 140-141) explain that

> *"Triangulation is a powerful way of demonstrating concurrent validity especially in qualitative research. It is also expected that concurrent validity is achieved when data gathered using one method concurs or agrees significantly with data gathered using a different method,(p. 140)".*

Golafshan (2003) asserts that triangulation counters all risks to validity and therefore helps qualitative researchers demonstrate validity in their studies. For the purpose of this study, triangulation strategy was employed to ascertain high degree of validity and reliability at two levels; data and methodological triangulations.

3.8.1.1 Data Triangulation

Data triangulation comprises the use of various sources of data to gather different views about a situation in one study (Roberts and Taylor, 2002). In the case of this study, data were gathered from different interviews such as users of Maarifa centres, managers of the telecentres, the agency responsible for Maarifa centres' projects (ALIN), and government agencies providing infrastructural support to Maarifa centres' projects. Various focus discussion groups and observation methods were used as well. This helped collaborate multiple data sources and therefore enhance

validity and reliability of the findings by investigating varied views of the situation under study (Taylor, Kermode and Roberts, 2007).

The different sources of data were triangulated by checking the outcomes that collaborate from all stakeholders or groups. Guion (2002) notes the importance of such triangulation, that if every stakeholder is looking at the same issue (in the case of this study provision of information and the resultant improved livelihoods) from diverse sources and sees an outcome in the same way, the outcome is likely to be "true".

3.8.1.2 Methodological Triangulation

According to Taylor, Kermode and Roberts (2007), methodological triangulation "involves using two or more research methods in one study at the level of data collection or design". In other words, the methods include: various case studies, qualitative and/or quantitative methods. This study used case study research design, and multiple data gathering methods in form of different interviews, observation for collecting both qualitative and quantitative data.

The methods used complimented each other; responses were compared across the methods to establish rigour of data collection. One important benefit of triangulation method according to Robson (2002) is the reduction of inappropriate certainty. Methodological triangulation provides confirmation of findings and enhances understanding of the studied phenomena (Halcomb and Andrews, 2005).

3.9 Instruments Pre-Testing and Approval

Instruments pre-test phase of the study tested all the data collection techniques. Analysis of the data collected during instrument pre-testing was also conducted to demonstrate the reconciliation of the research design and data collection methods with the study's aim and objectives. Pre-testing is an effective technique for improving validity in qualitative data collection procedures and interpretation of the findings (Brown, Lindenberge and Bryant, 2008). Since qualitative research is by nature very interactive, so does the pre-testing present an interaction to self-correct between design and implementation to ensure an opportunity for attaining reliability and rigour.

Data collection instruments for this study such as interview schedules (Appendices 1–4), FGD questions (Appendix 5) and observation guide (Appendix 6), were prepared in consultation with the supervisors. Guidelines such as those provided by Kothari (2004) were used. The purpose of pretesting was to enhance the quality of the instruments. The pretesting was done by a panel from the researchers' professional colleagues including librarians and lecturers in library and information studies and research methodology from various Kenyan universities. The researcher also engaged the Deputy Director, ALIN to look at the schedules.

3.10 Pilot Study

The researcher and two research assistants visited one Maarifa centre (Isinya) to pilot and then had a brainstorming session. Most of the research assistants were post-graduate students who made informed contributions.

The panellist provided constructive criticism for revision of the instruments. All the observations were integrate into the instruments to produce a final version. The final version of the instruments were verified and approved by the research supervisors. Results from Isinya Maarifa centre eventually formed part of the study findings.

Pre-testing and piloting process was necessary as it increased validity and usability of the instruments.

3.11 Data Collection Methods

While establishing the issue of improved livelihoods through provision of information by Maarifa centres, problems were to be identified and solutions suggested. This is in line with the aim of this study which was to investigate the extent to which Maarifa centres are providing information to communities in ASALs with a view of establishing the challenges and coming up with a framework for improving information provision. This study employed qualitative data collection methods to help understand Maarifa centres as well as factors affecting their contribution to improved livelihoods. Quantitative method was also used albeit on a small scale.

This study used structured and semi-structured interviews, focus group discussions and observation techniques as instruments of collecting data. The use of various instruments in data collection was important to compliment shortfalls of the different data-gathering instruments.

Interview was the dominant method of collecting data in this study because the study had four sets of interview schedules (see Appendix 1–4). The interviews were

conducted using structured questionnaires which had predetermined questions. The interviewer followed a rigid procedure of written questions to ensure that no omission of pertinent aspects was experienced. The questions were semi-structured; this allowed the researcher to probe and encouraged the interviewer and interviewee to discuss some areas in more detail. Qualitative interviews are fairly informal and this makes participants feel they are taking part in a conversation or discussion.

Focus group discussion (FGD) is a good way to gather together people from similar backgrounds or experiences on a specific topic of interest. Compositions of seven participants in FGD were picked from among users of Maarifa centres under study; users formed a key segment of this study's respondents. Managers of the Maarifa centres participated in the FGD sessions. FGD facilitators posed questions from the focus group discussion guide (see appendix 5). These questions were prepared beforehand in line with the objectives of the study.

FGD was chosen because it is a good method of data collection. It allowed the participants to discuss and provide insight into how those in the group thought about the role of Maarifa centres in the provision of information and conversely how they benefited from it. Different opinions were gathered from participants who enriched the findings of the study. FGD helped obtain more information because being a collective discussion; FGD enhances the understanding of circumstances, behaviour and opinion.

Observation method of data collection involved collecting data with help of observation by the researcher being present in the five selected Maarifa centres and

making observations. The researcher used an observation guide (Appendix 6) designed before going to the field. Young (1966) defined observation as "systematic viewing, coupled with consideration of seen phenomenon." Observation method has some advantages such as; the researcher gets current information and that the research is independent from respondent's variable as in interview where respondents' bias creeps in. Observation can also serve as a technique for verifying or nullifying information provided in the face-to-face interviews. Techniques used to collect data during observation were writing down description of people, situations and environment as well as taking photographs of activities. The researcher made observation in a very natural setting without making it known to the users. One research assistant at each of the five Maarifa centre was busy making observation alongside other research activities. In other words, while research activities like FGDs were taking place outside, a research assistant was busy making observation inside the Maarifa centre. Observation was conducted for three days.

3.12 Data Analysis

Data gathered during data collection is expected to convert it to information. Data analysis, according to Kothari (1990), summarises the collected data through a number of closely related activities. Data analysis organises data in an organised manner that they answer all the research questions. The operations of data analysis according to Kerlinger (1986); Marshall and Rossman (1989) include editing, coding, classifying and tabulating. It also entails categorising, ordering, manipulating and summarising data, to find answers to the research questions.

3.12.1 Analysing Qualitative Data with Nvivo

Analysing qualitative data is mostly mechanical exercise, it however requires the researcher to have a very high degree of intellectual propagation; he "has to be dynamic, intuitive and creative, to be able to think, reason and theorise" (Basit, 2003).

NUD.IST Vivo (Nvivo) is a qualitative data analysis software package designed for handling data that are not in form of number. Nvivo was consider ideal for this study because its data were majorly qualitative. For this study, the processes of organising data in terms arranging the data, reading through the collected data and trying to internalise the data was done concurrently during data collection process.

Data were repackaged in terms of transcribing, typing then imported into the Nvivo software progressively during data collection. Data were coded and categorised according their meaning. This meaning was re-contextualised as new data continued continued going through analysis. According to Lyn (2005), the dynamics of data analysis change with every new data input which continually informing the analytic processes.

Data from the semi-structured interviews with users of Maarifa centres that emanate from the set of closed-ended questions required to be processed using quantitative analysis. In this case SPSS was used to analyse descriptive statistics involving frequencies and percentages to facilitate graphical and tabular presentations.

3.13 Ethical Considerations

Ethical considerations represent a moral obligation that calls for high professional standards of technical procedures, respect and protection for the respondents

participating in the study (Payne and Payne 2004). According to Busha and Harter (1981), professional ethical standards should be adhered to during all phases of the research process.

Among the ethical consideration facets include: protecting the confidentiality of respondents, adhering to procedures and conditions spelt out by institutions where research is to be carried out. Accurate reporting of procedures and findings, obtaining informed consent from the respondents, acknowledging all research associates and applying intellectual honesty (Cohen, Manion and Morrison 2000; Busha and Harter, 1981; Leedy and Ormrod, 2001).

The researcher of this study strived to adhere to ethical research considerations such as; avoiding data fabrication, academic dishonesty in falsification and plagiarism. Permission to conduct the study was obtained from the relevant authorities such as ALIN headquarters and the Ministry of Research Science and Technology (now Ministry of Education, Science and Technology**)** before commencement of data collection (see appendices 9 and 10). During data collection the researcher explained the aim and significance of the study to the respondents, and consent for participating in the interviews and focus group discussions was sought from them. The researcher guaranteed the respondents that information collected would be treated with due confidentiality and was used purely for research work. The informants' identification was protected by making them anonymous in the final report. The questions that respondents were asked were carefully structured, to avoid questions that might embarrass and/or annoy the respondents.

Non-coercive disclosure; respondents were free to answer or not to answer any question; they were also free to withdraw from the interviews.

Privacy of the respondents; the researcher ensured that all the images in the text were extracted from open source; they were for purposes of displaying information services at the Maarifa centres. They did not in any way interfere with individuals need for privacy.

Purpose of the research; ALIN acknowledge that the findings of this research will contribute towards a better understanding of telecentres in improving social and economic development among rural communities (see appendix 9)

3.14 Chapter Summary

Chapter three presented the road map to the research process including research design, methods of data collection employed in this study were discussed in detail, justification for the selection instruments for data collection was provided. This chapter presented issues of validity and reliability including ethical standard that were embraced during the entire research process were presented. This chapter finally discussed methods of data analysis to be used in the study. The following chapter four will present the results.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the analysis and interpretation of the findings as guided by the objectives. The study targeted the following respondents: five telecentre managers; telecentre users; the ALIN director; the ICT Board director; and officers from the Communication Authority of Kenya (CAK), all of whom were respondents. Focused Group Discussions (FGDs) were also conducted with telecentre users. The findings are organised according to the objectives. The findings are presented in tables, graphs and charts as appropriate with explanations being given in prose thereafter.

The SPSS was used to analyse quantitative data. Data were analysed using descriptive statistics whereby frequencies, percentages, mean and standard deviations generated from the various data categories computed and presented in graphs and tables. On the other hand, qualitative data were analysed using Nvivo 9. Information relating to identified themes was coded based on the responses from the interviewees on the role Maarifa centres play in providing information to communities in ASALs.

4.1.1 Response Rate

Among the target population of 80 individuals in the communities surrounding Maarifa telecentres, specifically users of the telecentres, managers of the selected telecentres and personnel responsible for managing Maarifa centres ASALs of Kenya, 50 respondents were interviewed translating to a response rate of 62.5 %. Mugenda

.and Mugenda (1999) state that a response rate of 50% and above is good for a credible research.

4.2 Demographic information

To understand how telecentres function in providing information for improved livelihoods, it is important to establish whose livelihoods these Maarifa centres support. This is established by gathering the demographic information of Maarifa centre users. The survey required to identify the users' age, gender, educational level, occupation and the general economic status of the families of telecentre users.

4.2.1 Distribution of the Telecentre Users by Age

The telecentre users were to indicate the age bracket that they belonged to. The findings are as shown in Figure 4.1 below

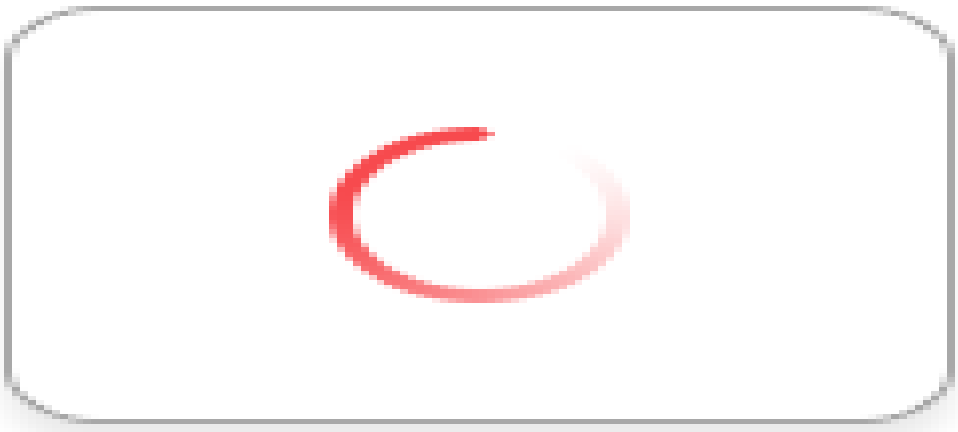

Figure 4.1: Distribution of Telecentre Users by Age

The most popular age group that visited the telecentres in general were aged between 19-25 years. Based on the findings, majority of the users in Marigat (65%) (32) were aged between 19-25 years. In addition, 70% (35) in Nguruman were aged between 19-25 years, 60% (30) in Ng'arua, 45% (22) in Isinya and 50% (25) in Mutomo were in this age bracket. However, in all the centres, there was low representation of the users above the age of 25 years. This shows that Maarifa centres benefited people across all age groups with the majority falling in the 19 to 35 age group who are categorised as youth.

4.2.2 Gender Distribution of Telecentre Users

The study sought to find out the gender of the respondents and the findings are as indicated in table 4.2 below.

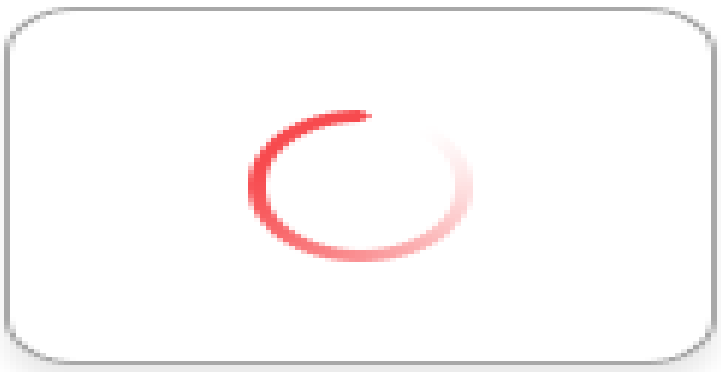

Figure 4.2 Distribution of Telecentre Users by Gender

Regarding the gender of users, majority of the users in all Maarifa centres sampled were male; with 60% (30) representation in Mutomo, 55% (27) in Isinya, 60% (30) in Ng'arua, 80% (40) in Nguruman and 70% (35) in Marigat. There is a recognisable

difference in male/female user ratio with Nguruman and Marigat recording very low female user representation.

4.2.3 Telecentre Users' Highest Level of Education

The respondents were requested to indicate their highest level of education. The findings are shown in Figure 4.3 below.

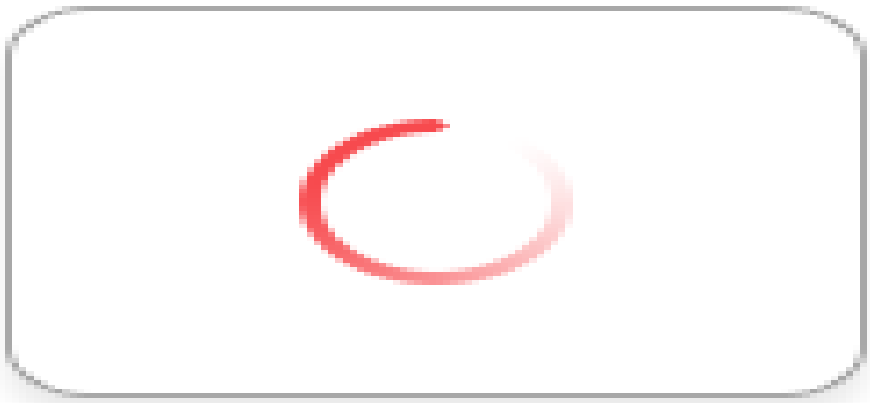

Figure 4.3: Highest Level of Education of Telecentre Users

According to the findings, the highest user group represented by 29.2% (14) of the respondents had attained secondary education (form I-IV), 19.4% (9) had attained higher secondary education (form V-VI), 14.3% (7) had primary school education, and 17.5% (8) had attained tertiary education such as diploma, degree while only 13.1% (6) had attended adult education. The level of education influences the usage of ICT because it determines the ICT skills that the respondents have. More educated people can be trained to apply acquire advanced ICT skills.

4.2.4 Telecentre Users' Occupation

The respondents were asked to indicate their occupation. The findings are as shown in Figure 4.4 below.

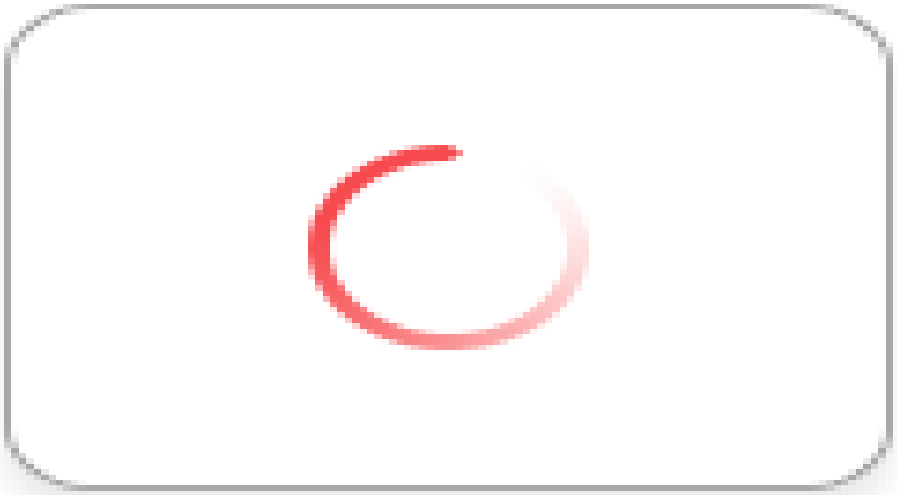

Figure 4.4: Telecentre Users' Occupation

Based on the findings, majority of the telecentres users were students with representation of 85% (42) in Marigat, 50% (25) in Nguruman, 60% (30) in Ng'arua, 60% (30) in Isinya, and 50% (25) in Mutomo. There was also representation from those in informal and formal employment. Those employed in informal sectors, explained that they were involved in farming or in small and medium enterprises. Those in the formal employment were agricultural extension officers. The majority lacked exposure to information because of working in the informal sector where information technology was partially used. 4.2.5 Telecentre users' household composition Maarifa centres' users were asked about their family composition. The findings are shown in Figure 4.5 below.

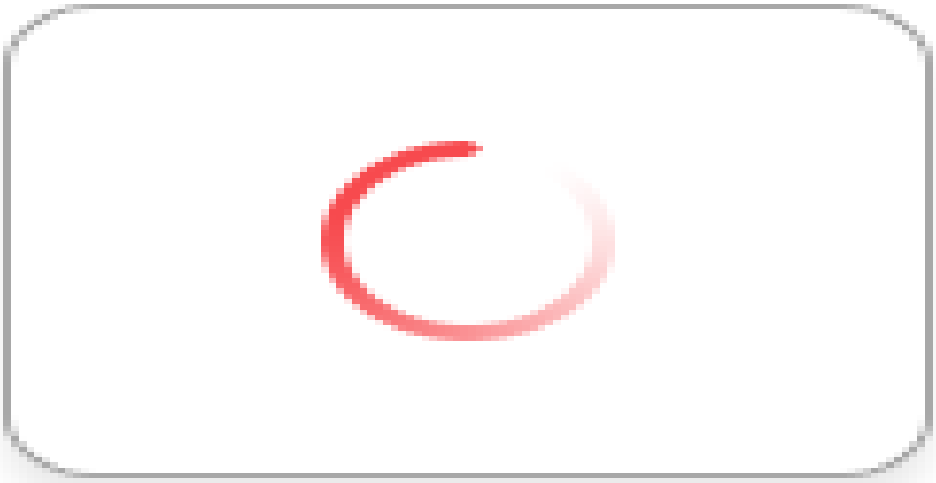

Figure 4.5: Telecentre Users' Family Composition

On the composition of the telecentre users' family, 32.5% (16) of the members were male adults, 30% (15) were female adults, and 25% (12) were male children while 12.5% (6) were female children. This shows that the local populace had families with both genders whose need for access to information was diverse.

4.2.5 Telecentre Users' Family Reliance on Remittances

The study sought to establish the extent to which Maarifa centre users' families depended on support from family members living elsewhere. The results are as tabulated in Figure 4.6 below.

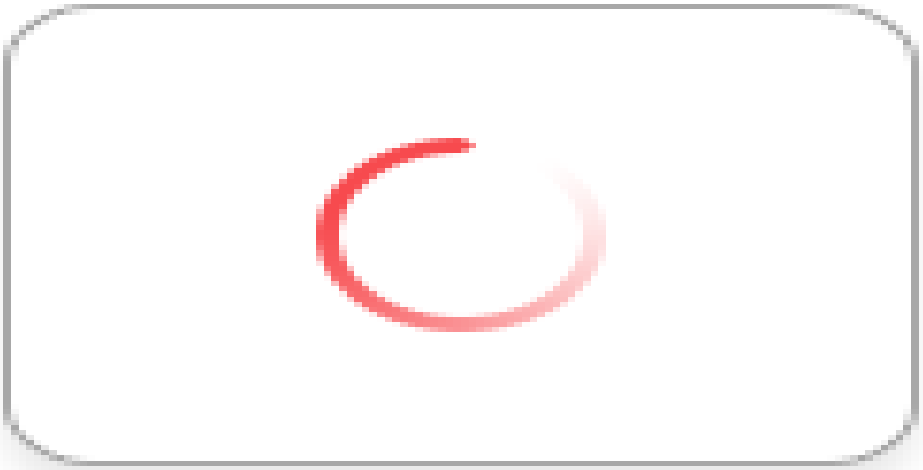

Figure 4.6: Telecentre Users' Family Reliance on Remittances

Based on the findings, 75% (37) of the telecentre users' family did not rely on remittances while only 25% (12) relied on remittances. This shows that majority of the local families did not have external financial support from other sources and solely depended on their own capability to fulfil their financial needs. Therefore, local community empowerment through services offered via telecentres would go a long way in solving the local societies' financial needs.

4.2.6 Telecentre Users' State of the House and Utility Supplies

The telecentres' users were asked to indicate the state of the house that they lived in. They responded as follows:

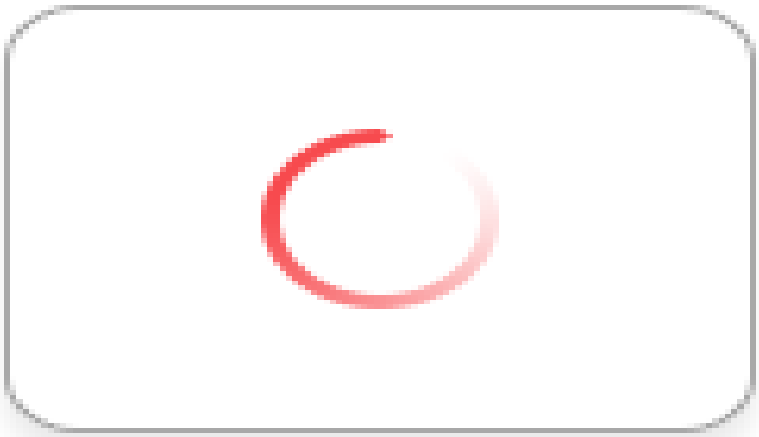

Figure 4.7: Telecentre Users' State of their Houses

The majority of the telecentres' users (60%) (30) live in their own houses while 40% (20) live in rented houses. Asked about the type of the house, whether permanent, semi-permanent or temporary, the respondents gave the below responses:

Figure 4.8: Nature of Telecentre Users' Houses

According to the findings, 53.3% (26) lived in permanent houses, 26.7% (13) lived in semi-permanent houses while 20% (10) lived in temporary houses. Therefore, the families in ASALs live in reasonably good houses as majority live in either permanent or semi-permanent houses.

The telecentres' users were asked to indicate whether they had access to electricity in their homes.

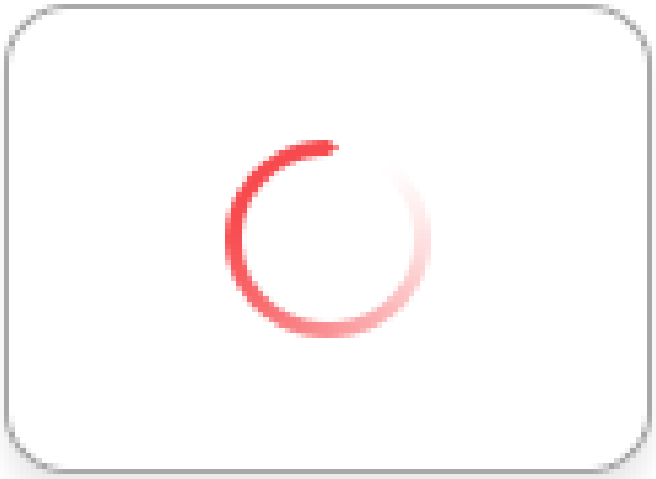

Figure 4.9: Telecentres' Users' Access to Electricity

The majority (67%) (33) Of the respondents did not have electricity in their houses while 33% (16) had electricity in their homes. Therefore, the necessary infrastructure in ASALs like electricity that can facilitate provision of electronic information resources is missing.

The respondents were asked to indicate whether they had access to running water in their homes.

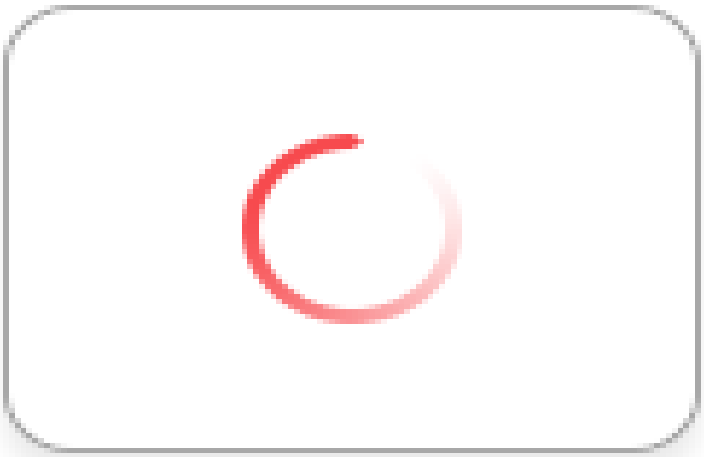

Figure 4.10: Telecentre Users' Access to Running Water

The majority (60%) (30) of the telecentre users' homes did not have running water while 40% (20) had running water in their homes. The local societies therefore lack access to water and other social amenities. This reveals that communities in ASAls live in poverty since water is such a basic source of livelihood.

Respondents were asked to indicate the kind of assets that their families owned.

Table 4.1: Telecentre Users' Ownership of Assets

	Frequency	Percentage (%)
Automobile Car	0	0
Tractor	0	0
Bicycle	27	53.3
Motor cycle	10	20
Computer	17	33.3
Radio	50	100
TV	10	20

According to the findings, 100% (50) of the telecentre users had radio, 53.3% (27) had bicycles, and 33.3% (17) had computers while 20% (10) had motor cycles. This means majority of the respondents are poor because they cannot afford to buy expensive assets such as cars and tractors. This justifies the intervention of ALIN through Maarifa centre services.

4.3 Relationship between Maarifa Centres and ALIN

ALIN directors were asked to describe the relationship between Maarifa centres and ALIN. They explained that

> *ALIN's work is mainly field-based. Maarifa centres are physical spaces where the work takes place. The director described Maarifa centres as ALIN's field offices; they are points of ALIN's engagement with communities.*

This points to the issue of telecenter's relevance even in the advent of mobile phones. As much as mobile phones are being heavily used to disseminate information to communities in ASALs, Maarifa centres are practically still useful.

4.3.1 Rationale behind Maarifa Projects' Establishment

The study sought to find out the rationale behind Maarifa projects being established in rural communities. The managers indicated that Maarifa centres were established;

> *to give people information that can help them improve their livelihoods. They have changed the lives of the people as they currently do not travel for long distances to access information. They are able to access e-government services such as acquiring a Personal Identification Number (PIN) and filing Kenya Revenue Authority Returns (KRA), application for jobs, access to agricultural information among others.*

The aim of Maarifa centres was to provide information to the community. The objective was to enlarge the outreach to the people in remote areas, enabling access, creating knowledge and empowering communities. The other aim was to improve their ICT skills, increase the local content and open rural areas to opportunities such as e-learning, e-government and e-commerce.

Again this is replicated by the government's plan to introduce Digital Village Project (DVP) so as "to provide services to Kenyans living in the rural areas to facilitate access to information through the internet." Through Pasha (a Kiswahili word meaning 'inform'; it is an ICT Board project that takes online services to marginalized communities in Kenya) , Kenyans are expected to access government services like NSSF statements, driving license application forms, police abstracts, etc. in remote areas without having to travel to major towns. These documents are in 'open access' where information outs are availed free of all restriction on access and can therefore be downloaded even at Maarifa centres.

4.3.2 Role of ALIN within Telecentre Movement

ALIN directors were asked to state the role of ALIN within telecentre movement. They explained that;

> *ALIN has been a member of the telecentre movement, with Maarifa centres being their flagship. Now that mobile devices predominate technology delivery, Maarifa centres as currently constituted will have to change both in structure and the services they offer. ALIN's focus now is on how to use mobile devices to link farmers with information and knowledge about agriculture and livestock value chains. This is being done through Sokopepe. (www.sokopepe.co.ke).*

ALIN directors further explained the achievements of Maarifa centre initiatives.

> *Maarifa centre initiatives were global recognition as a model that was ahead of its time.*

This is a clear indication of Maarifa centres relevance and success within the ASALs communities

4.3.3 Role and Responsibilities of ALIN Directors

The ALIN directors were asked to state their roles and responsibilities. They indicated that their roles were those of;

- *Coordinating programs*
- *Strategic planning and implementation*
- *Resource mobilization*
- *Team management*
- *Networking and outreach*

ALIN's headquarter is located in Nairobi where most of the background activates for Maarifa centres are executed then cascaded down to the centres.

4.4 Services Provided by Maarifa Centres

The first objective of this study was to map and audit the services provided by Maarifa centres to rural communities in ASALs in Kenya. The aim of finding out the services offered was to identify how Maarifa centres support livelihoods in the communities that they serve. The specific questions were: "What range of services do Maarifa centres offer? Do they offer specific services to support certain economic activities so as to improve livelihoods?" The findings are as discussed in the subsequent sections.

From the FGDs, the study established that people understood telecentres and Maarifa centres. Respondents said they visit Maarifa centres to:

> *Access internet, borrow books and DVDs and be trained in computer skills, access information through internet, charge phones and laptops and access e-mails.*

The main aim of Maarifa centres is to improve ICT skills, increase local content and open rural areas to opportunities to ICT related services such as marketing and accessing competitive prices of produce and outsourcing among other services mentioned earlier.

Respondents further stated that information is accessed through community-based Maarifa centres via a range of channels such as; "Web portals", "Web 2.0 applications", "mobile phone platforms" such as Sokopepe, "workshops" in collaboration with the Ministry of Agriculture, "exchange visits" and "regular publications" for instance *Baobab Journal*.

The telecentre managers indicated that users visit Maarifa centres for:

> *personal communication, business communication, to buy goods or services, to sell goods or services, to search for information and get assistance on administrative matters.*

Therefore, Maarifa centres are very important institutions where the rural communities in ASALs in Kenya access information and other services using modern technologies that improve their livelihoods.

4.4.1 Categories of Users and Services Offered by Maarifa Centres

The study sought to find out what categories of users are served by the Maarifa centres. The telecentre managers explained that the users were:

> *Mainly local community members, students – both high school leavers and those in institutions of higher learning –farmers, civil servants and teachers, business community and the self employed.*

This means that Maarifa centres serve as a critical source of information to a diverse population of the rural communities in ASALs in Kenya.

The study sought to find out the key services offered by Maarifa centres. The key services offered at Maarifa centres are documentation and information dissemination through blogs, magazines, films, journals, word of mouth and posters. Maarifa centres link the communities with news sources and brings together farmers and small business traders to tell their testimonies, promote their brands and sell their products and services online through Sokopepe. Maarifa centres' users further stated that the other services offered included training on modern methods of farming by field officers and advisory services,

The study sought to establish whether Maarifa centres' users were satisfied with the telecentre services. From the findings, majority 73.46% (36) of the users were satisfied while 26.53% (13) were not satisfied with the telecentre services. Therefore, the level of satisfaction on information services offered at Maarifa centres was high.

Maarifa centres' users were asked how they accessed the same services before the telecentres were established. They explained that they:

- *Visited cyber cafes in the urban areas closest to where they lived.*
- *Used mobile phones to surf the internet.*
- *Were quick to mention that they had to travel to far off distances to access the same services they now get at the telecentre like the library services and computer services.*

This shows that Maarifa centres are essential facilities because, compared to other information services providers, they have enhanced access to information. The reason may be that the services offered are free of charge and are easily accessible. From these findings, it is clear that Maarifa centres improve people's lives because training is important; it helps develop competencies that telecentre users need to improve their human capital. Relevant training will then enhance users' financial assets because trainees will be able to apply skills acquired (UNCTAD 2007).

The study sought to find out the mechanisms used by Maarifa centres to avail, train and sensitise people on ICT related issues. The managers indicated that they used community networks to pass information such as the social gatherings, *barazas* and notice boards. These methods are good but Maarifa centre can do better marketing through mass media especially radio considering that most households have them. Maarifa centres mainly focus on providing basic ICT skills. They use classes with computers to train and sensitise the local community about various issues.

4.4.2 Access and Use Pattern of Information by Rural Communities

The study was also to examine access and the use pattern of information by rural communities benefiting from Maarifa centres.

Majority of the users (67.34%) (33) had not heard about the telecentre before while 32.653% (16) had heard about a telecentre before one was established in their area.

Among those who had heard about a telecentre got the information from advertisements posted on notice boards at strategic places and signs along the main roads, some heard from friends, while others had been approached to be members of Maarifa centre committees. This shows that ALIN needs to be aggressive in marketing Maarifa centres now that they are already established. Majority of the people living in ASALs had not heard about telecentres before their inception in their respective areas.

The main reasons why users visit Maarifa centres have been stated, other respondents said that they used Maarifa centres to:

> *do research, enhance my reading culture through borrowing of books and other information materials, attend committee meetings, receive training on farming from field officers and Ministry of Agriculture officials, charge phone and socialisation.*

This shows that the rural communities have diverse needs that are met by Maarifa centres. The users are able to access a wide range of information services and resources in the telecentres.

The main purposes of using the telecentre can be compounded; “receiving training,” “searching for information,” and “personal communication.” This means that Maarifa centres contribute to improved quality of life in the areas of information and knowledge.

The study sought to establish how often Maarifa centres’ users visited the telecentre. According to the findings, 61.2 % (30) visited the telecentre on weekly basis, while 40.8% (20) visited on fortnight basis. This shows that the users of Maarifa centres rely

heavily on services provided by the telecentres especially access to information for enhancing their livelihood.

Telecentres' users were asked to comment about the distance from their homes to where the telecentres were located. The majority (53.06%) (26) of the users posited that the distance to the telecentre was less than 1 km, 34.7% (17) said it was 1-5 km while 14.3% (7) indicated that it was over five kilometres. That means Maarifa centres are highly accessible to the local societies as majority did not have to travel long distances to access the centres. This confirms the efforts of ALIN in taking computerised information services to the remote isolated communities.

4.4.3 Business Support Services

The study sought to find out the business support services offered at the different telecentres. It is necessary to note here that training to develop skills is important for stimulating economic activities. Business support services are listed in table 4.2 below:

Table 4.2: Business Support Services

S.NO.	Business support services	Frequency	Percent (%)
1	Typing	24	48
2	Employment opportunity	12	24
3	Tax filing	24	48
4	Access to government services	37	74
5	Job searching/advertising	49	98
6	Content development	37	74
7	Access to professional/sector-specific information	49	98
8	Searching for information	49	98
9	Advertising	12	24
10	Export-import/trade	24	48
11	Facilitation services	37	74
12	Buying and selling	37	74
13	Data storage and management	24	48
14	Microfinance (access to credit)	12	24

According to the findings, the business support services offered at the different Maarifa centres included; access to professional/sector-specific information 98% (49), searching for information 98% (49) job searching/advertising 98% (49), buying and selling 74% (37), facilitation services 74% (37), content development 74% (37), access to government services 74% (37), data storage and management 48% (24), export-import/trade 48% (24), tax filing 48% (24), typing 48% (24), employment opportunity 24% (12), advertising 24% (12) and access to micro finance 24% (12) respectively.

From the responses above, it is evident that Maarifa centres support economic activities through its business support services. The services most consistently

provided include “job searching and advertising”, “access to professional information” and “searching for information”. Other services more widely available are “access to government services”, “content development”, “facilitation service” and “buying and selling”. Services like “tax filing” are not very prominent because they are new phenomena that need to be made popular by the government. “Advertising” and “microfinance” services have limited support from Maarifa centres because they require specialised skills and additional infrastructure that is not available. Maarifa centres have so far been giving more basic services and specific knowledge requirements.

According to UNCTAD (2007-2008), business-related services can be supported in a number of ways, among them;

i. *Through specific training courses*
ii. *Provision of service by the telecentre staff (p.278)*

As part of broader training courses for instance, a general course on ICT may teach how to search the internet for general and sector-specific information, make payments online and access different e-government services.

The findings show that Maarifa centres are a strategic source of business information that helps the rural communities in ASALs to learn and access opportunities that may assist them in improving their livelihoods.

4.4.4 Respondents' Level of Computer Training

The users were asked to state whether they had undergone computer training at the telecentre. The majority (80%) (40) Of the telecentres' users stated that they had undergone computer training at Maarifa centres. Only 20% (10) of the users stated that they had not undergone computer training at the telecentres. They were trained in introduction to computers and packages like MS Word, Microsoft Excel, Windows, PowerPoint, internet and e-mail.

The study inquired from the telecentres' users their reason for attending computer training. Explanations given by respondents indicated that they attended computer training to *"acquire modern information technology and to gain computer knowledge"*. This illustrates that users relied on the computer training offered at Maarifa centres to update themselves on modern information technologies and to build their capacity in use of ICTs.

This means with telecentres, majority of the local community would lack computer literacy that enable them to exploit or benefit from the services offered at the Maarifa centres. It further points to the great role that the Maarifa centres play in building the capacity of the rural communities in ASALs towards bridging the digital divide. This is because Maarifa centres are the only places where majority of users can learn computer and other IT related skills.

The respondents were asked to indicate in what ways the training had been useful. Based on the findings, they indicated that they had learnt how to:

- *Use internet and access e-mails,*
- *Apply for scholarships,*
- *Use of social networks like Face book,*
- *Make online applications,*
- *Acquire skills to qualify for new jobs,*
- *Access online information.*

Form four school leavers showed increased interest in studying IT related subjects at advanced level after interacting with the telecentres.

This shows that Maarifa centres play an important role in empowering rural communities by enhancing access to information. Maarifa centres benefited the rural communities in use of internet, social networking and access to strategic information such as jobs, e-government services, and agricultural advisory services, among others.

According to UNCTAD (2007), "*the greatest impact of a telecentre comes from the acquisition of new skills which in turn enhance their economic activities" (p.287).*

4.4.5 Proficiency in Using Computers, Internet and E-mail

Respondents were asked to indicate their proficiency in using computers, internet and e-mail. The responses are as shown in figure 4.3 below.

Table 4.3: Telecentre Users' Proficiency to Use Computers, Internet and E-mail

Using computers, internet and e-mail	**Yes**		**No**	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Do you know how to use a computer?	40	80	10	20
Do you know how to use the internet?	37	74	13	26
Do you know how to use e-mail?	30	60	20	40
Do you have an e-mail address?	33	66	17	34

According to the findings, 80% (40) posited that they knew how to use computers while 20% (10) posited that they do not know how to use a computer. Meanwhile 74% (37) indicated that they knew how to use the internet while 26% (13) indicated that they did not know how to use the internet. On the other hand, 60% (30) attested to knowing how to use e-mail while 40% did not know how to use e-mail. In addition, 66% (33) of the telecentres' users indicated that they had an e-mail address while 34% (17) indicated that they did not have an e-mail address.

The findings show that majority of the telecentres' users are equipped with the skills of exploiting electronic information services offered in Maarifa centres such as using computers, internet and e-mail. It further indicates that Maarifa centres have successfully empowered the rural communities in ASALs in accessing information through the internet which consequently has opened new opportunities of learning new ideas that they could apply to better their lives.

Asked to indicate how they communicated by e-mail, respondents elaborated that they communicated by e-mail by sending attachment, through messaging and by sending and receiving e-mails.

Respondents were also asked to state what they normally used e-mail for. The findings show that they used e-mail for "business communication", "social communication" with friends and family, "gaining new knowledge", "communicating during emergencies" (family and friends), "official communication with job supervisors and main office" for field workers.

This shows that the internet has enabled respondents to communicate with other people on diverse issues that affect their lives. They are able to communicate detailed information at a very low or no cost through e-mail, something that is not possible with other channels of communication like mobile phones and the commercial cyber cafes.

The study further required telecentres' users to state how many times they used e-mail in a month. The findings show that 74% (37) used e-mail on weekly basis, 20% (10) on daily basis while 6% (3) used e-mail on fortnight basis. This shows that rural communities in ASALs regularly and heavily rely on internet to communicate to other people. Therefore internet communication through e-mails is a critical channel of communication for the beneficiaries of Maarifa centres because of the high frequency of use of the e-mail platform.

4.4.6 Respondents' Investment in Financial and Social Capital and, Improvement of Life

The five types of capital assets in the SLA are represented by the shape of a pentagon; these SLA assets are human, social, natural, physical and capital assets are considered to represent the needs of the poor in order for them to sustain an adequate income to live. The assets are applied to ICTs and their interaction to improve livelihoods outcome. For instance, how does the community use the internet to realise social equity, improve education, agriculture and marketing and, at what cost?

Respondents were asked to state how much it cost them to access the services offered at Maarifa centres. According to the findings, they unanimously agreed that they did

not pay any money to access the services at the telecentres. Therefore, the ICT services are offered free of charge. This proves that Maarifa centres have enabled rural communities in ASALs to access information free of charge as majority of the community members are economically challenged. They cannot afford the information services offered by other service providers and therefore Maarifa centres are very important sources of information because they are free of charge.

Maarifa centres' users were asked to explain how their investment in the use of the telecentres had been helpful for financial capital. They explained that:

> *Maarifa centre saved us travelling costs, cyber costs and cost of purchasing textbooks, magazines and newspapers.*

This shows that Maarifa centres are instrumental in reducing the amount of money that the rural communities use to cater for their information needs. Therefore, their livelihoods were improved as they had more financial resources to use for other household needs.

When asked to indicate how the telecentres had improved their lives, respondents explained:

- *I have gained skills on how to use computers, how to access internet and other sources of information;*
- *I have enhanced my career growth because am able to apply for jobs online as well as learn of new career opportunities.*
- *Communication has improved because I can interact with friends through social media platforms.*
- *I receive up-to-date information from the field officers on farming through researches the field officers conduct from the internet at Maarifa centres.*

These changes translated into improved quality of life, improved income levels, access to public goods and services, coverage of basic needs like health, housing and nutrition, social relations and confidence level. Most of the respondents cited:

- *Behavioural change due to confidence gained in the use of ICTs.*
- *Improved income levels as a result of getting employed or job promotion after acquiring computer skills from Maarifa centres.*
- *Improved provision of information needs especially distance learning students and agricultural extension workers.*
- *Improved public services like access to digital KRA information e.g. iTax, university enrolment and HELB application forms.*
- *Improved access to agricultural and marketing information is critical because it helps increase income through better prices and people in ASALs can in turn afford food, shelter, health facilities and education.*

Respondents were asked to indicate how their investment in the use of the internet had been helpful for social communications. According to the findings, they explained:

- *I have been able to connect and interact with friends through social media like Face book and twitter.*
- *Internet has helped me in linking up with the extension officers and sharing of knowledge on better methods of farming and income generating activities to boost their livelihoods.*
- *It also had enabled them to send e-mails with the help of the staff at Maarifa centres and in knowledge exchange and ideas with their friends.*

Respondents were also asked to state how inability to access internet impacted on them socially. The findings showed that it would affect them negatively as they would not be able to communicate with friends. They would lose friends who are only accessible through the social network. They would also lack access to current

information that the social media platform provides. This shows that the internet has greatly enhanced the social life of rural communities as they can network as well as share knowledge. Most important, Maarifa centres have opened new opportunities for the rural communities to access new sources of information through the internet that has improved their social lives by being able to interact more with their friends and share information to better their lives.

4.5 Telecentres' Users Response to Functionality 0f Telecentres

Respondents were asked to state the functions of telecentres based on various services that were offered.

Table 4.4: Areas around Functionality of Telecentres (N=50)

S.NO.	Areas around functionality of telecentre	Frequency	%
1	Does the internet facility work at the telecentre?	50	100
2	The last time you went to use the telecentre, were you able to use the internet?	50	100
3	If equipment repairs are needed in the telecentre, do they get done quickly?	33	66
4	Do you feel there are enough teachers at the telecentre?	20	40
5	Do you feel that there are enough software at the facility?	26	52
6	Would you be willing to pay for the improvements of the speed of access?	36	72
7	Do you use the phone services at the telecentre?	23	46

The findings revealed that internet facility was working at the telecentre (100%) (50); respondents stated that the last time they went to use the telecentres; they were able to use the internet (100%) (50). Respondents who said they would be willing to pay for the improvements of the speed of access were (72%) (36). Respondents were asked if

when equipment repairs were needed in the telecentre, they are done quickly, (66%) (33) responded in the affirmative. Asked if there are enough software at the facility (52%) (26) said the software is adequate. The respondents who used phone services at the telecentre were (46%) (23) while those who stated that there were enough teachers at the telecentre were (40%) (20), respectively.

This shows that the Maarifa telecentres are functional all the year round and that the majority of the informational services offered were provided promptly.

4.5.1 Telecentres Working Hours and use

Respondents were asked to indicate for how many hours per day Maarifa centres run. Based on the findings, the majority (100%) (50) of the users indicated that the telecentres were run for 8 hrs a day, between 8 am and 5pm, Monday to Friday. This shows that all the Maarifa centres are operational for the better part of the day and therefore the telecentres' users were not restricted in accessing the information services offered as they could visit the Maarifa centres at any time of the day. however, majority of those who work on the farms, herd livestock and other engaged in other livelihood activities were of the opinion that working hours of Maarifa centres be extended till night since these category of users cannot fully exploit resources Maarifa centres during official working hours.

Respondents were also asked to state the type of websites they browsed most often when using the internet. The users stated that the websites they visited included; news, educational, entertainment, social, religious, business, career/work, government information and health.

Based on observation of the search histories, it was found that the websites commonly visited in Isinya, Marigat, Ng'arua, Mutomo and Nguruman were yahoo, Google, social media networks like Face book and Twitter, institutional websites like university and colleges' websites like Kenyatta University, University of Nairobi and government websites like HELB, Kenya Revenue Authority website and e-learning sites.

This shows that through the internet, the rural communities benefit from Maarifa centres by exploiting diverse sources of information that they access as availed from the internet which has increased opportunities to learn new ideas and improve their lives.

Telecentres users were also required to state the various activities that they used the telecentres for as listed in table 4.5 below:

Table 4.5: Telecentre Users' Use of the Telecentre (N=50)

S.NO.	Telecentre users' use of the telecentre	Frequency	Percent (%)
1	Use internet to look for jobs	26	52
2	Use of computer skills to get an office job	23	46
3	Use of computer to access e-government services	17	34
4	Use of computers to send e-mail or to chat with people outside the community	43	86
5	Use of computers to write letters to the authorities	40	80
6	Use of computers to read newspapers and magazines	30	60
7	Use of computers to access health information	26	52
8	Use of computers to do homework for school	36	72
9	Use of computer to create a community newspaper or magazine	20	40

Among the various ways that the telecentres' users benefited from Maarifa centres include; use of computers to send e-mail or to chat with people outside the community (86%) (43); use of computers to write letters to the authorities (80%) (40); use of computers to do homework for school (72%) (36); use of computers to read newspapers and magazines (60%) (30); use of computers to access health information (52%) (26); use of internet to look for jobs (52%) (26); use of computer knowledge to get an office job (46%) (23); use of computer to create a community newspapers or magazines (40%) (20); and use of computer to access e-government services (34%) (17) respectively.

4.5.2 Number of People Using Telecentre per Day

Based on observation, this study found that in Isinya centre, the number of people using the telecentre per day was 50 in Marigat, 70 in Ng'arua, 10 in Maarifa centre and 30 in Nguruman.

This shows that, Maarifa centres are always busy serving the rural communities in ASALs by providing them with information because for every given day, they had users coming to access their services. However, Ng'arua Maarifa centre was not fully used by the community because it served the least number of members per day.

Based on observation, it was found that more male than female patrons were using the telecentre in Isinya. In Ng'arua Maarifa centre, the ratio of telecentre users was two males to one female (2:1). During school holidays, majority of the users were students while when school were in session, the majority of the users were the parents.

4.5.3 Level of Information Service Satisfaction by Respondents

From the FGDs, the study established that the ICT related needs in the community were;

> *lack of computer knowledge among the community members, need for a marketing channels for their farm produce, need to be updated with current affairs, library services, information services and computer training.*

These ICT needs could effectively be satisfied if members of ASAL communities were involved in establishment of Maarifa centres. The study however, established that the level of community members' involvement in the Maarifa project design and implementation process was very low as only very few were involved at inception. The community provided land, was part of the committees helping in the project implementation and helped in mobilising the community to participate in the establishment of the telecentres.

Those that are involved now help the field officers and community knowledge facilitators (CKF) in running the centres, providing security and solving problems. This shows that there is some community participation in the Maarifa project design and implementation process as seen through community focal groups that are involved in the management of the telecentres as well as provision of land to construct the telecentres.

4.6 Sources and Forms of information

Based on observation, it was found that in Isinya, Marigat, Ng'arua, Mutomo and Nguruman telecentres, the other sources of information besides the internet include

the print media (magazines and newspapers), the mass media (radio and TV), campaign materials such as banners on HIV/Aids and drug abuse, books and journals.

From the FGDs, the study established that majority of the residents would not have preferred that the money spent by ALIN on Maarifa centre be instead spent on another project. This shows that the Maarifa centres are very useful to the rural communities in ASALs as it has reduced the information gap that existed between them and other places in the country and beyond.

From the FGDs, the study established that to get information on pasture, seed/fertilisers, product prices and marketing information, people physically walked to the Ministry of Agriculture offices, use print media (newspapers), check information in business sites, books, DVDs, internet, magazines, marketing blogs or use Google search.

The study also sought to find out strategies put in place to ensure that users accessed information relevant to their needs. The managers explained that through the inquiry desk, farmers and other centre users identify the problems they face and Maarifa centre staff try to come up with solutions.

4.6.1 Maarifa Project Intervention to Community Information Problems

From the FGDs, respondents who were mostly the youth explained that the biggest community-related problems faced before the establishment of Maarifa centres project included:

- *Lack of digital literacy and lack of internet services.*

- *The youth lacked a place to train on computer use which reduced their chances of being employed due to lack of ICT skills required by the employers.*
- *They also lacked information on current affairs, research opportunities, livestock and farming opportunities, health information and lack of information on effects of climate change.*
- *exploitation and monopoly by cyber cafés who charged high fees for computer, skills training and access to information. In addition, the cyber cafes were limited.*
- *poor access to information on farming,*
- *low literacy levels,*
- *lack of ICT related skills and*
- *lack of library services.*

Respondents further explained that the establishment of Maarifa centres has solved community-related problems by:

- *Availing internet services and enhancing computer skills of users.*
- *Farmers easily access information on farm inputs, prices, the existing prices of farm and livestock products.*
- *Access of information on improved livestock keeping practices, disease prevention and various methods of farming is now fast.*

In addition availability of electricity has also played a big role in solving information related problems. Isinya, Ng'arua, Mutomo and Marigat receive electricity from the national grid. To cope with power shortages, the aforementioned Maarifa centres have installed solar panels. However, only in Nguruman gets power from solar energy.

Mobile phones to a large extent have solved the problem of access to information. Based on observation, it was found that majority of the people had mobile phones that they use on daily basis. The mobile phone service coverage in Isinya, Marigat, Ng'arua, Mutomo and Nguruman is adequate especially through the Safaricom mobile services network. This shows that ICT infrastructure in the rural areas in Kenya is sufficient and can be exploited to increase access to information to the rural communities.

There are other services that helped to solve the problem of access to information. Based on observation, it was found that there were alternative computer based information services available in the community such as cyber cafes. However, they are few. For instance, in Isinya, ICT services are available only in Faraja Computer College. In Marigat, there are other ICT services available such as internet cyber cafes while in Ng'arua, there were no other ICT services available in the community apart from the ALIN sponsored Maarifa centre.

In Mutomo Maarifa centre, there are other ICT services available including internet/cyber cafes, which are, profit making. In Nguruman, apart from services provided by the Maarifa centre, there are no other ICT services in the area. This shows that ICT services provided by Maarifa centres to rural communities are strategic and helpful because there are no other ICT service providers. Where alternative services exist, the cost is prohibitive.

4.7 Availability of Infrastructure

Availability of infrastructure was mostly identified through observation and FGDs. This research found that in Isinya, the main road is tarmacked but the feeder roads are in very poor condition. Electricity is also available in the area. There are 70 primary schools in the area. In Marigat, roads are murram but well maintained. In Ng'arua, there are murram roads; electricity is also available from the national grid. Mutomo had a very poor road network. In Nguruman, the road network is also in very poor condition. This is a confirmation that, ASALs in Kenya lack the necessary local infrastructure required to open up of the areas to economic development as well as

such as establishing information centres. The problem of poor infrastructure in rural areas was also cited by the Director of ICT Board.

In all the five telecentres, the ICT infrastructure is adequate. ICT infrastructure in these areas such as mobile phone towers and satellite dishes provided by Safaricom and Airtel are spotted in various localities. Mobile telephony is the most used communication gadget.

The type of internet connection in all the Maarifa centres is the wireless type. In Isinya, Kenya Data Networks provides wireless internet connection; this connection is characterised by slow network connectivity from time to time.

The locally produced information products in Isinya Maarifa centre include DVDs, environmental awareness campaign materials such as posters and agriculture promotion information such as Sokopepe. Marigat Maarifa centre locally produces communication brochures and flags while Ng'arua Maarifa centre published the sign language chart. Information handouts on useful websites such as Sokopepe registrations are printed. Mutomo Maarifa centre does not have locally produced information products. Nguruman Maarifa centre locally produces information products such as local videos, DVDs and posters.

4.7.1 Finances for Running Telecentres and Sustainability

The study sought to find out the monthly cost of running each telecentre and the plans for future funding. The managers stated that the monthly cost ranges from KES 16,000 to KES 30,000 per month, featuring mainly operation costs (KES 6,000),

electricity (KES 2,500) and rent (KES 7,500). The monthly budget was higher when there was farmer training by Kenya Agricultural and Livestock Research Organisation (KALRO) and Kenya Seed officials.

The study sought to find out main sources of finance for the telecentres. The managers stated that the main sources of finance include the government, donors, well-wishers, community and from own generation through income generating activities. This is a replica of the government initiated Digital Villages Projects (DVP) Pasha, launched in January 2009, whose main financier is the government, of Kenya.

Based on observation, this study established that all the five Maarifa centres do not have ample strategies to ensure the telecentre sustainability. Majority of the funds used in the running of Maarifa centres were donor fund which will create a gap in-case the donors withdraw their support. However, the sustainability was guaranteed through community members' voluntarism by working as staff and the 'introduction of revenue collection from computer training', to help run the centre. The funds are however, not sufficient for sustainability.

4.8 Benefits Witnessed in Peoples' Lives since Establishment of Maarifa Centres

From the FGDs, the study established that the change witnessed in people's lives ever since they became project's beneficiaries includes;

- *Learning digital literacy and how to use the internet*
- *Gaining access to more information*
- *Learning new farming skills*
- *Communities have developed interest in learning IT skills to an advanced level*
- *They also benefit from access to real time news*
- *Increased participation in social life, improved social lives*

- *They are more enlightened, and have more access to marketing information and modern methods of farming.*

Therefore, Maarifa centres have improved the livelihoods of the rural communities through creating new possibilities for them to improve their livelihoods such as learning better farming methods as well as marketing their agricultural produce through Sokopepe.com. The centres have also reduced the cost of accessing information. This translates to improved social, human and capital assets.

4.8.1 Relationship between Maarifa Centres' Services and Socio-Economic Development

The study sought to establish the relationship between the services offered by Maarifa centres and socio-economic development of the beneficiary communities. The managers stated that there is a positive relationship because the services offered are in line with the communities' socio-economic needs that enhance livelihoods.

On enquiring about the main areas in which Maarifa centres have helped users, the telecentres' managers explained that Maarifa centres have helped users as indicated in table 4.6 below:

Table 4.6: Areas that the Telecentres helped Users

S.NO.	Areas that the telecentre helped users	Frequency	Percent (%)
1	Acquire new skills	50	100
2	Support existing economic activities	25	50
3	Develop new economic opportunities	37	74
4	Improve self-employment opportunities	37	74
5	Improve salaried employment opportunities	13	26

The managers explained that telecentres help users to; acquire new skills (100%) (50), develop new economic opportunities (74%) (37), improve self-employment opportunities (74%) (37), support existing economic activities (50%) (25) and improve salaried employment opportunities (26%) (13).

Therefore, Maarifa centres were instrumental in improving livelihoods of the rural communities in ASALs because users acquired new skills, developed new economic opportunities, improved self-employment opportunities and supported existing economic activities.

The study sought to find out the changes observed in the lives of Maarifa centres' users. The managers indicated that users:

- *have grown their confidence levels in computer use,*
- *have a better quality of life,*
- *access to good services has increased and,*
- *have more social interaction through the social networks.*

Furthermore, Maarifa centres managers explained that in ASALs communities:

- *There is also better integration of farmers.*
- *Farmers income levels and distribution have increased as they have more access to information on market trends,*
- *There is better access to public goods and services,*
- *There is better social relation through interacting via social media,*
- *There is improved health as they know better ways of disease prevention and control.*

This is a clear indication of improved lives since the introduction of Maarifa centres.

4.9 Studies carried out in the Telecentres

The study sought to find out the kind of studies carried out in Maarifa centres. The findings are as shown in table 4.7 below.

Table 4.7: Studies carried out in the Telecentres

S.NO.	Studies carried out in Maarifa centres	Frequency	Percent (%)
1	Who uses Maarifa centres and for what?	50	100
2	The effectiveness, sustainability and impact of Maarifa centres	12	24
3	The livelihoods of a community	37	74
4	The needs of the community	25	50
5	Diffusion of technology by the community	12	24

According to the findings, the studies carried out in Maarifa centres include; who uses Maarifa centres and for what (100%) (50), the livelihoods of a community (74%) (37), the needs of the community (50%) (25), diffusion of technology by the community (24%) (12) and the effectiveness, sustainability and impact of Maarifa centres (24%) (12).

Therefore, Maarifa centres are instrumental in identifying the needs of the local populace through regular researches that are conducted. This in turn identified home-grown solutions that are most applicable and relevant to the local situations. Thus, Maarifa centres are helpful in improving the livelihoods of rural communities.

The study also sought to find out the results of the data (statistics) collected and analysed at Maarifa centres. The managers said:

> *We carry out needs assessment to help in identifying community information gaps that required to be bridged to facilitate socio-economic development. Through the inquiry desk, the centres are able to know the information needs of the community.*

The statistics from the demographic information in section 4.2.2 show that more men than women use the telecentres. There is high use of information by the community leading to different innovations. The managers further explained that supporting economic activities is an objective of Maarifa centres to a great extent.

4.10 Areas to Promote Livelihoods in the Near Future

The study sought to find out areas in which Maarifa centres' managers believed their telecentres could strongly promote livelihoods in the near future. The manager in charge of Isinya Maarifa centre suggested that:

> *Areas that could promote livelihoods in the near future include marketing of agricultural produce and promotion of formation of farmer organisations such as agribusiness and cooperatives.*

This suggestion is valid creating profitable outlet for agricultural produce for ASALs communities will improve their income. Formation organised economic groups will help farmers make savings for investments.

The study sought to find out whether Maarifa centre managers believed that ICTs contribute to socio-economic development of the people in ASALs. The managers confirmed that ICTs contribute to socio-economic development of the people in communities through:

- *Promotion of new knowledge, sharing of knowledge and enhancing socio-economic development.*

- *Promotion of social interaction and information to enhance the linkages between the community and the experts.*

4.11 Policies Facilitating Development and Utilisation of Maarifa Centres

The third objective of the study was to establish the policies in place that facilitate development and utilisation of Maarifa centres in ASALs in Kenya. The findings are as discussed in the subsequent sections.

The Communication Authority of Kenya (CAK) officers were asked to state the policies or strategies that CAK has put in place to ensure wider accessibility of ICTs to the majority of Kenyans especially those living in ASALs; in other words, to ensure that Maarifa projects reach their beneficiaries.

The CAK officer stated that:

> *CAK is responsible for ensuring that all Kenyans have access to affordable communication services. It regulates the rates of the communication services that are offered to all Kenyans. In addressing the information gaps, CAK has undertaken some pilot projects in certain parts of the country. It provided computers and internet connectivity to the 16 school-based ICT centres, five Maarifa centres and eight centres for persons with disabilities. This was done in collaboration with other players in the communication sector. To enhance access and promote capacity building in ICT, CAK has also partnered with Kenya Institute of Curriculum Development (KICD) to support the digitisation of educational materials.*

Officials from CAK further explained that:

> *The Kenya Communications Act (2009) amendment provides for the establishment of a Universal Service Fund (USF), administered and managed by CAK. The sources of the fund include levies on licenses, appropriations from the government as well as grants and donations. The fund is meant to support the widespread access to ICT services, promote capacity building and innovation in ICT services in the country as well as reduce the digital divide across the country.*

The CAK officers were asked to comment on the Kenyan ICT policy in fostering universal access to ICTs. According to the findings, the Kenyan ICT policy has been successful in achieving its objectives especially in fostering universal access to ICTs. This is shown by the increase in the number of internet users to 69.5 % in 2015 up from 9.7 % in 2015 as reported by CAK and ITU. This was a growth of 11.6%. Similarly there is already in place an ICT curriculum from the Ministry of Education that is facing immediate uptake of the training.

The primary objective of establishing the centre is to build ICT capacity and skills development in the country. In addition telecentres are the community access points mainly adopted for rural and disadvantaged areas to reduce the cost of individual ownership of equipment. Services like the Maarifa centres are offered at subsidised costs to rural communities in ASALs in Kenya. However, ICT sector has digitised the Kenya Certificate of Education Curriculum content and also enabled the computerisation of health centres.

The study sought to find out Maarifa project's relationship with CAK. The CAK officer explained that:

> *CAK has supported the establishment of five Maarifa telecentres which were provided with various communication services. This enhanced ICT capacity in ASALs in Kenya through training and access to information. CAK provided each Maarifa centre with a server, two computers, a printer, and free internet connectivity for one year. The centres are run and managed on behalf of the local people through partnership with ALIN which has sufficient experience in rural ICT development.*

This is clear indication of the strong relationship between ALIN and CAK that has hence supported Maarifa centres initiatives.

4.12 Government, Community and CBO Support to Maarifa Centres

ALIN directors were asked to explain the role of the government and other non-governmental organisations in the implementation and running of the Maarifa centres. The Director ALI explained the help of the government and other non-governmental organisations extended in the implementation and running of Maarifa CKCs as:

- *Material support from CAK and ICT board of Kenya*
- *Good will and solidarity*
- *Hosting – all Maarifa centres are hosted by supporting institutions.*
- *Provision of expertise and skills*
- *Publicity and outreach*

The study sought to find out the type of government support that telecentres currently receive. The managers responded:

> *We collaborate with the Ministry of Agriculture in training the community. The government also helps in paying the salary of some staff of the telecentres as well as in capacity building. The government through CAK formulates policies and regulations relevant to the operation of telecentres. The government also offers security to the telecentres. The ICT Board facilitates provision of infrastructure such as electricity and development of ICT resources.*

The study sought to find out the contribution of the community and community-based organisation (CBOs) towards the development and maintenance of Maarifa centres. The managers explained that:

> *the community provides every centre with a focal person who assists in the day-to-day running of the centre while some CBOs helps in publishing information in magazines and local dailies.*

The study established that Maarifa centres project are by and large supported by ALIN despite its public private partnership (PPP) status.

4.13 Challenges in Provision of Information

The fourth objective of the study was to analyse the challenges experienced in the provision of information in rural communities' of ASALs in Kenya. The findings are as shown in the subsequent sections.

4.13.1 Nature and Literacy Levels in ASALs Region

Based on observation, it was found that literacy levels among the rural communities in the five selected centres are low. This means the majority of the rural communities in ASALs have poor basic academic foundation. This slows down the rate at which the rural members of the communities benefit from the Maarifa centres because their poor academic foundation limits their understanding of the ICT training. This slows down the rate of diffusion of technology and information.

4.13.2 Major Problems Facing Communities in Accessing/Using Computers and Internet

From the FGDs, the study established that the major problems that ASALs communities face in accessing/using computers and internet were compounded to include;

> *Few cyber cafes, lack of money to access internet services, lack of computer competence to use the computer, few computers and travelling long distances to get to the only Maarifa centres available in the area. They also talked of high levels of illiteracy, lack of resource persons to train the community in ICT, negative perception about the computer by the older generation, limited space in the telecentres, and lack of alternative power supply in case of blackouts.*

The study sought to find out the major constraints that needed to be removed so that telecentres performed or operated better. Maarifa centres' managers explained that:

- *There is negative attitude towards use of computers because the majority of community members think that computers are meant for highly learned persons.*
- *Language barrier also limits community access to information. Most of the information is written in English and the level of community literacy is low.*
- *Poor infrastructure also hinders the functionality of the Maarifa centres as necessary infrastructure is required for the full operationalisation of the Maarifa centres.*

The study sought to find out problems that Maarifa centres face in acquiring and maintaining ICTs. Maarifa centres' managers indicated that:

- *there were inadequate funds to purchase ICT devices*
- *rampant virus attacks,*
- *frequent power failure, and*
- *internet connectivity challenges.*

4.13.3 Community's Related Problems

The study sought to find out the three biggest community-related problems facing area residences before the telecentre project came in. The managers indicated that there were:

- *very low literacy levels,*
- *low awareness levels on agricultural information and*
- *low information in ICT training.*

This presents a case of digital divide which refers to uneven distribution in the access to, use of ICTs that results to socio-economic inequalities (Merriam Webster Dictionary 2019). Digital divide is experienced in Kenya because rural communities

in ASALs have limited or no access to information services due to lack of ICT platform.

In addition, the study sought to find out the minor constraints that affected effective working of Maarifa centres. The telecentres' managers explained that Maarifa centres' users borrow books but fail to return them. Also, the reading culture is low which affects information uptake in rural communities in ASALs.

4.13.4 Major Impediments to Implementation of Maarifa Centres

The ALIN directors were required by the study to indicate the major impediments to the implementation of Maarifa centres across ASALs in Kenya. According to the findings, the major impediments to implementation of Maarifa centres include;

- *poor infrastructure;*
- *low levels of literacy;*
- *lack of financial resources to afford the information services due to poverty;*
- *cultural barriers such as, women are not allowed to participate in certain forums where they can acquire new knowledge and,*
- *declining donor interest in funding the telecentres.*

4.13.5 Challenges Experienced in the Management of Maarifa Projects

ALIN directors were to further indicate the progress of Maarifa centres and some of the challenges that ALIN has experienced with the telecentre management. They explained that:

> *ALIN's approach to involve communities in the management of Maarifa centres and to work with hosting organisations in some areas has been highly successful, winning several national and global awards. These include the 2011 The Bill and Melinda Gates Foundation's Access to Learning Award (ATLA); and UNESCO's International Price for Rural*

Communication given under its International Programme for Development of Communication (IPDC) – 2012.

4.13.6 Strategies to Overcome Maarifa Centres' Operational Challenges

The study sought to find out strategies that the Maarifa centres' managers used in trying to overcome or solve problems. The managers intimated that some strategies include:

- *continuous resource mobilisation through fundraising and income generation activities such as charging a small fee to the users,*
- *taking computers with viruses to Nairobi for repair and installation of antivirus, limiting the use of unauthorised flash disks,*
- *using solar as an alternative source of power although it is not sufficient for all the computers and using modem for internet when the server fails.*

Therefore, Maarifa centres have strategies to mitigate and cope with operational challenges. They have alternative sources of power to keep the centre running in-case of power failures. The staff of Maarifa centres supervise users of the telecentres to ensure that they do not contribute to the breakdown of the systems. They also seek technical support from ALIN offices.

4.14 Recommendations for Improving Information Provision

The fifth objective of the study was to make recommendations and develop a framework for improving information provision to rural communities by Maarifa centres for sustainable livelihoods. The findings are as shown in the subsequent sections.

4.14.1Areas to Receive More Support

The study sought to find out the areas that the Maarifa centres' managers would like to receive more support in:

Table 4.8: Areas to Receive More Support (N=50)

S.NO.	Areas to receive more support	Frequency	Percent (%)
1	Support for ensuring the sustainability of telecentres	50	100
2	Support to develop the skills of telecentres	50	100
3	Support to promote agricultural practices	37	74
4	Support to deliver a wide range of services	25	50
5	Advisory support on the management of telecentres	25	50
6	To make services more affordable to users	12	24
7	Support to access and develop relevant content	25	50

Maarifa centres' managers indicated that the areas managers would like to receive more support include; support for ensuring the sustainability of telecentres (100%) (50), support to develop the skills of telecentres (100%) (50), support to promote agricultural practices (74%) (37), support to deliver a wide range of services (50%) (25), advisory support on the management of telecentres (50%) (25), support to access and develop relevant content (50%) (25), and making services more affordable to users (24%) (12).

Maarifa centres' users were also to indicate whether the facility needs physical improvement. Based on the findings, the telecentres' users indicated that:

> *the facility needs physical improvement in terms more space, more computers as well as improving the internet speed.*

This shows that Maarifa centres require continued technical, financial and material support to boost their effectiveness and sustainability. The areas that required assistance include capacity building and skills development of the implementing staff

and the users, up scaling of the information services and financial support to make the services offered affordable to the rural communities in ASALs.

4.14.2 Strategies that ALIN Deploys to Counter Challenges

ALIN directors were asked to indicate the strategies that ALIN deploys to counter the challenges facing the implementation of Maarifa centres across ASALs. According to the findings, the strategies that ALIN deploys include;

- *community involvement in running Maarifa centres;*
- *working with hosting organisations in some areas;*
- *locating field officers to run the day-to-day operations at Maarifa centres; and*
- *building networks and partnerships with government, private sector, civil society and local societies thus embracing the concept of* PPP.

From the FGDs, it was recommended that to improve the Maarifa centres' performance;

- *there should be expansion and scaling up of the Maarifa centres to serve more rural communities in ASALs*
- *Maarifa centres should adopt alternative power sources to cope with power shortages, expansion of the telecentre space should be expanded,*
- *internet speed should improved,*
- *provision of more updated ICT reference books,*
- *improve security provision,*
- *provide more programmes and software,*
- *introduce other information services like printing, photocopying services and e-learning.*

The CAK officers were asked to make suggestions for government, people and ALIN organisation to reach a national goal for rural development. The CAK officers suggested that for the government, people and ALIN organisation to reach a national goal for rural development, the government should invest and digitise its services so that corruption could be reduced and save time in service delivery to the people.

4.14.3 Measures to Ensure Telecentres' Sustainability

The study sought to find out measures taken to ensure telecentres' continuous use and hardware and software maintenance over a long period of time without donor support. Maarifa centres' managers indicated that:

> *Maarifa centres use open source software so that they do not have to purchase or renew licenses. They have also partnered with other organisations to provide software at competitive rates. In terms of hardware, the users are trained on how to do basic maintenance.*

4.14.4 Best Practice on Telecentres as a Source of Livelihoods' Support

The study sought to find out best practice examples of how Maarifa centres are supporting livelihoods. The managers indicated that:

> *there is provision for exchange programmes among farmers to share agricultural information like installation of simple biogas. This has enabled the rural communities in ASALs to improve their livelihoods as they continue learning new technologies to enhance their agricultural productivity and other livelihood initiatives like energy generation.*

4.14.5 Progress achieved in the implementation of Maarifa Centres

ALIN director was asked to explain the progress achieved in the implementation of Maarifa Centres so far. He explained that:

> *having reached its peak in 2012, ALIN feels that there could be a mismatch between technology trends and the idea of having fixed means/location of accessing knowledge.*

The director further explained that:

> *the future is in mobile phones, and hence ALIN's move to consolidate Sokopepe to use the online space that will be accessed through mobile devices, particularly the mobile phone. Sokopepe is aimed at harnessing the power of information and communication technologies in enabling farmers to efficiently reach out and exploit competitive markets for their produce (ALIN 2013). The ALIN Directors asserts that mobile phone has become a "Maarifa in the hand*".

The ALIN directors were to further indicate the areas in which Maarifa centres lagged behind. They explained that technology has moved in a different direction and noted that Maarifa centres lagged behind. Recognising the shift in technology, ALIN is now committed to remain in the cutting edge of technology by emphasising Sokopepe over Maarifa centres.

About lessons that telecentre initiatives could learn from ALIN; ALIN directors indicated that telecentres should 'start with the people' and not the technology. By understanding the technological solutions that solve people problems, telecentres' management should deploy the latest technology and empower the people to utilise and harness it.

4.15 Findings from the Assumptions of the Study

This study confirmed these assumptions because all the respondents said that Maarifa centres are very useful and have practically changed their lives for the better. Maarifa centres have improved socio-economic status of ASALs communities; for instance, improved farming methods, increased their income, their socio-economic status has been enhanced through easy online communication including emails and social networks. Some of the problems identified in the study are by and by mitigated, for

instance; the distance between information provided at Maarifa centres and members of the community have been bridged by use of mobile phone; ability to share information and knowledge has been made possible through the use of Sokopepe application. Problem of Maarifa centres open at 8 am and closing at 5 pm is no longer of concern because access to online information is not restricted to official working hours.

CHAPTER FIVE: DISCUSSION OF THE FINDINGS

5.1 Introduction

The chapter discusses the findings as guided by the objectives. The findings indicate the appropriation of ICT-based information resources accessed through Maarifa centres with the purpose of improving the livelihoods of communities served by Maarifa centres' initiative. The research findings were derived from analysis of the data collected on the role of Maarifa telecentres in improving livelihoods. Information from the literature review will in conjunction be used to support the interpretation of research findings of the study.

The purpose of this study was to explore the experiences by Maarifa centres when providing information to communities in ASALs in Kenya. This was done by investigating what the selected five Maarifa centres do to promote livelihoods. The study examined the following aspects on the role of Maarifa centres: how Maarifa centres provide information services; how users access telecentres and use information resources; policies that facilitate the development and utilisation of Maarifa centres' services and resources; and challenges experienced by Maarifa centres in the provision of information in ASALs in Kenya.

Analysis of the results of the study involved examining the services offered by Maarifa centres against the objectives so that the successful performance of Maarifa centres can inform other stakeholders to emulate Maarifa centres' policies for establishment of other telecentres. The objectives of Maarifa centres include: increasing information and knowledge capacity of communities to enable them to turn

past experiences into lessons, enhance documentation of local content, share knowledge and offer training.

The central question of the study was to determine access to information and how information has in turn contributed to development and improved the livelihoods of people living in ASALs.

The study established that Maarifa centres' users have benefited from the telecentres through; use of computers to send e-mail or to chat with people far from home; this indicates improved communication links. This means that through ICT innovation and technology, communities will be properly informed and involved in social issues. They use computers to write letters to the authorities; for training, access health information; use internet to look for jobs; acquire digital competencies to qualify for office jobs; create community newspapers or magazines; and access e-government services.

This chapter begins by discussing the background information of the respondents. It is fundamental to note that background information of the respondents was not constituted as an objective of the study but was considered pertinent for associating responses to the respondents as well as enhancing the flow of arguments in this study. The characteristics of the respondents were analysed and presented to prove that the population was appropriate for the study and would provide the information required to respond to the research questions.

5.2 Characteristics of Respondents

The findings of the characteristics of respondents are provided in section 4.2 of Chapter 4. Discussions at this juncture are to establish the implication of telecentre users on the livelihoods of people in ASALs. Otieno (2011) explains that "those living in the remote arid lands … must do without a lot. They have no water or electricity. They go for long stretches without rainfall and they often do not have access to medical care". Sebusang and Masupe (2003) points out that "rural communities lack certain necessary skills, technical and otherwise, and are, on average, less formally educated than urban communities. Without intervention, they may miss out on the empowerment that comes with the services of telecentres".

This section discusses how the characteristics of respondents influence access to telecentres and exploitation of ICT-based information resources. Etta and Parvyn-Wamahiu (2003) points out that, users of the telecentres are disadvantaged on the basis of age, gender, education, literacy levels and socio-economic status. Hudson (2000) points out that it is important to consider how demographic characteristics of the users such as gender, education level, income, among others affect their information needs.

5.2.1 Age of Respondents

From the findings, majority of the users from the five sampled Maarifa centres were aged between 19 and 25 years. These findings are similar to findings in other parts of the world conducted in earlier studies. Etta and Parvyn-Wamahiu (2003) found out that in Mali, youths below 40 years of age constituted 80% of telecentre users. In a

study conducted in Uganda at Nakaseke telecentre, Ojo (2005) showed that 80% of the users were below 35 years old. In both cases, users are relatively well educated.

Age as a demographic factor influences the use of Maarifa centres because the young generation is more acquainted with the modern ICTs than the older generation. Most users visit Maarifa centres to apply for university admission, meaning they were young people who have recently completed form four. Others go there to apply for jobs.

A supposition of people in the rural areas is that, the old are retired and probably never got opportunities to be exposed to technology during their very active stage in life. This category of people will most likely resist using telecentres. This explains the reason why old people rarely patronise Maarifa centres, they probably rely on the young people to gather information for them. The other supposition is rural-urban migration; those interested in exploiting resources offered by Maarifa centres have already moved to urban areas to look for white-collar jobs.

5.2.2 Gender of Respondents

Respondents were picked at random from the telecentres in a very non-probability manner; ending up with a male representation above 55% (162). The findings revealed that majority of Maarifa centres' users were male. Previous studies by Kumar and Best (2006) and Githinji (2011) highlight significant variations in the gender balance among telecentre users to the disadvantage of female users because of lack of information and knowledge.

This ratio disparity can be attributed to the social position of women that distances them from using telecentre facilities. Etta and Parvyn-Wamahiu (2003) and Rathgeber (2002) discovered similar trends; in Mali, 70% of telecentre users were men, in Mozambique 63%, in Senegal 70% and also in Uganda where 70% of users were male.

The findings of this study confirm gender disparity in the use of telecentres and access to ICTs. Although there are gender equity initiatives especially in the –Kenya Constitution, 2010 article 35, women assertiveness in accessing information is still low in comparison to men. This may be attributed to gender nature of the socio-economic roles. Some of the reasons for exclusion of females are lack of time and male dominance in rural cultural setting. For instance, most women have less time; they carry the burden of doing household chores while young men have more free time to visit the telecentre. Besides, most young women have young children and as observed, Maarifa centres' facilities are small and cramped and do not have childcare facilities. Naivinit (2008) cites Foucault et al (2006;) confirming that "Liberal feminism" would recognise a digital divide where ICT is neutral, but access and use of it by women and men is different and even unequal … gender roles allocated to women restrict their access to technology, which slows their learning and use of ICT'.

At the same time, it is not easy to train the less educated, women from the ASAL area especially the Maasai are shy and will not feel comfortable in an open one-on-one technical assistance situation with a man. Furthermore, as pointed out by ALIN Directors, one of the impediments to implementation of Maarifa centres is "cultural

barriers such as those that bar women from participating in certain forums where new knowledge is acquired."

5.2.3 Telecentre Users' Highest Level of Education

A comparison of the difference in educational level of Maarifa centres' users revealed that, the highest user group (29%) had attained secondary school education. Education is necessary in acquiring new skills, those with high literacy levels are more likely to acquire various better ICTs skills than those who do not have. Roman and Colle (2002) agree with this assertion stating that "no matter how wired a country becomes, without basic literacy, the major benefits of ICTs will be lost". Telecentres may be located within accessible distances to communities but without education, many people will not be able to use the computers. This means that the educated are early adapters of ICT for instance, students and recent school leavers easily assimilate the skills better and are open to adopting and learning ICT.

However, as Sornamohan(2012) asserts, "ICTs need not remain the preserve of the educated and the literate: by reaching out to also the uneducated and the illiterate, the telecentre becomes an inclusive, "info-rich" force for development that not only meets identified learning and information needs, but also creates a new demand for learning, information and knowledge."Maarifa centres should have a "no exclusion" policy, so that all those in the neighbourhood can think of Maarifa as a centre for all. Such a design was witnessed at Bangladesh "Pallitathya Kendra" where Raihan (2007) points out that since a vast lot of the rural community is illiterate, the concepts of "infomediary" [information intermediary, human interface between knowledge-base

and rural illiterate people] could allow these group to get the benefit of technology thus getting solutions to their livelihood problems. ALIN directors echoed the same sentiments:

> *'... start with the people, not the technology. Having known what technological solutions people require, deploy the latest technology and empower the people to harness it.'*

It is therefore improper to assume that telecentre users are literate and able to communicate in a metropolitan language. Initiatives and policies must be put in place to make telecentres all inclusive. Telecentre staff can overcome this barrier of literacy versus illiteracy and use of ICT resources provided by Maarifa centres by coming up with a localised and customised training method that would target the disadvantaged groups like the uneducated, people with special needs and women.

5.2.4 Occupation of Respondents

Occupation of the respondents is an important facet of demographic information because it explains the socio-economic dynamics that influence people to use internet services. In other words, occupation may influence usage of the telecentres. The findings explained in Chapter four indicate that students are the majority users of Maarifa centres.

Respondents in working class category were majorly engaged in the informal sector; farming and small and medium enterprises. Those engaged in formal employment were agricultural extension officers, health workers and teachers. In terms of exposure and exploitation of resources offered at Maarifa centres, respondents engaged in the

formal sector and students were the main beneficiaries. Services accessed included internet services such as sending e-mails, social media, computer training, research, meeting people, among others.

Those engaged in the informal sector are not regular users of Maarifa centres because they spend most of their time working on their farms and herding livestock. Besides, they have low literacy dispensation and are not well informed of the advantages of accessing information. This is confirmed by Esselear et al (2007) who state that "owners of informal businesses were, on average, less educated than owners of semi-formal businesses and this affected their use of ICTs and the rate of adoption".

Hudson (2000) further explains that it is important to identify and measure what users accrue as individuals and as members of groups. For example, as family, work culture, etc., there perceived roles as individuals or members of a group influence their various information needs.

5.2.5 Users' Access to Electricity

Electricity is required to run computers, charge mobile phones, as a source of lighting, among others uses. Fraser (2013) intimated that electricity is a massive challenge in Kenya. Rural areas are most affected. Limited electricity supply results in limited economic development. Electricity is a major obstacle to the adoption of ICTs; most households as indicated by respondents do not have electricity from the main power grid, which means unless people visit the telecentres, they cannot realise the benefits of computer and internet-related ICT services. Electricity is a prerequisite for access

to global communication networks, making telecentres a focal point in bridging the digital divide.

For homesteads, an alternative source of power is solar which few people can afford. Lack of electricity supply also affects the rate of adoption of innovations.

Report on users' access to running water and ownership of assets will not be discussed in this section as the information provided in Chapter four is adequate.

5.3 Services Provided by the Telecentres

Telecentres are service providers and the first objective of this study was to endeavour to understand how Maarifa centres support livelihoods. This was made possible by examining the range of services offered by Maarifa centres to people living in ASALs. The research questions were expected to explain whether Maarifa centres offer services that support the economic activities of the community.

The questions were guided by the fact that Information Communication Technologies (ICTs) such as internet, e-mail and satellite technology have the potential to improve the livelihood opportunities for the poor and marginalised. Lack of access to vital information for people living in marginalised communities such ASALs, may lead to overall disempowerment and poverty. As explained in the literature review, construction of telecentres facilitates access to ICTs for meeting the educational, social, economic and personal needs of communities.

ALIN Directors offered the background information of the origins, the aims and structure of Maarifa centres' initiatives. The first research question was how Maarifa

centres provide information to rural communities in ASALs. The study revealed that Maarifa centres provide a variety of services with the most effective one being online services. As explained by the ALIN directors in the following caption;

> *ALIN began as a network facilitating knowledge sharing among people involved in agricultural and livestock extension. This was initially realised through a print magazine 'Baobab Journal', it then moved to sharing information through 'Satellite radio (WorldSpace)' to deliver information to remote places. When the internet became widely available, they also evolved and created permanent centres where computers and internet access were installed. Maarifa centres are now evolving into the use of mobile devices to link farmers with information and knowledge about agriculture and livestock through Sokopepe (www.sokopepe.co.ke).*

From the foregoing, it is evident that the range of services provided by Maarifa centres has evolved with technological developments. A study conducted by UNCTAD (2007) reported that telephone services are no longer offered because of the emergence of mobile phones. Similarly, Maarifa centres as currently constituted will have to change both in functions and services they offer.

ALIN's focus is now on the use of mobile devices to link users through Sokopepe. Chilimo (2008) explains that mobile phones are easier to cope with the challenge of lack of electricity much better than other computer-related ICTs because mobile phone (operators Safaricom, Airtel, and Orange, among others.) Install masts and users manage to keep their mobile phones charged. Access to information via mobile phones is much easier.

5.3.1 Training Services

Training is at the heart of the telecentre, it is the main activity of the telecentre. As earlier pointed out, a telecentre is a place where people can access computers; the internet and other digital technologies that enable users gather information, create, learn and communicate with others while they develop essential skills. The first main activity of Maarifa centres is to train users. Most respondents indicated that their main reason for visiting the telecentre was for 'computer training'. UNCTAD report (2007) points out that training services helped develop competencies that helped users conduct economic activities; that is, human capital. Human capital will then be exchanged for financial assets. Training is supposed to be relevant to trainees needs. This means that the existence of Maarifa centres is very important to communities living in ASALs.

5.3.2 Internet Access

Access is a crucial factor for telecentres; it is where people can access computers, the internet and other digital technologies to derive the benefits required. According to the findings of this research, respondents in the five telecentres gave two main reasons for visiting Maarifa centres: to access agricultural information and for e-mail services.

Email services were used to communicate with friends and relatives, sending job reports; students taking distance learning courses used e-mail for receiving instructions from their lecturers and paying school fees. Emails were further used to apply for jobs, conducting business and making applications for university admission,

bursaries and loans. Other means of communication apart from e-mails at Maarifa centres included social media such as Face book and Twitter.

Many studies conducted in developing countries report that use of e-mail is as a primary reason for accessing the internet and telecentre services. For example, in Nakasake - Uganda, Ojo (2005) realised that the main activity was using e-mail; that is, sending and receiving messages from friends and relatives who live far. This helped keep in touch with relatives living abroad. At the time of data collection for this study, the main activity of telecentre users of the five Maarifa centres sampled was to apply for university admission.

Etta and Parvyn-Wamahiu (2002) state that ICTs are used are mainly used for social activities and rarely for developmental activities. Very few people use the internet for development-related activities. Information that could be consumed from the internet for development advantage include e-commerce, academic research or agricultural best practices. This observation is a sad indicator of the ability of ICTs in bridging the digital divide and as well as to empower communities socially or intellectually in rural areas (Sonaike, 2004).

Maarifa centres came up with an innovative service which is designed to meet specific needs of farmers. According ALIN directors, Maarifa centres reached their peak in 2012. ALIN felt that technology had moved in a different direction and Maarifa was lagging behind. To remain in the cutting edge, Maarifa centres embraced Sokopepe, an online space where people access information through their mobile telephones. ALIN directors referred to mobile phones as “Maarifa in your hands”.

According to Chilimo (2008), many farmers are not ICT literate but when empowered with basic computer skill but if the service providers introduce simple technological applications like Sokopepe, many users especially farmers will benefit from the services of Maarifa centres.

5.3.2.1 Sokopepe

Nguo (2015) explains that Sokopepe.com is an ALIN innovation. Sokopepe is accessible online and on mobile telephone. Transactions through Sokopepe can be completed on a mobile phone handset through short messaging service (SMS) making it widely accessible to farmers in remote areas after they have registered. The aim of ALIN is to harness the power of ICTs in enabling farmers to efficiently reach and exploit a fair market for their produce.

Sokopepe was introduced to bridge the information gap by providing farmers and livestock keepers with a "one-stop information platform" that is always available and easy to use. Communities in ASALs did not have a platform that would enable them access information needed to make informed decisions, Sokopepe services include information on: *commodity prices, farm inputs, linkage with other service providers, and livestock tips as well as secure mobile payment systems.* Sokopepe is particularly good for women and youth who were previously excluded from the mainstream enabling them to participate in the agriculture value chain at various levels. The youthful farmers foresee a revolution in farming and access to markets as an opportunity to improve their livelihoods.

5.4 Computer Literacy

Previous studies such as Chilimo (2008) indicated lack of ICT skills as one of the impediments to effective utilisation of ICTs. Latchem (2001) stated that technology can enhance access … but cannot empower those who lack the knowledge and skills to exploit it. Mtega and Melakani (2009) assert that limited information affects decision making. People living in ASALs are likely to experience low levels of awareness on agricultural innovation in the event of scarcity of information.

The findings in this study revealed that Maarifa centres provide free computer literacy programmes where skills to interrogate the systems and effectively use the information found to meet their information needs. This in turn enables communities in ASALs to improve their lives through improved agricultural practices and entrepreneurship. Farmers and pastoralists are able to conduct business communication; search online for product prices. This protects them from exploitation by brokers or middlemen hence enhancing human and financial capital.

Communities in ASALs have in turn accrued benefits such as; skills development, job creation and increased incomes. The findings of the study indicated that Maarifa centres have effectively contributed to improved livelihoods though communication services such as internet access and e-mail. The major objective of telecentre initiatives was to narrow the information gap between rural and urban communities and facilitate information sharing (Mtega and Melakani, 2009). The internet offers valuable communication both horizontally and vertically among rural people, government, development agencies and other decision makers. Ojo (2005) points out

that telecentres promote the use of ICTs for grass-root development which in turn improves livelihoods.

The findings are similar to those of Gómez and Hunt (1999) and Oestmann and Dymond (2001) who state that telecentres are established in communities with the objective of improving social and economic development and the empowerment of citizens. Telecentres have been hailed as the solution to development problems around the world because of their ability to provide desperately needed access to information and communication technologies (ICTs) (Gómez and Hunt 1999; Oestmann and Dymond 2001).

Maarifa projects have helped rural communities to improve their livelihoods by positively through the introduction of new technologies for accessing information and services relevant for households to intensify agricultural production. They enable communication between individuals and communities, governments and citizens by sharing information on "lessons learnt" and determine and use "best practices," (Mtega and Melakani, 2009)

Maarifa projects have also significantly reduced the long distances travelled to access information. This saved the people transport costs and improved people's savings.

5.5 Location of Telecentres

The distance factor has been described as very important by Benjamin (2002), who defined it as "catchment area". Telecentre catchment area ensures that people get access to information services within walking distance from their residential areas.

Many respondents were happy about the location of Maarifa centres because of the shrunken distance. It made it convenient for them to access Maarifa centres. Pick (2013) confirms that "the location of a telecentre influences its use through relationships to local user markets, transport access, convenience, availability of local ICT workforce, and cultural aspects of communities".

According to the World Bank (2011) report, 77% of Kenya's population resides in rural areas and most earn their living from pastoralism and agriculture. Scientific knowledge and agricultural information is generated by the Kenya Agricultural and Livestock Research Organisation (KALRO) and the Ministry of Agriculture. Information generated by these units may not reach farmers and pastoralists perfectly and in timely fashion. Auda (2010) points out that "all extension service providers within government can only have a maximum of four minutes with any given farmer in Kenya in a year. Telecentres, by enabling access to agricultural information play the role of extension service providers within the communities they serve to bridge the gap created by government extension service providers.

The findings agree with those of Duncombe and Heeks (1999) who indicate that the deployment of telecentres in rural villages brings about new technologies for accessing information and services relevant for households to intensify agricultural production. Making relevant content and services available through appropriate information and communications media can help motivate rural livelihoods to use and obtain information from the telecentres.

ICTs can also provide marketing information for agricultural products, hence improving farmers' income. This would have an impact on rural livelihoods by increasing and diversifying the income of small-scale farmers through the exploitation of new market opportunities and existing market niches. Information gathered from the telecentres may benefit farmers by enabling them to participate in cooperative activities such as participation in agricultural cooperative unions that would assist farmers in marketing their products. ICTs can promote growth of other small-scale enterprises in rural areas and provide people with multiple and more sustainable livelihoods' opportunities (Duncombe and Heeks, 1999).

5.6 Challenges Observed

To identify challenges experienced in ASALs communities, this study relied on document analysis of the available literature about communities where Maarifa centres are located. The study found out that the rural communities in ASALs have a poor academic foundation as reflected by the low literacy levels among them. This has reduced their ability to understand the training on information technology that they receive in Maarifa centres. Illiteracy also presents a language barrier. The findings are similar to those of Mansell and When (1998), who maintain that "illiteracy is the fundamental barrier to participating in knowledge societies".

Illiteracy presents a problem because most of those targeted in rural areas are illiterate; they not only lack formal education but also have low levels of computer literacy. This adds on to another problem of slow uptake of technologies by agro-pastoralists served by Maarifa centres. Language barrier hinders access to information

especially if information is packaged in scientific jargon. Besides, information in the internet is mainly in English which is not a common language for the rural communities (Mansell and When, 1998).

Gomez et al (1999) describe the various types of telecentres as basic telecentre, civic telecentre, cyber café and multipurpose community telecentres. Maarifa centres fit in the category of basic telecentres that provide limited information services. Gomez (1999) further describes a basic telecentre as the one located in a rural or marginalised area, where the population has limited access to information services and hardly uses sophisticated technologies. This research deduced that ALIN deliberately started with the basic telecentres' model for people first and foremost to learn and diffuse technology, because communities who were initially served by Maarifa centres were early adapters and their literacy levels and information literacy were quite low. Mtega and Melakini (2009) point out that it is necessary to know all community variables related to information needs before deciding to provide a certain information service through the telecentre.

This study established that rural areas have poor infrastructure which hinders the functionality of the Maarifa centres' full operationalisation. The findings concur with Munyua (2000) and Prado (2009) who indicated that rural areas commonly lack communication lines; have low bandwidth, inadequate or insufficient equipment and also suffer from scarce/lack of connectivity Also, unstable power supply is an obviously primary constraint. However, power generators can be used if electricity is not available. Poor roads limit access to the telecentres by communities who are

geographically isolated. They suffer from inadequate access to physical markets and inadequate market information. Munyua (2000) says that new ICTs are not such a cheap means of expanding rural information systems. Besides, Prado (2009) noted another infrastructural factor that limits the optimal adoption of ICT initiatives – telecommunication infrastructures – these cannot reliably support connectivity. There is also scarce skilled personnel on the ground capable of operating and maintaining ICTs.

Based on the findings, the telecentres have limited space, few computers and slow internet connectivity as well as lack of information skills among the users which makes effective use of sophisticated ICTs impractical in rural communities. The finding corroborates earlier findings by Githinji (2011) who also found that lack of information skills makes effective use of sophisticated ICTs impractical in rural communities.

The study established that there was gender disparity in the utilisation of the Maarifa centres in provision of information as more men than women visited the facilities. This is likely contributed by the cultural barriers and perceptions in the rural communities that hinder women in accessing the information services in the Maarifa centres. According to Githinji (2011), the Maasai women in Kenya for instance are not allowed to mingle with men; they are therefore constrained in exploiting resources at Maarifa centres. Perceptions are also barriers as many view new technology as a preserve of another class preferable the educated, the young and the rich (Githinji, 2011).

5.7 Theoretical Perspectives

A theoretical framework connects a researcher to existing knowledge and enables a researcher to transit from describing phenomenon to generalising the various aspects of that phenomenon. It helps a research understand the meaning of concepts that are relevant to the research. Theoretical framework influences the use of knowledge and understanding gained in the study and makes the researcher react in a more informed and effective way. As mentioned earlier, this study was guided by two theoretical frameworks; Sustainable Livelihoods Approach (SLA) and Diffusion of Innovation (DOI) theories.

5.7.1 Sustainable Livelihoods Approach (SLA)

This section discusses the components of Sustainable Livelihoods Approach (SLA) framework and the effect of ICT mediated information services on those components based on the analysis from the data collected from five Maarifa centres' users. The SLA Framework is explained in section 2.4.2 and shown in figure 2.5. The framework demonstrates the impact of ICTs and individuals are expected to provide information access for poor people in rural areas. Soriano (2007) asserted that ICT is a powerful engine for rural development.

The vulnerabilities context, capital aspects and structures, processes are looked at in the context of livelihoods' strategies and livelihood outcomes in relation to people living in ASALs in Kenya.

5.7.2 The Vulnerability Context

Vulnerability is caused by lack of access to resources and opportunities to operate these resources (Ahmed and Lantz, 2008). Poor people operate within vulnerability context. The vulnerability context influences the livelihood strategies which are open to people in pursuit of beneficial livelihood outcomes that meet their own livelihood objectives (DFID, 2001). Information is crucial and is required by rural people to make decisions on livelihood strategies. According to Devereux (2001), there are several factors that affect people's lives: government, politics, technological trends and conflicts. Others include shocks like natural disasters, economic factors and epidemics; price fluctuation, unreliable production and business opportunities.

Maarifa telecentres are considered as development projects. The question is; in what ways – positive, negative or neutral – are telecentre projects likely to interact with different livelihood strategies? For instance, which demographic groups within the population served by Maarifa telecentres are most likely to use these strategies? The communities involved in this study were analysed in relation with their vulnerability context. People living in ASALs are vulnerable to remoteness, unemployment, severe weather conditions that is excessive drought or flooding and variations in prices of farm produce.

In terms of the role of information and access to it with regard to vulnerability context, respondents acknowledged benefits from use of ICT information to control crop pests and livestock diseases, information on drought resistant crops, etc. ICTs help people living in ASALs diversify their source of income.

5.7.3 The Assets Pentagon

Within the vulnerability context of the livelihoods framework, people apply the five asset pentagon presented in figure 2.6. The figure shows that people's lives are built upon these assets to reduce poverty (DFID, 2001). These assets are influenced by institutional structures and processes for the livelihood strategies to realise measurable livelihood outcomes. The assets include capital, embraced as social, natural, financial and physical, all which are discussed in Chapter 3. This study concentrated on three assets that were more relevant to the study; human, social and financial capital.

5.7.3.1 Human Capital

Human capital describes the health, skills, knowledge and education, capacity and ability to work that enable people to pursue livelihood strategies. Ducombe (2007) explains that human capital requires information concerning health, education and skills acquisition from both formal and informal sources of information. This is guised as knowledge component.

Informal sources are the local indigenous information that becomes very useful when combined with formal information from external sources. For example, agricultural success can be achieved by combining indigenous knowledge in traditional production techniques with formalised knowledge related to quality adherence and marketing of produce (Chapman, et al 2001). Positive changes in human capital will in turn be a supportive factor for the other assets.

To understand the effect of ICT mediated information, users of Maarifa telecentres gave various reasons for doing so. The most common reasons according to the respondents were:

- *To access internet*
- *Learning computer*
- *To get agricultural information*
- *To seek information about the community*
- *To meet people*
- *To borrow books, etc.*

The most common purposes of using Maarifa centres were personal communication and e-literacy programmes. This means that, according to users, telecentres' main impact on life was in the area of acquiring computer literacy and communication. This concurs with a study conducted by Etta and Parvyn-Wamahiu (2003) who note that telecentres were mainly used for communication and entertainment rather than for economic activities. One would ask, is it that Maarifa centres do not offer services that support business activities? For users engaged in business and agricultural activities, they are more likely to make business communication rather than personal communication, for example, selling farm produce through sokopepe.com. Those in employment like the agricultural extension officers may communicate to solve administrative matters like writing and sending reports to their head offices.

ICTs have made positive contributions to human capital. The internet as pointed out in Chapter 4 has contributed to knowledge acquisition which is the primary component of the human capital. Training of ICT skills at Maarifa centres contributed to boosting the human capital in giving people skills which enabled them secure jobs

hence boost their financial capital. Soriano (2007) reports that telecentres in China promoted e-literacy which enabled some users to secure jobs. Similarly, in this study, users needed ICT literacy to benefit from ICT applications.

Besides using computers at Maarifa centres, communities were taught how to use mobile phones to access market information. The training on skills to use sokopepe.com was highly welcome as it formed the respondents' gateway to information society, thus bridging the information/digital gap. Chilimo (2008) points out that "mobile phone is a technology that has ushered rural people into information society".

5.7.3.2 Social Capital

Social capital, in the context of sustainable livelihoods' framework describes the features of social organisation that serve to coordinate action. It represents social resources upon which people seek their livelihoods' outcomes. This involves networking and connecting people to work in a coordinated manner. The facets described in social capital include the infrastructure of social relations and the information transmitted via social networks.

People in such networks are more advantaged as they can access the most up-to-date and accurate information and make better returns through such participation. On one hand, the results in this study indicate that social communication was the main reason of using telecentre services. E-mail was used to communicate with friends. Many users were on social networks including Face book and Twitter. However, those who engaged through sokopepe.com, business improved as they were able to sell their

produce at profits through mobile telephony. Soriano (2007) explains that mobile telephony serves as a convenient means of tracing relatives and friends and obtaining news. ICTs as revealed by this study help to strengthen the social capital and improve relations between people by breaking down the barrier of distance and time. People are able to improve income through cash transfers and bring about a sense of wellbeing.

Some users said they visit Maarifa centres to meet people and exchange ideas. This is an aspect of social capital that is facilitated by the telecentre. Telecentres organise workshops for the communities they serve; this helps strengthen the social capital as well as financial capital. Farmers form self help groups to consolidate their farm produce and sell them on wholesale. They (farmers) have formed cooperative societies to help them sell their produce bulk and take control of the market.

5.7.3.3 Financial Capital

Financial capital describes the portfolio of monetary resources that can be accessed to provide a range of livelihood options (Duncombe, 2006). It denotes the availability of cash or equivalent that enables people to adopt different livelihood strategies.

Telecentre services such as computer training enable users to secure employment, promotion at work and even improve on their businesses. This ensures people access to financial capital. ALIN has established an agricultural marketing information service that provides farmers with timely and reliable access to up-to-date market information. Sokopepe.com provides farmers with information on the prices of their farm products. Adhiambo (2013) explains that Sokopepe has increased efficiency in

agriculture value chain by providing a platform for farmers to share information and execute electronic transactions. Users access the information via various media, including SMS, WAP, e-mail and Web. The system has a payment mechanism.

Before Sokopepe, farmers often struggled to find market for their agricultural products. Brokers used to appear during harvest season to buy their commodities at much lower prices. Providing information that links farmers directly to markets from different parts of the country is important. It gives farmers power to seize markets for their farm produce. Providing information that links farmers to markets is very necessary for small scale farmers. This helps to eradicate exploitation by middlemen/brokers in the market chain. Molony (2006b) explained that lack of information represents a significant impediment to market access especially for poor small scale farmers in remote rural areas.

Besides Sokopepe, there is also the use of mobile phones in the delivery of marketing information in Kenya known as Kenya Agricultural Commodity Exchange limited (KACE) whose concept was adopted by Sokopepe. The fact that these services are mobile phone enabled means that their impact can be a huge success since mobile phone services are now accessible in most parts of the country. A mobile phone is like a computer in almost every user's hand.

5.7.4 Diffusion of Innovation Theory

The adoption-diffusion theory applies to Maarifa centres that serve communities in ASALs in Kenya. The goal of using this theory is to test how the services provided by Maarifa centres are adopted and diffused. The study also tested whether or not the

theory supports utilisation of computer technology to enhance access to information with a purpose of reducing poverty and to improving livelihoods of telecentre users.

Adoption of diffusion of an innovation is the process by which an innovation is communicated through certain channels among members of a social system. Adoption of an innovation is a decision taken to make full use of an innovation (Rogers 2003). Kumar and Best (2006a) state that diffusion of ICT innovation is a useful framework to understand diffusion of ICT innovation. They assert that it is well suited for telecentre serves' diffusion in terms of its predictive potential, versatility and stimulus for further research shaping the theory. DOI framework bestows insights of attributes of innovation relevant to this study. The attributes of DOI that determine the adoption process are according to Rogers (2003); (a) relative advantage, (b) comparability, (c) complexity, (d) observability and (e) triability.

5.7.4.1 Relative Advantage

Relative advantage is the extent to which an innovation is perceived to be superior to the idea it replaces (Pick et al, 2013), relative advantage is presented as advantages of ICTs. Heeks (2002) explains that farmers suffer from huge information gaps. They lack information on the best farming techniques. They are therefore less productive than they could be. Heeks (2002) further says that farming and production is related to the soil type and climate of an area. It is so localised that information available on the internet may require to be repackaged for it to be useful to a farmer. Besides information being made local, it needs to be relevant and timely for it to provide relative advantage over the current situation. ALIN repackages information with the

help of extension officers. The information is then availed through Maarifa centres to farmers to enable them improve farming methods hence their livelihoods.

All the interviewees had access to ICTs since they were users of Maarifa telecentres. They agreed that ICTs have relative advantage over other methods of agribusiness. Interviewees felt that adoption of ICTs was necessary for proper functioning in agriculture, marketing and development, be it farming, information searching on the internet, etc.

Participants reported that ICTs have increased agricultural productivity through accessing information on recent trends, appropriate fertilisers to be used, other modern methods of farming and accessing market information.

ICTs, according to the respondents have enhanced communication, for example, accessing government information. Those admitted to universities were able to download Higher Education Loans Board (HELB) forms as well filling in university admission forms. All these take place at Maarifa centres.

ICTs facilitate networking of people through sharing of information especially farmers from across ASALs in the region via e-mail and SMS services. Social interaction was provided through social media such as Twitter and Face book.

Speed of communication was seen as another advantage of ICTs experienced by people using Maarifa centres. ICTs made mediated communication faster and easier.

It is paramount to mention that relative advantage in so far as telecentres are concerned is complex because as mobile phones and broadband networks spread in

the rural areas, so will the relative advantage telecentres have different benchmarking points. As the ALIN Directors explained;

> *"Now that technology delivery has become predominated by mobile devices, Maarifa as currently constituted will have to change both in function and the serviced they offer. ALIN's focus now is the use of mobile devices to link farmers with information and knowledge about agriculture and livestock value chains. This is being done through (sokopepe.co.ke).*

5.7.4.2 Compatibility

Compatibility refers to the extent to which an innovation is perceived as well-suited with existing values, past experiences and need for potential adopters (Pick, 2013). This study sought to establish whether, use of Maarifa centres for information is compatible with the experience of applying current systems in farming. ICTs were deduced to be more compatible with changing lives of people living in ASALs. It made it easier for people to communicate and to improve the methods of farming and rearing livestock. Some respondents indicated that ICTs assisted them to do research.

Despite ICT assisting in communicating, improving farming methods and conducting research, respondents experienced problems of inaccessibility. This shows that although ICTs are quite compatible, infrastructural challenges poses a major barrier.

5.7.4.3 Complexity

Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use (Rogers, 1995). Complexity considers how complex the innovation is, given the skills of the users; the less complex an innovation is perceived to be the greater the rate of adoption (Pick et al, 2013). Pick et al (2013) explain

further that, “the complexity associated with ICTs use in a rural kiosk may be a significant barrier in its diffusion”.

Murkerji (2010) states that there is a general perception that computers and telecentres are for the educated. Although it is commonly said that rural people are illiterate and often do not understand English – the predominant language on the internet, and that they do not have training on use of the computer – Maarifa centres have operators who act as intermediaries. They train people and enable collection of simple information such as current market prices of products and e-government services; this reduces complexity.

Most interviewees reported that they learnt ICT literacy at Maarifa centres. Learning increased adoption of technology as it helps increase exposure to technology. Furthermore, modern programmes have been made much more user friendly; these programmes have become easy to use with increased exposure to technology. Exposure was witnessed by the fact that most users use computers for e-mail, visiting social network sites as well as searching for information on best farming practices.

ICT may be complex to those who are unfamiliar with technology which means that lack of proficiency could affect adoption and diffusion of technology. This can hinder the intended efficiency and effectiveness.

Infrastructural problems such as congestion in the computer laboratories due to limited space can hamper ease of use of computers. Other problems as analysed

earlier include connectivity issues, limited number of computers and distance to the telecentres.

The challenges mentioned above are not withstanding because ICT in this stage of its development is not a very new concept, it has reached the threshold level for adoption and use. ICTs have proved to be easy to try out; they do not pose a threat to ICT-mediated information provision to people using Maarifa centres.

5.7.4.4 Observability

Rogers (1995) explains that observability is the degree to which the results of an innovation are visible to others. The more an innovation's positive results are visible, the greater the rate of adoption. Pick et al (2013) highlight several relevant issues in the context of rural telecentres such as: "Is the community aware about the existence of the telecentre? Do they know about the potential of the internet and how they can be of use to them? Do the people know who have benefited from using the telecentre?"

Furthermore, observability can be attributed to the development of computers; from the mainframes through the desktops, laptops and now mobile devices. Maarifa centres according to the ALIN directors have embraced mobile phones to link farmers with information and knowledge. That means telecentre services are more visible since a large percentage of the people living in ASALs own mobile phone, thus "Maarifa in users' hands".

Observability is also realised by the level of ability of people to use computers through Maarifa centres' computer literacy programmes. Computer lessons constitute a major activity in the centres. The main aim is to enable users to access information on better methods of farming and marketing agricultural products so as to improve their livelihoods.

CHAPTER SIX: SUMMARY OF THE FINDINGS, CONCLUSIONS AND SUGGESTIONS

6.0 Introduction

This summary of the findings, conclusions arrived at and recommendations discussed in this chapter are based on the data presentation and interpretation as outlined in Chapter 5. The main objective of the study was to find out what information services Maarifa centres provide to communities in ASALs. It also focussed on use patterns, policies, challenges and proposing a model for improving information provision. The following is a summary of the findings based on objectives of the study.

6.1 Characteristics of the Respondents

The findings established that:

1. Majority of the users of Maarifa centres are generally young people in the age bracket of 14 to 18 years. Older users in the five Maarifa centres were few.
2. The percentage of male users was higher than that of female users. Gender disparity of those accessing the ICTs was attributed to the socio-cultural and economic factors that constrained potential female users.
3. Most of the users accessing the services are educated up to form four level. Most users were applying for university admission. Use of telecentres is often correlated with education as all users had some education.
4. Most users at the time this study was conducted were not in employment as they were expecting to join institutions of higher learning (universities).

Just like community libraries, the main purpose of Maarifa centres is to satisfy information needs of communities. The centres should therefore strive to provide more relevant content to attract the average farmer, business person and the general public. As main clienteles, focus should shift from serving pure educational information needs to trade needs that can directly improve livelihoods of the average member of the community, not students.

6.2 Services Provided by Maarifa Telecentres

As discussed in preceding chapters, ALIN began as a network facilitating knowledge sharing among people involved in agricultural extension work. *Baobab Journal*, a magazine, was the main tool or source of information. It later adopted use of satellite radio and the internet presently, to deliver information to remote areas. The information nodes evolved into permanent centres where computers with internet access were installed.

First, the centres provide information that is relevant to small scale farmers in ASALs. The main concerns include improvement in agriculture, climate change adaptation, natural resources management and other livelihood issues. To increase its reach and effectiveness, ALIN targets informediaries who work for the government, CBOs, NGOs and FBOs. These informediaries are a source of information and knowledge for local communities.

Second, the main information services the telecentres and Maarifa centres offer are: surfing the internet, documentation, communication via e-mail, reading books, typing services, photocopying, printing, watching DVDs and computer literacy training.

Other related services are the space (meeting place) and charging lap tops and mobile telephones. Other services offered in the telecentre are publications, advisory services, and online marketing information.

People are able to borrow books and DVDs from the centres, which, improve their knowledge and also provide entertainment. Therefore, Maarifa centres have solved most of the information access problems the community faced. A good example is the trainings by field officers on modern methods of farming.

Therefore, the ICT training provided by Maarifa centres has led to increased use of ICT in the community, hence access to more information. This has opened rural areas to opportunities such as e-learning, e-government, e-commerce, library services and outsourcing labour. Rural communities are able to access services locally that hitherto they had to travel long distances to government offices to get. Personal and business communication has also become easy. Therefore, the ease with which they stay in touch with friends and relatives and buy and sell goods or services has improved their quality of life.

Third, a main need identified among the users was the quest for news, especially current affairs. The users access information on the form of newspapers, internet, e-mail, books and the notice boards at the centres. As informed citizens, they are able to make informed decisions in all aspects of their lives, hence improved livelihoods. Some of the major decisions include knowing when there are disease outbreaks, information on weather patterns, seeds to plant and documentaries on TV and newspapers about farming. Many are able to learn from others' best practices and

mistakes. The people are also able to follow the political discourse in the country and vote based on policy rather than intuition.

Fourth, community involvement was limited to recruiting a few field officers and Community Knowledge Facilitators (CKF) in running the Maarifa centres and in solving operational problems. But, the centres can do more especially sensitising communities on the need to own the projects. Once that is done, they can understand the need to use the resources effectively and also contribute finances for sustainability.

It is notable that some users are willing to pay for the services or even contribute towards repair or enhancing internet speed. Sustainability can also be achieved through community members' voluntarism and working as staff and also using computer training revenue to run the centres.

Fifth, although the four except Nguruman have electricity, solar panels are necessary in coping with power outages. Nguruman Maarifa telecentre uses only solar panels as the only solitary source of power. It is important to impress upon the management the importance of green energy. It is not only environmentally friendly, but also easy to maintain. With electricity, high power bills may make the projects be unsustainable. Installing solar panels may be expensive at the beginning but are cheaper in the long run.

Sixth, majority of the people have mobile phones. The network coverage is also adequate. This shows that the ICT infrastructure in rural areas in Kenya, including

ASALs communities is sufficient and could be exploited to increase information provision. If users can afford smart phones, this can reduce the demand for services at the telecentres.

Other ICT services available in the community are few internet cyber cafes. This shows that ICT services provided by Maarifa telecentres to rural communities in ASALs are very strategic and helpful because in most cases there were no other ICT service providers.

The ASALs lack the necessary local infrastructure like proper road network that is needed to open up these areas to economic development. Therefore, use of technology has to a large extent mitigated the vagaries of having to frequently travel on dilapidated roads.

Seventh, the study established that in Isinya the locally produced information products included DVDs, agricultural and environmental awareness campaign materials and agriculture promotion platforms. In Marigat telecentre, they locally produce communication brochures and flags while in Ng'arua Maarifa telecentre, they generated the sign language chart and information hand out on useful websites such as Sokopepe registrations. The Mutomo Maarifa telecentre had no locally produced information products while in Nguruman Maarifa telecentre there were local videos, DVDs and posters.

The importance of local content cannot be overemphasised. It ensures not only relevance of information but also in a format and language that the people understand.

Therefore, the centres should be encourage to repackage such information so that it is in a form in which even users who cannot read or write can use without any help. That way, the telecentres can link the communities with news sources and bring together farmers and small business persons to tell their stories, promote their brands and sell their products and services online through Sokopepe.

The telecentres offer various business support services. This means that Maarifa centres are a strategic source of business information that helps the rural communities in ASALs in Kenya to learn about available opportunities that can assist them to enhancing their livelihoods.

Finally, since majority (73.3%) of the telecentres 'users are satisfied with the telecentre services, it means the centres are popular and important sources of information compared to other information providers. It also shows that the Maarifa telecentres are functional all the year round and that the majority of the information services offered are provided promptly. The users are not restricted in accessing the information services offered as they can visit the Maarifa centres at any time of the day, from 8 am to 6 pm.

6.3 Access and Use Pattern of Information by Rural Communities

From the study, the concept of Maarifa telecentres is new to rural communities as majority of them (66.7%) had not heard about the telecentres before their inception in their respective areas.

First, many users visit the telecentres to meet people, access telephone and internet services, acquire computer skills, research, borrow books and other information materials, receive training, charge phones, and for general socialisation. This shows that the rural communities benefit a lot from Maarifa telecentres since they have access a wide range of information services.

Second, majority of the users (60%) visit the telecentres on weekly basis while 40% visit every fortnight. This shows that the telecentres' users regularly use the services indicated heavy reliance on information to better their livelihoods. It also shows that the establishment of the centres was handy and good use of them is being made. That should be replicated across the country.

Also, majority of the users would not have preferred that the money spent by ALIN on Maarifa centres be instead used on another project. This shows that Maarifa centres are very useful to the rural communities as they have reduced the information gap that existed between them and other places in the country and beyond.

Third, majority (53.3%) of the telecentres' users travelled for less than one kilometre, to access the telecentre. We can conclude that, the Maarifa centres are highly accessible to the local populance as they do not have to travel for long distances to access the facilities.

Fourth, from the study, majority (80%) of the users have undergone computer training at the Maarifa centres. The training covered introduction to computers, Word Processing, Microsoft Excel, Windows, Microsoft PowerPoint, internet and e-mail.

This means the problem of lack of computer competencies has been solved. Users can therefore benefit from the services offered in the Maarifa centres without assistance. Also, the centres, through trainings, have successfully empowered the rural communities and consequently opened new opportunities of learning new ideas that they could apply to better their lives.

It further points to the great role that Maarifa centres played in building the capacity of the rural communities in ASALs in Kenya to use information technology. It should be noted that Maarifa centres are the only places that the majority of them would learn computer and other IT skills free of charge. Competence building is important especially if the projects are to be self-sustaining. Such a resource base can help in running the centres and not rely on "experts" from outside the community.

Fifth, Maarifa centres are very important in empowering the rural communities to access information and reduce the digital divide. Maarifa centres have benefited the rural communities who are now able to use the internet. Some of the main functions are social networking, communicating via e-mail and access to strategic online information. In addition, users are now able to apply for jobs and scholarships, conduct online searches and study IT-related careers at advanced level.

Sixth, the centres mainly offer free access but charge minimal fee for photocopying typing and a few other services. Therefore, Maarifa centres have enabled the rural communities in ASALs to access information at a very affordable cost as majority of them are poor. This is in contrast to other information services offered by other

service providers like cyber cafes which are relatively expensive, hence limiting access to those who can afford.

The telecentres have saved them costs related to travelling, cyber cafe fee and purchasing textbooks, magazines and newspapers. Therefore, Maarifa centres are instrumental in reducing the amount of money that the rural communities use to access information services. Therefore, their livelihoods have improved as they have additional income to utilise on other household needs.

Seventh, the study confirmed that the telecentres have improved users lives. Apart from gaining access to information on farming methods, markets and government services, career growth among the youth and those who are employed are true testimonies. People learn about new career opportunities and apply for jobs online. Interaction with friends through social media platforms such as Face book and twitter has also improved their communication skills. They also attested to receiving up-to-date information on farming from the local field officers who research using the internet.

Also, social media has not only enhanced relationships but has also helped them stay in touch with the agricultural extension officers. That way, they are able to share knowledge on better farming methods and income generating activities to boost their income, hence livelihoods.

Otherwise, without social media, users cannot to communicate with friends; some of who are only accessible through the social network platforms. It will also mean lack

of access to current information that the social media platform provides. This shows that the internet has greatly enhanced the social life of the rural communities.

Most important, new opportunities of accessing latest sources of information through the internet have kept them abreast with newest developments around the globe making them world citizens. From weather forecasts to games and political happenings like terrorism attacks, then villages get the information first hand which improve their lives.

Eighth, the users have access to diverse sources of information which increases opportunity to learn new ideas and improve their lives. The websites visited by the users include: news, educational, entertainment, religious, business, career/work, government information and health information websites. Other websites commonly visited were: yahoo, Google and e-learning sites.

Ninth, Maarifa centres have made a major impact in improving the livelihoods of the rural communities. Some of the changes visible are new skills, improved farming methods, access to markets and education.

Maarifa centres are also instrumental in identifying the local information needs of the communities. Through the inquiry desk, the centres get insights into community information needs. This has led to development of home-grown information solutions that are most relevant to the local situation. The needs assessment has helped in identifying community information gaps that require to be bridged to facilitate socio-

economic development. There is high uptake of information by the community leading to different innovations in the area.

Users have grown confidence in their computer use levels. In turn, access information on goods and services has increased. Their income levels and distribution have increased as they have more up-to-date information on market trends, better access to public goods and services and improved health as they know better ways of disease prevention and control.

Furthermore, Maarifa centres can strengthen promotion of livelihoods, by use of innovative strategies to market agricultural produce and promotion as well formation of farmer organisations such as agri-business and cooperatives. Maarifa centres have exploited the power of ICTs in socio-economic development of ASALs communities. The study found out that ICTs have enhanced acquisition of new knowledge that has facilitated improvement of agricultural practices. ICT promotes social interaction and information sharing as well as enhancing the link between the community and the experts. The major achievement of Maarifa centres' initiative is the global recognition as a model that was ahead of its time.

6.4 Effect of ICTs on the Various Aspects of the Rural Livelihoods

This section provides a summary of the results of livelihood assets discussed in this study in relation to diffusion of innovation and improved livelihoods. The livelihood assets include social capital, human capital and financial capital.

In relation to **Social Capital**, Maarifa centres, ICTs and related services offered at the telecentres were:

1. Email was the main reason for using the internet.
2. Email was used for social communication with friends and relatives living far.
3. Face book and Twitter were used to socialise with friends.
4. ICT provided an interaction forum and kept people in touch socially.
5. Some users go to Maarifa centres to meet people.

Concerning **Human Capital**, ICTs, the internet and other services offered at Maarifa centres were as follows:

1. Most respondents used Maarifa centres to access online information about university education and opportunities for further studies.
2. Telecentres offered seminars and workshops where people acquired knowledge on improved farming methods.

As far as **Financial Capital is concerned,** Maarifa centres, ICTs, the internet and other services offered:

1. Information accessed via sokopepe.com on marketing and information on prices of products offered by ALIN enabled farmers to get fair prices for their products.
2. Farmers were able to get more bargaining power over middlemen.
3. People used the internet to looking for employment.
4. Acquiring ICT skills enabled people to get jobs.

5. Online information provided by ALIN facilitated access to information on prices of products in different markets and the price of farm inputs via mobile phones.

6.5 Vulnerability Context

1. Knowledge acquired at Maarifa centres have direct effect on people living in ASALs. cope with seasonality issues such as floods and droughts For instance, planting drought resistant crops, controlling soil erosion and various methods of landscaping to counter the effects of floods.
2. Access to health information from Maarifa centres helped people deal with medical emergencies before calling for help using mobile phones.

6.6 Policies Facilitating Development and Utilisation of Maarifa Centres

It is the responsibility of CAK to ensure that all the Kenyans have access to affordable communication services. This is achieved through regulating rates of the communication services. To address the information gaps, CAK has undertaken some pilot projects in certain parts of the country which include; establishment of 16 school-based ICT centres, five Maarifa telecentres and eight centres for persons with disabilities.

CAK has also provided computers and internet connectivity to these institutions in collaboration with other players also already noted. Another initiative is partnering with the Kenya Institute of Curriculum Development (KICD) to support the digitisation of the secondary schools curriculum.

Kenya's ICT policy has been successful in achieving its objectives especially in fostering universal access to ICTs. This is shown by the increase in the number of internet users. Similarly, there is already in place an ICT curriculum from the Ministry of Education that is taught in schools.

The primary objective of establishing the centres is to build ICT capacity and skills development in the country. Telecentres are also community information access points to reduce the cost of individual ownership of equipment and services.

CAK supports the establishment of Maarifa centres: which has enhanced ICT capacity in ASALs. The centres are run and managed on behalf of the local people through partnership with ALIN which has sufficient experience in rural ICT development. The government and other non-governmental organisations have been instrumental in providing material and financial support.

However, the government can do more to enhance freedom of information as envisaged in The Kenya Constitution, 2010. Instead of giving out free services, it can pass relevant laws to ensure affordability of information. That may include reducing tax on airtime, paper, books and other information related products. More can also be achieved through mobilisation of communities for the sustainability of the projects, using county governments and also encouraging Public Private Partnerships (PPP).

6.7 Challenges in Provision of Information

Challenges of accessing/using computers and internet have been addressed by Maarifa centres. However, the following challenges are still present: high levels of illiteracy,

funding, inadequate ICT skills, lack of enough resource persons to train the community in ICT, negative perception about the computer by the older generation, limited space in telecentres, and lack of alternative power supply in case of power outages. These major constraints need to be addressed so that the telecentres can perform or operate better so as to improve livelihoods of people in ASALs. Maarifa centres have done considerably well, despite the challenges.

6.8 Suggestions for Improving Information Provision

#Finding: Users indicated that the facilities require physical improvement in terms of more space, computers, as well improving internet speed.

#Suggestion: The Maarifa telecentres require continued technical, financial and material support to boost their effectiveness and sustainability. The centres should be assisted in competence building and improving skills of the implementing staff and the users, up scaling of the information services and financial support to make the services offered affordable to the rural communities.

#Finding: The strategies that ALIN deployed to counter the challenges facing the Maarifa centres included community involvement; working with hosting organisations; allocating field officers to run the day-to-day operations; and building networks and partnerships with government, private sector, civil society and local societies.

 # Suggestion: There should be expansion and up scaling of Maarifa centres to serve more rural communities in ASALs. The number of computers and trainers should also be increased.

#Finding: Power outages

 # Suggestion: The centres should adopt alternative power sources to cope with power shortages.

#Finding: Poor funding and sustainability

 # Suggestion: For the government, people and ALIN to achieve the national goal of developing rural areas, they should invest more in telecentres and digitise their services so that corruption could be eliminated which will save time in service delivery to the people.

To ensure that the telecentres can continue to use and maintain the hardware and software over a long period of time without donor support. The Maarifa telecentres should encourage use of open source software so that they do not have to purchase or renew licences. They should partner with other organisations to provide software at competitive rates. In terms of hardware, the users should also be trained on basic maintenance.

#Finding: Poor access to information

 # Suggestion: Although access to information has improved, there are still gaps. Therefore, there is need to have more information exchange programmes among

farmers to share agricultural information. This can enable the rural communities to improve their livelihoods as they continue learning of technologies to enhance their agricultural productivity and other livelihood initiatives like energy generation.

#Finding: Maarifa centres lagged behind in recognising the shift in technology.

 # Suggestion: The telecentres can borrow from ALIN initiatives lessons such as focussing on the people, not the technology. By understanding the technological solutions that solve people's problems, the telecentre's management should deploy the latest technology and empower the people to harness and utilise it.

Other recommendations include expansion of the telecentre space, improvement of the internet speed, provision of more updated ICT reference books, improved provision of security, provision of more computer programs and software, introduction of other information services like selective distribution of information.

6.9 Conclusions

Apart from Maarifa telecentres, there are many other players in the provision of information to rural folks living in ASALs. These include NGOs like ALIN, governments (both national and country), CBOs, NGOs, FBOs, KALRO and Kenya Seed. It should be possible for these players to work together to benefit from synergy and economies of scale.

Informediaries play an important role in the distribution of information in rural areas and so should be seen as partners. They are very important especially in repackaging scientific information on new discoveries so that farmers can easily understand.

The main sources of finance for Maarifa centres is the government, donors, well-wishers, community and from own generation through income generating activities. Therefore, the study concludes that there is need for stronger government intervention in the provision of ICTs. The centres should also come up with income-generating activities so that the centres can sustain themselves.

Maarifa projects were established to give people information that can help them improve their livelihoods. They have changed the lives of the people as they currently do not travel for long distances to access information like e-government services and access to agricultural information. Therefore, Maarifa telecentres are very important in empowering the rural communities in Kenya towards access to information and in reducing the digital divide in Kenya.

CAK has supported the establishment of five Maarifa telecentres which were provided with various communication services. This enhanced ICT capacity in ASALs in Kenya through training and access to information. As noted by the ICT Board respondents, Kenya has several regulatory provisions that facilitate access to information such as:

1. The Kenya Communication Act of 1998.
2. The Science and Technology Act Cap 250 of 1977.
3. A regulatory Bill (in place of Universal Bill) that was established in 1999 by the Kenya Information and Communication Act which is under the Communication Authority of Kenya (CAK).

Freedom of information as envisaged in the Kenya Constitution, 2010, in addition to the above legislations can guarantee wide access to information.

Other as challenges like illiteracy will be overcome with maturity of the Free Primary Education programme introduced in 2003. That means by now, most of the beneficiaries who are the elders of tomorrow will have access to at least basic education.

In the same breath, the One-Lap-Top-Per-Child initiative implemented by the government since 2016 will help diffuse technology. Children are introduced to computers at an early age. That means they are able to appreciate ICTs and will fill adequate to use them in their lifetimes.

6.10 Recommendations

The following recommendations are suggested for the purpose of addressing the gaps Maarifa centres face in providing information to communities in ASALs. The aim is to address the challenges by coming up with a model for improving information provision. The recommendations are based on the findings of the study.

6.10.1 Services Provided by Maarifa Telecentres

Cost of running the Maarifa Centres: it was established that the cost of running the centres is very high and that the main sources of finance included the government, donors, well-wishers community and from own resources through income generating activities.

Recommendation: The study recommends that the management of Maarifa centres should come up with strategies to streamline the operations of the Maarifa centres through adopting cost cutting practices as well as adopt a philosophy aimed at reducing cost by the elimination of waste. This effort should be coupled by more lobbying for funds from the donors and the government.

Impact on the ground: it was established that use of information provided by the centres has improved livelihoods.

Recommendation: The study recommends that the management of the Maarifa Centres should conduct regular monitoring and evaluation to understand the impact of Maarifa Centres in improving the livelihoods of the rural communities they are serving. This will assist in redesigning services to meet the emerging local needs and make the project always relevant to the beneficiaries.

6.10.2 Access and Use Pattern of Information by Rural Communities

Illiteracy: illiteracy was cited as a major problem.

Recommendation: the government through the Ministry of Education and Ministry of Information should start adult learning classes alongside the Maarifa Centres to enhance the literacy levels of the rural community which will enable them to acquire the ICT skills offered in the Maarifa Centres.

6.10.3 Policies Facilitating Development and Utilisation of Maarifa Telecentres

Funding: this remains a huge challenge.

Recommendation: The government should cast its net wider to increase the amount of funds collected through the Universal Service Fund (USF) to upscale the information services provision to the rural communities through the Maarifa centres and other platform

Need for policy review: Good government policies can enhance access to information.

Recommendation: The government should review the Kenyan ICT policy to identify and address the existing bottlenecks in access to ICT in Kenya. This should be coupled with strict supervision on the implementation of the ICT policy to ensure compliance by the players in the communication sector.

6.10.4 Challenges in Provision of Information

The government together with other stakeholders and development partners should provide the necessary infrastructure to enable provision of information in the rural areas. They can formulate a multi-faceted strategy to address the many impediments to the implementation of Maarifa centres.

6.10.5 Improving Information Provision

The study recommends that the management of the Maarifa centres should work with other implementing partners to improve infrastructure in terms of expanding spaces in the telecentres, equip it with more computers and improve the speed of the internet. The implementing partners such as ALIN should regularly offer technical support to the Maarifa centres to ensure that the facility is always functioning and sustainable.

6.11 A Proposed Human-Techno Interface for Telecentres Service Framework

The proposed framework fulfils the last objective of the study which is to recommend a framework. This section presents a proposed human-techno solution for telecentre services framework. The framework's ideas are borrowed from the two frameworks discussed in chapter two of this research study used to guide the process of this study. This new framework is therefore based on the empirical findings of this study.

Although there are many theoretical frameworks that attribute ICTs to poverty alleviation and improved livelihoods, the world especially the developing countries are still experiencing slow economic growth particularly in the rural areas. For instance, some communities in the remote parts of Kenya are still living in abject poverty and in very desperate conditions.

While carrying out this study, the researcher realised that there is very high penetration of mobile telephony in these communities which can be used to harness the potential economic advantages that they possess. The government through various ministries has as well committed resources for increasing the levels of ICT penetration in the rural areas.

The proposed human-techno interface framework

A number of questions came to mind during the process of this study. For instance, the researcher silently wondered; are the existing frameworks inadequate, irrelevant and not compatible with activities in the remote parts of the world? Are the governments and other stakeholders not doing enough to strengthen technology for

poverty alleviation? Why did the Kenyan government initiate “Pasha Village Project” fail to pick even with the vibrancy and enthusiasm that it had started with?

Has the Kenyan government dedicated enough ICT resources for its citizens living in ASALs? Which resources or models do governments employ to achieve its agenda of alleviating poverty and improving livelihoods? The preceding questions can only be answered through empirical research. This study employed two frameworks, i.e. DFID’s Sustainable Livelihoods Approach and Roger’s Diffusion of Innovation. The two models are not to be disqualified because they have provided substantial contribution to issues of ICT and improved livelihoods. They worked as a good guide but what came out is the lack of strong connection between technology, people, and poverty alleviation and support instruments.

The proposed new model is motivated by what an ALIN director asserted during the interview for this study with the researcher. He stated that “start with the people, not the technology, having known what technological solution people require, deploy the latest technology and empower the people to harness it to their advantage”. In another interview at a different forum, the regional director, ALIN East Africa was asked how ALIN’s work contributed to the improvement of rural communities in East Africa; how has ALIN changed people’s lives. His response was, “ALIN has enabled rural communities to access information and ICT skills that were impossible for them to get previously. Access to information has enabled them to set up businesses. This was confirmed during data collection because the researcher learnt how lives have been transformed for the better through access to information.

With the above explanation in mind, the proposed human-techno interface for telecentre services framework has put people as a core factor: people who look to Maarifa-ALIN projects to solve their diverse information needs. The proposed framework picks some aspects from the two frameworks that guided this study, i.e. SLA and DOI.

DOI was first developed to assist in the promotion of agricultural practices; it provides a useful framework to demonstrate adoption of ICTs in the rural communities. The five perceived attributes (Compatibility, Complexity, Observability, Relative advantage and Reliability) have been picked because they are the more practical elements in the process of adopting ICTs and are relevant to this study. They are also results oriented.

Sustainable Livelihoods Approach framework has been used by researchers such Parkinson (2005) to provide a framework for assessing the impact of ICTs on individuals and communities. The framework illustrates how ICTs participate in the various aspects of livelihoods of the people such as resources, relationships, information sharing and strengthening financial capital. The framework is ideal because it appreciates that poor people are vulnerable and sensitive to that vulnerability. Parkinson (2005) and Best and Kumar (2008) explain how the framework works towards eliminating that vulnerability.

The new framework (figure. 6.1) proposes that information and technology are the answer to poverty alleviation. Information should be relevant, accurate and repackaged in a way that communities in ASALs can access. Information needs

assessment must be conducted to ensure that information needed is availed accordingly. Appropriate technology should be engaged for disseminating the right information because as suggested by DOI, “ICTs for poverty alleviation should be conceptualised within the context of the targeted community” who are the beneficiaries of the digital access. Technology employed should capture relevant tacit knowledge that is not available in digital format and repackage it as local content. In other words employ technology that will enhance access to information and transform people’s lives.

Another key issue in this framework is sustainability because the whole process should work towards long-term poverty reduction. Information generated should educate people to exploit the natural resource and ensure long-term productivity from the natural resources. The natural resources should also be preserved to prevent deterioration. The system should encourage agricultural development on long-term basis and embrace practices that do not compromise natural resources e.g. soil fertility. Sustainability is also to do with livelihood that withstand external shocks and stress like price fluctuations, climate change, disasters, etc. It is a livelihood that depends less on external support and, ultimately a community that is empowered.

Information generated must be relevant, up-to-date, in the right format and content. Information should not only be for poor people in the rural communities; there should also be information for stakeholders who help in making informed decisions for the local/poor people. People in ASALs may need information on crops and livestock,

availability of inputs, weather conditions, sowing time, expert advice on markets, disease breakouts both of livestock and crops.

Opportunities and benefits of such a framework are the outcome of telecentre services such as:

1. Better healthcare
2. Increased human empowerment
3. Provision of education and training
4. Increased trade and marketing opportunities, etc.

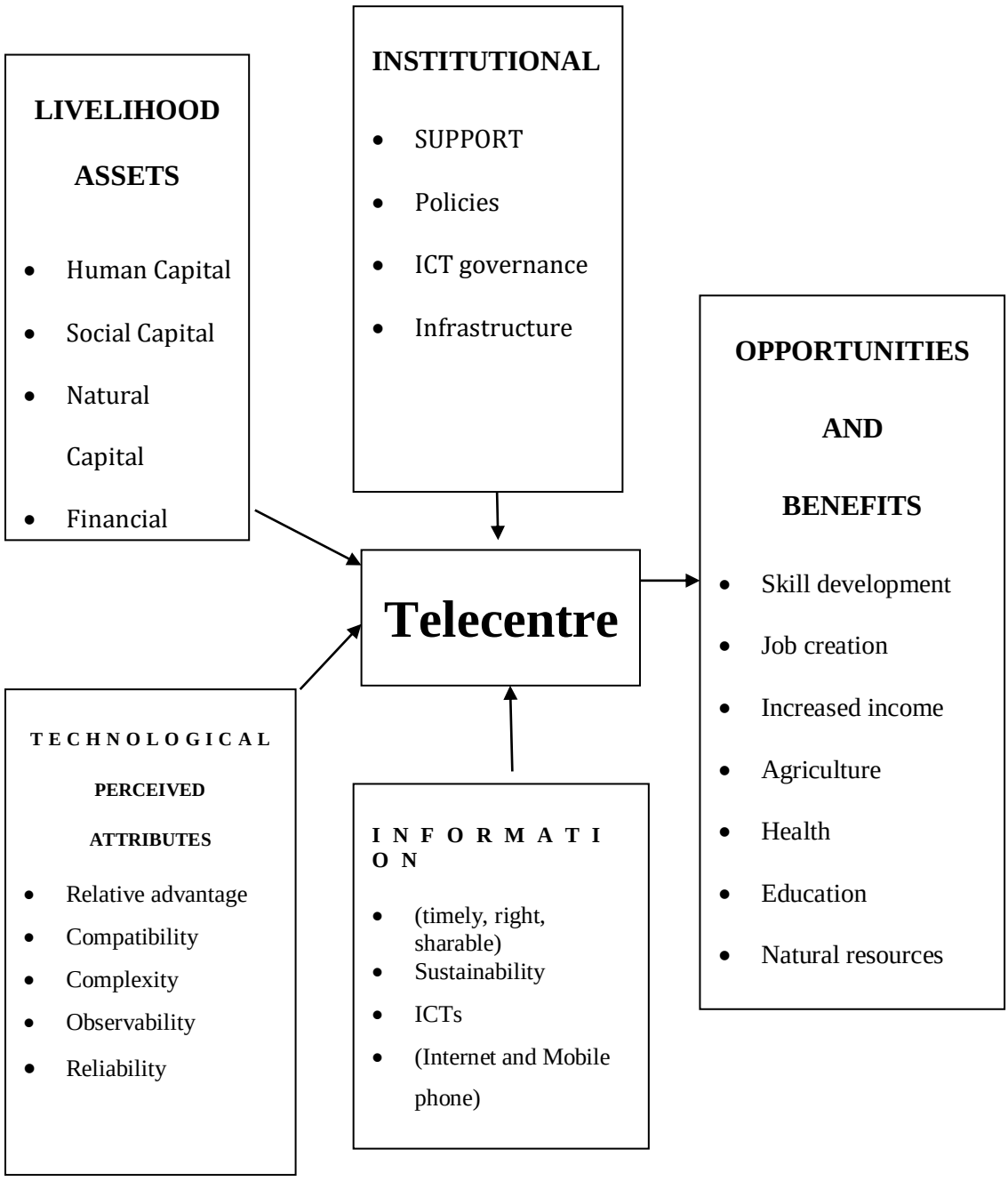

Figure 6.1 Human-Techno Interface for Telecentres

6.12 Suggestions for Further Research

This study provides a basis for further research on the role of telecentres in promoting socio-economic development. This is a case study research that explored the provision of information by Maarifa centres to improve rural livelihoods in Arid and Semi Arid Lands (ASALs) in Kenya. There are a total of 15 Maarifa centres but this study focussed on only five. Below are the suggestions for further study:

1. Although five is a reasonable size to extrapolate findings; there is need for a more in-depth study on the other centres to irrefutably establish the impact of Maarifa centres in improving livelihoods of the people they serve. The study can also be expanded to other centres in the East African region.
2. Maarifa centres are just one type of model telecentres that have done well in providing information. There are other models in existence like the government initiated Pasha digital villages. Since Pasha digital villages are not doing as well as Maarifa centres, a comparative study should be conducted between the two models. Such a study will assist Pasha Digital Villages to learn from Maarifa centres and adopt best practices. It will also help telecentres avoid bad practices and contribute towards attainment of MDGs.
3. Further, research on the role of mobile phones applications as tools of information dissemination needs to done.

4 A study should be conducted to establish the role of rural community in improving information provision in Kenya.

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APPENDIX 1: INTERVIEW SCHEDULE FOR TELECENTRE MANAGERS

PROVISION OF INFORMATION TO IMPROVE RURAL LIVELIHOODS IN ARID AND SEMI ARID LANDS KENYA: THE CASE OF MAARIFA TELECENTRES

A. Management - About Your Telecentre

A.1 Name of your telecentre? .....

A.2 Location of your telecentre? .....

A.3 Name of the manager? .....

A.4 Which year was your telecentre established? ☐

A.5 What is the number of staff in this telecentre? ☐

A.6 What is their training background? ……

A.7 What is the annual cost of running your telecentre and the future plans for the telecentre?…….....

A.8 What are the main sources of finance? .....

A.9 What was the rationale behind Maarifa project established in such a rural community? .....

A.10 (a) How do you perceive the telecentre generally? .....

A.10 (b) What are the aims, objectives and the structure of Maarifa CKC initiative?

(i) ……..…

(ii) ……..……

(iii) ……..……

Services

A.11 What categories of users are served by this telecentres? (e.g. students, business people, farmers, civil servants, etc)……

A.12 (a) What are the frequent main services offered by this telecentre? (e.g. Internet, training, telephone services, photocopying, printing, etc. .....……

A.12 (b) Are there other services that you would like it to offer? …… …….....……...

A.13 Training services: What mechanisms are used by Maarifa projects to avail, train and sensitise people as regards ICT related issues?

.....…….....…

A.14 Business support services: Does the telecentre provide training or other forms of support for the services listed below:

- Typing
- Employment opportunity
- Tax filing
- Access to government services
- Job searching/advertising
- Content development
- Access to professional/sector-specific information
- Searching for information
- Advertising
- Export-import/trade
- Facilitation services
- Buying and selling
- Data storage and management
- Microfinance (access to)

A.15 Are there any strategies to follow up people in their activities to see whether what they learn at the telecentre are implemented to enhance economic development and support livelihoods?

YES ☐ NO ☐

A.16 What type of government support does your telecentre currently receive? (Describe the type of government support you receive and from which institutions).

……

A.17 What is the contribution of the community and that of community-based organisation (CBOs) towards the development and maintenance of this telecentre? ……

A.18 Apart from ALIN, which other organisations (National and International) helps the telecentre in one way or another? ……

A.19 If you do receive help for the organisations that you have stated in question A.17 above, what kind of help do those institutions provide the telecentre? .....

A.20 Have you undertaken any study of:

(a) the needs of the community (needs assessment) ☐
(b) who uses the telecentres and for what? (monitoring) ☐
(c) the effectiveness, sustainability and impact of the telecentres? (evaluation) ☐
(d) the livelihoods of a community? (Livelihoods analysis) ☐ ☐
(e) Diffusion of technology by the community? ☐

A.21 Please briefly describe the results of the analysis…..……

A.22 To what extent supporting economic activities is an objective of your telecentre? …….....

A.23 What is the relationship between the services offered by this telecentre and socio-economic development of the people living in this community? ……..

A.24 what are major constraints that need to be removed so that telecentre performs or operated better?

(i) ……
(ii) ……
(iii) ……
(iv) ……
(v) ……

Facilities

A.25 How many computers are available for public use at this telecentre? ……

A.26 What is the total number of printers available? ……....

A.27 What other hardware is available in the telecentre? ……..

A.28 Are the facilities in the telecentre enough to satisfy the needs of your users?

YES ☐ NO ☐

A.29 What problems do the telecentre face in acquiring and maintaining ICTs?

.....……
…….....……

A.30 What strategies do you employ in trying to overcome or solve problems mention in the above question?

(i) ……
(ii) ……

A.31 How relevant do you see this telecentre as improving lives of these people who use this telecentre on a daily basis?…….....

B. The Use and effect of Telecentres

B.1 In your personal opinion, what are the three biggest community- related problems you faced before the telecentre project came in?…….....

B.2 In your opinion, have these problems been solved since the telecentres was introduced? ……..…

B.3 Who are your main groups of users? (e.g. unemployed, employed, self-employed, students, people engaged in family duties, women, men, etc.) …….....

B.4 For which purposes do various user groups use the telecentre? e.g. Women, men, unemployed, farmers, self employed, students, users living below the national poverty line.…….....

(Personal communication, Business communication, Buy goods or services, Sell goods or services, Search for information, Solve administrative matters)

B.5 Would you say that your telecentre helps users to:

cquire new skills?	YES ☐	NO ☐
support existing economic activities?	YES ☐	NO ☐
develop new economic opportunities?	YES ☐	NO ☐
improve self-employment opportunities?	YES ☐	NO ☐
Improve salaried employment opportunities?	YES ☐	NO ☐

B.6 What changes have you observed in the lives of telecentre users? (e.g. changes in: income levels and distribution, quality of life, access to public goods and services, coverage of basic needs (housing, health, and nutrition), social relations, confidence, etc.).....

.

B.7 What strategies have you put in place to ensure that users get access to information which is relevant to their needs? (e.g. local content) …….....

B.8 What measures have you taken to ensure the telecentre continuous use and maintain the hardware and software over a long period of time without donor support?…….....

B.9 Please describe a best practice example of how your telecentre is supporting livelihoods.……

B.10 (a) What are the minor constraints that constrain the working of this telecentre?……

B.10(b)What do you want to improve at the telecentre at present?…….....

B.11 Please name some areas in which you believe your telecentre could strongly promote livelihoods in the near future (e.g. two years) …….....

B.12 In which areas would you like to receive more support?

(a) Support for ensuring the sustainability of telecentres ☐
(b) Support to develop the skills of telecentres ☐
(c) Support to promote agricultural practices ☐
(d) Support to deliver a wide range of services ☐
(e) Advisory support on the management of telecentres ☐
(f) To make services more affordable to users ☐
(g) Support to access and develop relevant content ☐

B.13. Do you agree to the general believes that ICTs contribute to socio-economic development of the people in communities and so this community? Please give explanation to your answer.....

APPENDIX 2: INTERVIEW SCHEDULE FOR TELECENTRE USERS

A. Respondent's Data

A.1 Name of the respondent (optional) ……

A.2 Age of the respondent…….....

A.3 Gender Male……..Female ……..

A.4 Have you received any formal education i. Yes ……ii. No ……

A.5 If yes to question 4 above, what level of education have you achieved?

Primary school ----------Secondary school (forms I-IV)……

Higher secondary school (forms V-VI)……..Tertiary level e.g. Diploma, Degree ……

Adult education (What stage).....Have never gone to school ……..

A.6 If no to question 4 above, do you know how to read and write? Yes ……No …..

A.7 What is your occupation? .....

B. Demographic and Economic Information

B.1 How many are you in your household

Number of Male Adults……Number of Female Adults …….

Number of male Children……Number of Female Children ……

B.2 To what extent does your family depend on support from family members living elsewhere?

Not at all …… Moderately ……..Highly ……

B.3 Regarding your house, do you live in…

A rented ……Personal owned……Other, Specify ……..

B.4 is the house……

Permanent..... Semi-permanent..... Temporary .....

B.5 Does the house have electricity. Yes……. ii. No…….

B.6 Does the houses have running water? i.Yes…….ii. No…….

B.7 Do you own a:

Automobile Car/Bike

Bicycle

Tractor

Computer

Radio

TV

C. Access to the telecentres

Access to services at the telecentre / awareness

C.1 Have you heard of the telecentre before this interview?

C.2 If yes, how did you hear about it?

C.3 When did you first come to the telecentre?

C.4 What are the main reasons for visiting the telecentre? What do you do in the telecentre? What type of things do you do? What type of services do you use? What do you use the telecentre for?

(Meeting people, Telephone services, Internet services, Computer training etc)

C.5 How often do you visit the telecentre?

C.6 What about the distance to where the telecentre is located, is it convenient?

D. Effect of use of telecentre on Human Capital

D.1 Have you undergone Computer training at the telecentre?

D.2 If yes to question D1 provide details of that training

D.3 In what ways has the training been useful to you? E.g. enabled you get a new job (Details).

D.4 How much did it cost

D.5 Do you feel this cost is too expensive for computer services?

D.6 How much of your investment in the use of internet been helpful in knowledge acquisition?

D.7 Why did you attend computer training?

D.8 What other service offered by the telecentre have you used?

D.9If you have used telecentre services, were you satisfied with the services?

D.10 How did you do the same things before coming to the telecentre

E. Effects of use of telecentres on financial capital

E.1 How has your investment in the use of the telecentre been helpful for financial communication?

E.2 What does the telecentre do to improve your life? How is your life changed since you came to the centre?

F. Effect of use of telecentre on social capital

F.1 How has your investment in the use of the internet been helpful for social communications?

F.2 How has your investment in the use of e-mail been helpful for social communications?

F.3 if you are unable to access the internet any more, how would this impact you socially?

F.4 If you were unable to access e-mail any more, how would this impact you socially?

G. Effect of use of telecentre on the vulnerability context

G.1 Is the internet important in emergency situations?

G.2 Is the e-mail important in emergency situations?

G.3 If you are using the telecentre, how often do you use the telecentre?

G.4If you are not using the telecentre, explain why

H. Ability to use computers, internet and e-mail

H.1 Do you know how to use the computer?

H.2 Do you know how to use the internet?

H.3 Do you know how to use e-mail?

H.4 Do you have an e-mail address

H.5 How do you communicate by e-mail?

H.6 What do you normally use e-mail for?

(e.g. Business, communicating with friends and family, Gaining new knowledge, Emergencies (family and friends))

H.7 How many times do you use e-mail in a month?

H.8 Are you using other means of communication apart from e-mail?

H.9 If the answer to H8 above is yes, What has been the effect of other means of communication since you started using the internet, e.g. (letters and post office, Face to face communication, Making social visits, Use of public phones, Use of newspapers, Referral to village elders)

I. Telecentre's Operations (For those who have interacted with the telecentre)

I.1 What do you think are the main services offered by the telecentre? Are there other services? Which ones are good? Which one could be improved?

I.2 Does the internet facility work at the telecentre?

I.3 The last time you went to use the telecentre, were you able to use the internet?

I.4 How many hours a day does the telecentre run?

I.5 If equipment repairs are needed in the telecentre, do they get done quickly?

I.6 Do you think the facility needs physical improvement? Kindly explain.

I.7 Do you feel there are enough teachers at the telecentre?

I.8 Do you feel that there are enough software at the facility?

I.9Would you be willing to pay for the improvements of the speed access?

I.10 Do you use the phone services at the telecentre?

I.11If your response is ''yes'' to question 1.10 above, which phone service(s) do you use?

I.12 If your response is ''no'' to question 1.10 above, explain why you do not use phone services at the telecentre?

I.13 When using the internet, what type of websites do you browse most often?

(News, Educational, Entertainment, Social, Religious, Business/work, Government information, Health, etc.)

I.14Please tell me something about how the telecentre has helped you to do the following activities

(a) Use internet to look for jobs

(b) Use computer competence to get an office job

(c) Use computer to access e-government services

(d) Use computers to sent e-mail or to chat with people outside the community

(e) Use computers to write letters to the authorities

(f) Use computers to read newspapers and magazines

(g) Use computers to access health information

(h) Use computers to do homework for school

(i) Use computer to create a community newspaper or magazine

I.15 Please elaborate on the ways in which the services mentioned in number I.14 above provided by the telecentre has helped you acquire new skills, knowledge, or other abilities:

J. Affordability of services at the telecentre

J.1 How much does it cost to use your mostly used services?

J.2 Do you feel the cost is too expensive for you? Please explain your answer

APPENDIX 3: INTERVIEW QUESTIONS FOR ALIN DIRECTOR

Name of the respondent (Optional) .....

Date of the interview …….....

1. Can you explain the origins, the aims and the objectives and structure of Maarifa centres Initiative?
2. Describe the relationship between Maarifa centres and ALIN. What role do you see ALIN within telecentre movement?
3. As a programme manager, what is your role and responsibilities?
4. From your perspective, what has been the major impediments to implementation of Maarifa centres across Arid Lands of Kenya?
5. How has Maarifa journey been? What are some of the challenges that ALIN has experienced with the telecentre management? What strategies did ALIN deploy to counter these challenges?
6. According to you, what have been the achievements of Maarifa centres initiatives? What has been the role of the government and other non-governmental organisations in the implementation and running the Maarifa CKCs,
7. Tell me about the progress achieved in the implementation of Maarifa Centres so far? What was or has been the government role? Where do you think Maarifa centres lagged behind?
8. What lessons could other telecentre initiatives take from your organisation?

APPENDIX 4: INTERVIEW FOR OFFICERS OF THE COMMUNICATION AUTHORITY OF KENYA (CAK)

Name of the respondent (Optional).....

Date of the interview .....

1. What policies/strategies does CCK have to ensure wider accessibility of ICTs to the majority of Kenya especially those living in rural areas to ensure that Maarifa projects reaches out to its beneficiaries?

2. What are your comments on the Kenyan ICT policy? Do you think it has been successful in achieving what it was meant to achieve especially in fostering universal access to ICTs?

3. What is Maarifa project relationship with CCK?

4. What services does CCK avail to Maarifa Centre and such other organisations to ensure that it strategically addresses peoples' needs?

5. Do you feel ALIN projects are helping people to improve on their livelihoods (socially, politically, economically etc)?

6. Are there any suggestions you would like to put forward for government, people and ALIN organisation to reach a national goal for rural development? If so, state them?

APPENDIX 5: FOCUS GROUP DISCUSSION GUIDE

Name of the community/telecentre.....

Date of discussion.....

Number of participants.....

1. How do you understand Telecentres and Maarifa centre in this area?
2. What are the ICT related needs in this community?
3. Were you involved in Maarifa project design and implementation process? And if so, what was your role?
4. In your opinion, what were the biggest community-related problems you faced before the telecentre project was established?
5. In your opinion, has these problems been solved since the telecentre was established?
6. In your opinion, what are the biggest community-related problems you faced before this community had access to Maarifa centre?
7. In your opinion, has this problem been solved during the time of telecentre presence?
8. In your opinion, can computers and internet be used to solve problems that this community have?
9. Would you have preferred that the money spent by ALIN on telecentre was spent on another project instead? If yes, what would you have preferred?
10. How would you get information on pasture, seed/fertilisers, product prices, marketing information etc?

11. What are the major problems that this community faces in accessing/using computers and internet?

12. What change have you witnessed in your lives ever since you became a projects beneficiary?

13. Are there any suggestions you would like to put forward as regards this development in this area?

APPENDIX 6: OBSERVATION GUIDE

Name of the community/telecentre.....

Date of observation.....

S.NO.	Items to be observed	Details
1	Access to electricity	
2	Mobile phone service coverage and use behaviour.	
3	Other ICT services available in the community such as other telecentres or internet cafes.	
4	Local infrastructure available e.g. Condition of the roads	
5	ICT infrastructure in the community such as mobile phone towers, satellite dishes etc.	
6	Type of internet connection available in the telecentre	
7	Check if there is any locally produced information products in the telecentre?	
8	Check the kind of website commonly visited by looking at search histories	
9	Check telecentre business hours	
10	Check other sources of information	
11	Nature and literacy levels in the region	
12	Methods on how the telecentre ensures its sustainability	
13	Observe actual use of the telecentre Number of people using the telecentre per day Gender aspects	

APPENDIX 7: LETTER OF REQUEST TO CONDUCT RESEARCH AT MAARIFA CENTRE

A Letter of Introduction to the Head of Arid Lands Information Network (ALIN)

Dear Sir/Madam

I am a PhD student at Moi University, School of Information Sciences in Nairobi. I have selected ALIN's Maarifa Centres to participate in my research. The title of research is **"The Role of Telecenres in Provision of Information to Rural Communities in Kenya: A Case Study of Maarifa Centre."**

My study seeks to contribute to the understanding of the contribution of Maarifa centres in improving rural livelihoods in Kenya through the provision of information. The main purpose of the study is to investigate the extent to which Maarifa centres are proving information to communities in Arid and Semi-Arid lands with a view of establishing the challenges then providing a model for improving information provision.

Data will be gathered by interviewing ALIN managers, telecentre managers from five centres which include Mutomo, Merti, Nguruman, Isinya and Ngarua and users of the selected telecentres.

The project has been approved by the school of information Sciences and research permit granted by the **National Council for Research and Technology.** All data will be kept confidential to the researcher and the two supervisors, Prof. J. Kiplang'at and Pro. Rotich. Raw data will be protected and destroyed after the conclusion of the study. Any information and opinions gathered from members of your organization will be attributed neither to the institution nor its members; data will be presented only in aggregated form. A summary of the findings and a research report will be provided to ALIN.

The purpose of this letter is therefore, to seek your authority to carry out this research in the selected Maarifa centres. I will audio record interviews and focus group discussion, request for any relevant documents that will enrich data collection and record observations.

Yours Faithfully

Catherine Ndung'u

APPENDIX 8: RESEARCH AUTHORIZATION LETTER

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RRI/12/1/INF-011/76/5**

Date: **20th December, 2011**

Catherine W. Ndungú
Moi University
P. O. Box 3900
ELDORET

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "***Provision of information to improve rural livelihoods in arid & semi-arid lands in Kenya: The case of Maarifa Telecentres***" I am pleased to inform you that you have been authorized to undertake research **Isinya, Mutomo, Nguruman, Merti, & Ng'arua** for a period ending ***30th September, 2013.***

You are advised to report to **the District Commissioners & the District Education Officers, Isinya, Mutomo, Nguruman, Merti & Ng'arua** before embarking on the research project.

On completion of the research, you are expected to submit **one hard copy and one soft copy** of the research report/thesis to our office.

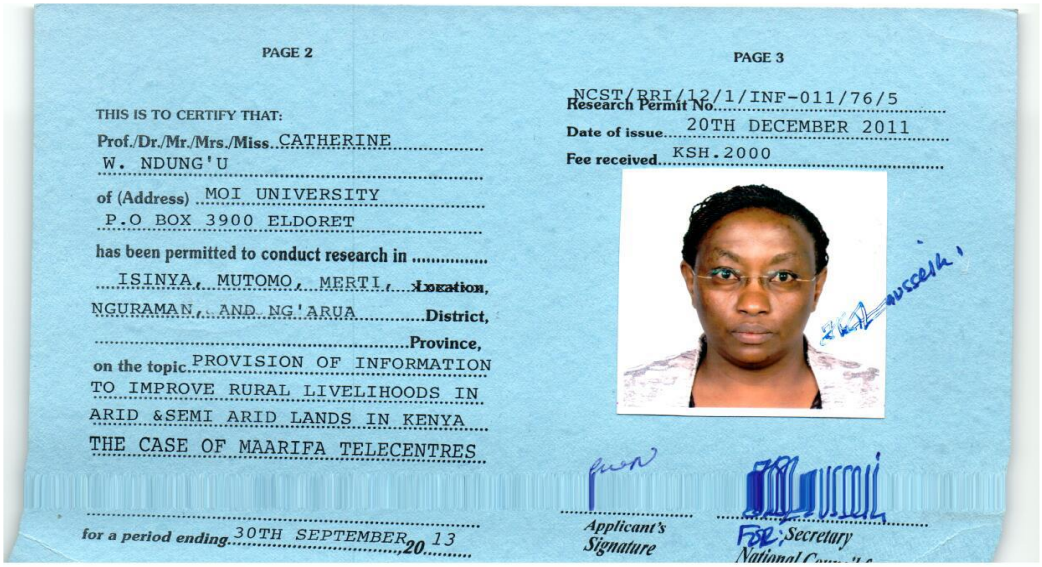
SAID HUSSEIN
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioners
Isinya, Mutomo, Nguruman, Merti & Ng'arua

The District Education Officers
Isinya, Mutomo, Nguruman, Merti & Ng'arua

APPENDIX 9: RESEARCH PERMIT



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THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss CATHERINE W. NDUNG'U

of (Address) MOI UNIVERSITY P.O BOX 3900 ELDORET

has been permitted to conduct research in ISINYA, MUTOMO, MERTI, ~~Location~~, NGURAMAN, AND NG'ARUA District, Province,

on the topic PROVISION OF INFORMATION TO IMPROVE RURAL LIVELIHOODS IN ARID &SEMI ARID LANDS IN KENYA THE CASE OF MAARIFA TELECENTRES

for a period ending 30TH SEPTEMBER, 20 13

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Research Permit No NCST/RRI/12/1/INF-011/76/5

Date of issue 20TH DECEMBER 2011

Fee received KSH.2000

Applicant's Signature

FOR: Secretary National

APPENDIX 10: RESEARCH AUTHORISATION FROM ALIN

May 14, 2013

Catherine Ndung'u
School of Information Sciences
Moi University
P. O. Box 1900
Eldoret

Dear Catherine Ndung'u

Re: Ph.D Research on *Maarifa* Centres

We are in receipt of your letter of May 14, 2013 requesting authorisation to carry out research in selected Maarifa centres namely: Mutomo, Merti, Nguruman, Isinya and Ng'arua.

Having reviewed your letter, we think the findings of this research will contribute towards a better understanding of the role of knowledge centres in improving social and economic development among rural communities.

We would however wish to inform you that though the Merti Centre was started with ALIN's support, it is not managed by ALIN. As such, you may wish to focus on the other four centres or identify another one between Ndhiwa, Marigat or Kyuso.

Through this letter and on behalf of ALIN, I would like to inform you that ALIN has no objection to your request to undertake the said research *"The Role of Telecentres in Provision of Information to Rural Communities in Kenya: A Case Study of Maarifa Centre."* We will also make time to respond to research questions you have provided to the extent possible.

As you have indicated in your letter, we will expect to receive a summary of the findings of the research once it has been completed for our own records. We wish you well in your studies.

Yours sincerely

Anthony Mugo
Deputy Director