The Social Sciences 9 (6): 386-401, 2014
ISSN: 1818-5800

A Systematic Review of Qualitative Research on the Role of ICTs in Sustainable Livelihood

Zeinab Zaremohzzabieh, Bahaman Abu Samah, Siti Zobidah Omar,
Jusang Bolong and Hayrol Azril Mohamad Shaffril
Institute for Social Science Studies (IPSAS), Universiti Putra Malaysia, Selangor, Malaysia

Abstract: In the recent past, the role of Information Communication Technologies (ICTs) in promoting socio-economic development and sustainable livelihoods has become the subject of heated debate. Nevertheless, an insufficient number of studies have systematically reviewed the growing influence of ICTs. In the present study, a systematic review is conducted to evaluate and examine qualitative studies that have explored the role of ICTs in contributing to sustainable livelihoods. Researchers performed a systematic literature review of studies written in English and published between January, 2007 and April, 2014. Inclusion and exclusion principles were employed to identify studies of any qualitative design that examined the concept of sustainable livelihoods through the lens of accumulation of assets in order to evaluate the purposes for which ICTs are utilized and also to review the impact that ICTs have had on various aspects of life. Researchers screened and retrieved all titles and abstracts and potentially relevant studies to establish whether the study met the inclusion criteria, yielding a total of 15 primary studies. Researchers then extracted the precise findings of studies that were relevant to the review through ATLAS.ti7 software in order to allow us to code the key themes, sub-themes and inter-relationships. The results of the review reveal that ICTs have certain influences on sustainable livelihoods and that this influence applies to human, social, financial, physical and natural assets. This review has the potential to address managerial problems by creating a reliable knowledge base that accumulates findings from the selected studies and highlights opportunities for further research.

Key words: ICTs, sustainable livelihoods, systematic review, qualitative research, finding

INTRODUCTION

Social and economic development has long been one of the main discussions in relation to the sustainable livelihoods of marginalized and poor people in underdeveloped and developing countries. Development researchers and planners agree that people need economic and education opportunities and healthy environments in order to overcome constraints (McNamara, 2003; Prahalad and Hammond, 2002). Indeed, Information and Communication Technologies (ICTs) are regarded, as complementary tools for developing social and economic conditions and thus may help improve poor and marginalized people's livelihoods (Nie *et al*., 2010; Singh *et al*., 2008). According to Chilimo (2008), ICTs for development are the best strategy by which to facilitate developing countries to become information societies in order to enhance people's lives. However, studies on the interrelationship between people and ICTs in creating sustainable livelihoods is lacking in relation to developing and developed countries (Parkinson and Lauzon, 2008), thus methodological investigations to uncover the uses and impacts of ICTs is needed. To address this need, the present study identifies journal studies that explore how individuals perceive the importance of ICT toward their sustainable livelihoods (Arun *et al*., 2004; Soriano, 2007; Souter *et al*., 2005). This in turn influences the use of ICT within a given capitals assets which namely are human, physical, natural, social and finance assets.

To date, several researchers have employed qualitative studies such as participatory methods, workshops and interviews, primarily adopting a bottom-up approach to provide an overall view of the development of ICT in relation to sustainable livelihoods (Duncombe, 2007; Gigler, 2004; McNamara, 2008; Molla and Al-Jaghoub, 2007; Parkinson and Ramirez, 2007). However, these qualitative studies provide understandings of expressive and pragmatic phenomena which are limited to the perspectives of those being scrutinized and based on small sample sizes, thus the generalizability of the results of these studies to larger populations is limited. Extended use of the results of these

Corresponding Author: Zeinab Zaremohzzabieh, Institute for Social Science Studies (IPSAS), Universiti Putra Malaysia, Selangor, Malaysia

qualitative studies will be possible if a systematic analysis of numerous studies is conducted which scrutinizes the common themes. Systematic reviews are generally considered to be efficient methods by which to provide precise, synthesized and up-to-date information to identify well-written and most relevant studies and to understand and utilize strategies by which to diminish bias and maximize accuracy. In the context of the present study, a systematic review will allow us to consider how ICTs impact social and economic development in underdeveloped and developing regions. Though, this systematic review is mostly used in health promotion, medicine and some areas of social policy, it is relatively new in the field of development and little evidence systematically reviewed that shed light on the developmental impacts of ICTs (Cook *et al*., 1997; Mulrow, 1994; Sebba, 2004; Van Rooyen *et al*., 2012).

Thus, this study evaluates and examines qualitative studies that have explored the role of ICTs in contributing to sustainable livelihood. In addition, the study seeks to establish whether a systematic review of qualitative studies can lead to the identification of reliable themes across studies which focus on the often-neglected issue of what people perceive as the importance of ICTs to their sustainable livelihoods. The study considers key themes, such as the contribution of livelihood assets towards socio-economic changes that are practical view and perspectives to evaluate the complexities of ICT use by people.

MATERIALS AND METHODS

Systematic review has established as a particular approach for searching reviewing and integrating results of primary studies and has rapidly developed a basis of the evidence for practice and policy program. Qualitative studies have conventionally been ignored within systematic analyses, however much research is currently being done to move toward more inclusive systematic reviews that integrate qualitative studies. In this study, the attempt is to resolve the discouraging methodological and epistemological challenges through a systematic qualitative review.

First, in order to ensure that researchers identify all studies that are relevant to the field for inclusion in the revision, a systematic search of ICTs and sustainable livelihood was conducted. Researchers utilized a combination of strategies to locate evidence, including 12 online databases and a number of relevant websites in addition, researchers conducted citationsearches for 7 prominent journals and examined the reference files of their primary studies. All journal issues (and supplements) identified were written in english and published between January, 2007 and April, 2014. In doing so, it was the intention to increase the sensitivity of the searching and avoid missing any relevant high quality research.

Second, researchers retrieved and screened titles and abstracts in order to determine whether the related study met the inclusion criteria. In order be included in the final synthesis, the studies had to meet the following criteria:

- Qualitative studies on topics of particular relevance to ICTs that explicitly acknowledged livelihood capital assets
- Containing participants who were involved with or affected by different kinds of ICTs
- Using qualitative methods for example, face-to-face contact and semi-structured interviews or an open-ended questioning approach; ethnographic studies or studies that used phenomenological, grounded theory or participatory action research
- Containing any qualitative elements of mixed-methods research both qualitative and quantitative, as structured questionnaires based on previous qualitative studies

Along with these criteria, researchers scanned full texts of papers in order to recognize and capture content related to social, natural, physical, financial and human capitals guided by a Sustainable Livelihood Approach (SLA) for the thematic synthesis of this qualitative review. Thematic scrutiny is a broadly utilized qualitative technique which provides an approach for recognizing and scrutinizing themes from data (Braun and Clarke, 2006). In addition, study that met the inclusion standards were entered into ATLAS.ti7 software in order to allow us to code the key themes, sub-themes and inter-relationships according to the content and meaning of the findings of each study. The sub-themes were brought together under the thematic groups. This procedure iteratively converted the original code list, thus ensuring that inter-rater reliability could be achieved in the identification of themes and coding and the interpretations. Once all of the identified qualitative papers had been coded, the themes and sub-themes were scrutinized and labeled as descriptive themes or analytical themes in light of the overarching theme. A narrative description of the synthesis was systematized and presented in evidence tables that took into account the features and consistency of the results and the applicability of the evidence to the objectives of the study.

RESULTS

Study selection and characteristics: A total of 415 papers were identified by searching within the electronic sources based on titles and abstracts. In the next stage, during which researchers screened the full text, 187 of the 415 papers were found to be potentially relevant to a multi-dimensional perspective on the role of ICTs toward sustainable livelihood assets in terms of human, social, financial, physical and natural assets and 228 were identified as irrelevant papers. Researchers excluded those that could not be considered qualitative studies (Qureshi, 2013) that were irrelevant to the topic were exactly the same or lacked methodological rigor (Makoza and Chigona, 2012; Thapa *et al*., 2012). Of these 187 papers, 15 qualitative studies met the inclusion standards and were used in the systematic evaluation. These 15 are summarized in Table 1. Of the 15 studies, 2 used interviews, 6 used mixed designs, 1 used ethnographic methods, 1 used triangulation and 5 used multiple methods (e.g., interviews, secondary documents, focus-group discussion, workshops, etc.). The studies were conducted in 14 different countries including China, Colombia, Thailand, Kenya, Benin, Jamaica, Ghana, Nepal, Uganda, India, Bangladesh, South Africa, Nigeria and Tanzania. Of the 15 studies, 8 of them directly used SLA as the theoretical underpinning from which to understand the impact of ICTs on sustainable livelihoods.

Researchers were surprised to find that the majority of studies explored the views and perspectives of people from rural areas, rather than urban sites. Only 1 study explored the perspectives of an urban population in Bangladesh (Rashid, 2011).

Identification of themes and sub-themes in the studies: ICTs can be used as a tool that cuts through all 5 different types of capital assets. Based on each of

Table 1: A summary of the 16 reliable and relevant studies included in this review

Ref.	Country of study	Study aim	Qualitative data collection tool	Study sampling	Data analysis	Participants	Study results
1	Tanzania	To assess telecenter, usage barrier faced by telecenters and rural radio and the role of telecentres and rural radio for of emergency or advice farmers communication in distributing agricultural knowledge and information services in supporting farming activates in rural areas	A qualitative interview	Purposing sampling	NVIVO qualitative analysis	8 telecenter operators	Low use of internet for knowledge acquisition, popularity of cell phones and use rural radio in case regarding farming activities
2	Nigeria	To examine the effects of mobile phones on livelihoods of rural residents in the Niger Delta zone	A semi-structured interview	Convenience sampling technique	The tape recordings were transcribed and coded	129 respondents who mobile phone users and CCOs	Mobile phone has socioeconomic impact on the rural (more frequently contact with urban family and friends; reduce cost of travel by sending recharge cards from urban relatives and CCOs become self-employed)
3	South Africa	To see the impact of ICT use on the livelihoods assets and outcome of microenterprises	Qualitative approach through in-depth interviews, observations and documentary review	Purposeful and snowballing sampling techniques	Transcripts of primary data	3 microenter-prises who are involved and 5 were involved in RED Door	Highlights the need of sustainable approach for understanding the role of ICTs in livelihood of microenterprises
4	Bangladesh	To examine strategic use of mobile phones by NOUs in 2 locations in Dhaka City and also the effect of the mobile phone usage on their livelihood strategies in term of social, economic and human capitals	Observational fieldwork and in-depth interviews were conducted using a semi-structured interview guide	purposing sampling	Interviews were recorded and then transcribed	5 kiosk operators, 15 NOUs and 12 mobile owners	Mobile use by NOUs has significant impact on their livelihoods by reducing communication gaps and facilitating better information flows
5	Tanzania	To investigate the link between ICTs and rural livelihoods	Semi-structured interviews and 8 Focus Group Discussions (FGDs)	Non-proportional quota sampling	The SPSS 15 and Nvivo 8 qualitative analysis	203 telecentre users from 4 districts	ICTs may not fully support socio-economic development but it has some positive contributions to the rural livelihoods including economic and social issues

Table 1: Continue

Ref.	Country of study	Study aim	Qualitative data collection tool	Study sampling	Data analysis	Participants	Study results
6	Uganda	To examine the impact of the social structure on how technology is adopted and used by small-to medium-sized scale of farmers who derives the greatest benefit from its us	mixed-methods design based on semi-structured in-depth interviews	Convenience sampling technique	Thematic analysis	50 women and 40 men mobile phone-owning holders of small to medium-sized farms groups from Kamuli District	Themajority ofrespondents use the mobile phone's calendar, speakerphone, andcamerafordevelopment initiatives (agricultural inputs and markets)
7	Nepal	To examine how an ICT4D project called the Nepal Wireless Networking Project (NWNP) in a remote mountain influences social, human, physical, financial and natural capital assets, as well as the relationships among them	A qualitative study through interviews, focus group interviews, workshop and observations	Snowball technique	Transcript and coding process	40 service users, such as teachers, social activists, health workers, students, as well as non-users	The NWNP's project correlates with the asset Pentagon Model (APM) by focusing primarily on developing thecapabilities of the community through ICT intervention
8	Ghana	To examine why respondents chose to use mobile phones and how they were using phone	Mixed-methods design based on interviews andsurveys	Purposing sampling	Transcripts	Interviews with 17 mobile subscribers and surveys with 118 subscribers and 79 non-subscribers from range of occupation	Most respondents value their phone for livelihood activities including social function and buisness/ economic uses and benefits
9	Jamacia	To investigate how telecenters influence on entrepreneurship andeconomic development in low-income urban rural communities	Mixed-methods design through interviews, observation and survey	Not reported	Themetic content analysis and EDTM	Interviews with 17 staff, Interviews with 15 users and survey of 88 users	Telecenters assist its users to increase their activities in entrepreneurship and economic development
10	Tanazania	To understand the ways to which mobile phones usage contributes to live-lihood outcomes, rural livelihood and poverty reduction in Morogoro Region	Mixed-methods through descriptive survey, Focus Group Disscussion (FGD) and interviews	Purpose sampling	SPSS and Nvivo	310 households, 74 focus group participants and 22 key informants	Mobile phones can increase rural households ability to acess livelihood assests undertake diverse livelihoods strategies and their vulnerabilities
11	Benin	To investigates the Interactions between acess to rural radio by farmers, gender and livelihood assests	Mixed-methods design based on interviews, Focus Group Disscussion (FGD) and the field survey	Non-Purpose sampling	The Mann Whitney test	Interviews with managers, hosts, marketing managers and/or founders of a total of 118 rural stations and survey with 120 rice processing	Rural radio station provide illiterate farmers with information relating to all aspects of agriculture production, processing and marketing in a language they understand
12	Kenya	To examine how financial services mobile (the M-PESA application) are being used in the livelihoods of poor users	Ethnographic methods (semi-structured, group interviews and participant observation and their financial diaries)	Not reported	Not reported	Interview with over 350 users andmany of theinformants	The impacts of usageynski are different when the phone is usedas a tool for communication, financial services and maintain social networks
13	Thailand	To examine the access to 2 Thai Community telecenters (CTs) by women and men in rural communities and the resulting changes in their livelihood	Qualitative methods (participant observation and unstructured and semi-structured interviews and in-depth fieldwork)	Purposing sampling	Transcripts of audio tapes and SPSS	The adult users of CTs who are at least 15 years old and have an income and the operators and staff of the CTs	Through the access (2009) and use of computer and the internet at CTs, people in remote areas can enhance their livelihood assets in various ways

Table 1: Continue

Ref.	Country of study	Study aim	Qualitative data collection tool	Study sampling	Data analysis	Participants	Study results
14	Colombia	To see how internet access anduse can influence on local social equity and livelihoods of the neighborhoods surrounding a telecenter in Cali	Triangulate method based on document review, interviews, observation and survey	Non-purposing sampling	Systematic analysis	Survey and interview with 100 and 28 telecenter users respectively, survey with 102 households, interviews with 10 Key informant	The Aguablanca telecenters contributed to development positively, however it was not improving local social equity through its services
15	China	To investigate how community telecenters can enhance the live-lihood strategies of rural poor households	Mixed-methods design based on desk research, field interviews, surveys and focused group discussions	Not reported	Number of code used	30 households from each of Pushang, Shangdian and Menwangzhuang Villages	Telecenters carry a huge potential for reducing poverty and increase the rural poor's access to more social,financial and human assets

1 = Lwoga (2010); 2 = Baro and Endouware (2013); 3 = Makoza and Chigona (2012); 4 = Rashid (2011); 5 = Chilmo and Ngulube (2011); 6 = Martin and Abbott (2011); 7 = Saebo and Thapa (2012); 8 = Sey (2011); 9 = Bailey and Ngwenyama (2013); 10 = Sife *et al.* (2010); 11 = Zossou *et al.* (2012); 12 = Morawezynski (2009); 13 = Naivinit (2009); 14 = Parkinson and Lauzon (2008); 15 = Soriano (2007)

Table 2: Identified themes and sub-themes

Themes	Sub-theme	No. of articles discussing sub-themes
Human	Access to education and training	9
Assets	Health	6
	Access to information	5
	Skills and knowledge	11
Social	Social relationships with family and friends	10
Assests	Networking, participation in social groups and mutually beneficial relationships	12
	Vertical connection to formal institutions	5
Financial	Better access to market information	10
Assets	Financial transactions	8
	Savings	6
	Income-generating activities	9
Physical	Access to ICTs	7
Assests	Physical infrastructure	4
	Reduction in transport costs and time	6
Natural	Access to agriculture input	9
Assests	Agriculture emergency services	3

the 15 qualitative studies, this study will provide a summary of the results in relation to the 5 capital assets (human, social, financial, physical and natural) which in this study were synthesized, as themes in relation to ICT (DFID, 1999; Heeks and Arun, 2010). Table 2 summarizes the themes and sub-themes identified in the studies.

Human assets: Human assets consist of a variety of resources that can enable people to achieve their livelihood objectives. In today's context, ICTs have been put in human capital from numerous point of use, it can be seen as education and training, good health, access to information and skill and knowledge was found very usual in people as the findings presented in here:

Access to education and training: The findings from 9 of the 15 studies show that education and training through ICTs, such as mobile phones are the 2 key human assets in determining livelihood strategies. The studies also indicated that training and education provided by ICTs assist communities to combine a modern way of life with the traditional. For example, a qualitative study conducted in Thailand found that training courses offered by telecenters extended the knowledge and skills of rural people in computer and internet usage (Naivinit, 2009). In another case, the researcher stressed that telecenters stimulate e-literacy (Soriano, 2007). According to Soriano (2007), telecenter staff gained IT skills that enabled them to increase the e-literacy of villagers in order to generate technology jobs in Wu'an, China. Out of the 9 studies, 4 also pointed out that selected telecenters, rural radio and ICT projects were beneficial to facilitate users, especially young people, teachers, micro entrepreneurs and farmers to benefit from basic computer training and other training programs on agricultural activities and business needs (Chilimo *et al.*, 2011; Lwoga, 2010; Makoza, 2011; Soriano, 2007). In addition, a lack of education is still an issue in underdeveloped and developing countries, so some ICT for Development (ICT4D) projects (e.g., the Nepal Wireless Networking Project) have been designed to address issues related to education. For example, school children and teachers use online resources for educational purposes, as 1 school child stated (ICT) helps me and my friends in the school work. For instance to understand history, the book is not adequate. Currently, researchers may save more info from the internet to get to understand more. It is supporting us to obtain additional information connected to the lessons (Saebo and Thapa, 2012). The findings from 2 studies conducted in Ghana and Uganda show that the respondents were using mobile phones for education and academic purposes (Martin and Abbott, 2011; Sey, 2011). Similarly, 37.4% of Thai participants employed computers and the internet for education purposes in terms of completing assignments, searching for academic sources and so on at community telecenters (Naivinit, 2009). Interestingly, the study based in Tanzania

showed that parents were encouraging their children to learn about computers and the internet at telecenters (Chilimo *et al*., 2011). Thus, as can be seen from the research results increased access to ICTs may allow people to undertake more training and education.

Health: The beneficial impact of ICTs on the ability to deal with health issues was discussed in 6 studies. Good health is crucial to economic development because it improves work productivity and effectiveness. Rashid (2011) who studied 5 kiosk operators, 15 Non-Owning Users (NOUs) and 12 mobile owners, found that many of them have families and are frequently the major wage-earners and decision-makers of the household. A reliable topic of conversation through the mobile phone among them is health issues of family members. Chilimo and Ngulube (2011) interviewed telecenter users from 4 districts in Tanzania to emphasize that mobile phones are helpful in emergency situations, such as in cases of death, sickness or injury.

In Nangi and Tikot villages located in Western Nepal, residents usually travel to urban areas to access health-care facilities, however the Nepal Wireless Networking Project (NWNP) in these villages has begun to boost their rural development for instance by improving health care which in turn can diminish migration from the villages (Saebo and Thapa, 2012). In this study, health staff remarked: At this time, we have a tiny clinic where 2 nurses are working. If they face any problems, then they connect directly to Kathmandu or other main hospitals and check with the experts there. Thus, telemedicine allows the local health workers to expand their social networks with other health workers and doctors (Saebo and Thapa, 2012).

Lwoga (2010) interviewed 2 operators of radio broadcasting services in Tanzania that they stated that all of the broadcasts at the Radio Jamii were more on entertaining program rather than health issues. However, another study reported different results, showing that many Thai females were unable to operate the internet to seek health-related information, particularly in relation to caring for young, aging and sick people in their household (Naivinit, 2009).

Access to information: Out of the 15 studies, 5 found that telecenters deliver information to users. These studies showed that information from telecenters assist in deploying new livelihood strategies and complementing existing livelihoods. According to Chapman and Slaymaker (2002), access to information by farmers could contribute to capacity-building for appropriate livelihood strategies and reduce vulnerability to shocks. This has, especially been found to be the case in China and Tanzania (Lwoga, 2010; Soriano, 2007). In China, telecenters have specific relevant content and services that focus on practical agricultural technology, farming and marketing techniques, market-price information, pest management, agro-industry activities, health advice and household management (Soriano, 2007). As Lwoga (2010) also pointed out in Tanzania, telecenters and rural radio stations also provide knowledge and information on agricultural products and farming activities. However, the results of the study revealed that only Family Alliance for Development Cooperation (FADECO) telecenter, countryside radio and Kilosa Rural Services and Electronic Communication (KIRSEC) in 8 telecenters employed the internet to provide knowledge to farmers and Radio FADECO (Karagwe) and KIRSEC telecenter (Kilosa) used email to distribute relevant agricultural information to agrarians. In Magu and Karagwe Districts, located in Tanzania, a group of women have learned how to cultivate agricultural products such as mushrooms, spices, vanilla, fruits and vegetable through telecenters. These new livelihood strategies complement their traditional livelihood strategies (Chilimo and Ngulube, 2011).

About 3 studies highlighted other purposes of telecenters, such as providing money-saving opportunities, developing small and medium enterprises and collective entrepreneurship, downloading government forms and helping entrepreneurs to run their businesses, including developing their products (Bailey and Ngwenyama, 2013; Naivinit, 2009; Parkinson and Lauzon, 2008).

Interestingly, the results of the earlier mentioned study from Tanzania (Sife *et al*., 2010) showed that most of respondents use cell phone for marketing information related to price for their produce and for making decisions on livestock, 58.9% revealed that the phones had greatly improved their ability to access market information. Additionally, radio contributes significantly to the transfer of information in African nations where reading ability is low (Odame, 2003).

According to a previous study conducted in Benin by Zossou *et al*. (2012), persons in charge of the local farming extension services collaborate with rural radio stations to influence uneducated farmers and to deliver marketing and agricultural production information in their local language. The case under investigation by Saebo and Thapa (2012) in Nepalshowed that such information comes from ICT4D schemes and training held in Kathmandu, this study used 40 interviewees including service consumers, such as educators (aged 30-40, males), social activists (aged 30-60, males and females), health workers (aged 30-40, females) and students (aged 16-18, girls and boys), as well as non-users, government officials, a telecoms director and NWNP members. In South Africa, interviews with 3 microenterprises who were

not involved in RED Door projects and 5 who were indicated that respondents use their mobile phone's calendar, speakerphone and camera to provide information on market access and tenders and communicating with customers (Makoza and Chigona, 2012).

Skills and knowledge: The majority of respondents from 11 of the 15 studies said they used ICTs for skills and knowledge acquisition. In Uganda, the majority of farm group leaders who use a mobile phone receive knowledge of agriculture from their contact with Family Alliance for Development Cooperation (FADECO) (Martin and Abbott, 2011). A study on 8 telecenter workers of which 2 also supplied radio programming services in Tanzania, showed that while mobile phones are attractive for farmers to communicate with telecenter operators, few visit telecenters for knowledge acquisition related to agriculture products and market information, due to a lack of awareness, funding, ICT literacy and content (Lwoga, 2010). The mainly common services in these telecentres were access to examination results for secondary schools, research, distance learning and tourism (Lwoga, 2010). Similar observations were made in South Africa where in some circumstances, microenterprises do not utilize ICT for commerce, due to an absence of ICT skills and knowledge on ICT compliance in their business (Makoza and Chigona, 2012).

Despite the major barriers inhibiting ICTs from disseminating information, some telecenters in villages in Tanzania help to empower rural people to seek employment in nearby cities, thus progressing the financial situation in the areas (Chilimo, 2008). According to Bailey and Ngwenyama (2013), entrepreneurial activities include business development, community radio and tourism, computer skills, creative writing, music, video and visual art all of which are currently promoted by telecenters in Jamaica which provide skill-development, knowledge and advice for entrepreneurial initiatives.

In Pushang, Shangdian and Menwangzhuang Villages, located in China, the telecenter staff acquired skills and tools that they were capable to share with leverage on to realize better earning technology jobs (Soriano, 2007). In a similar study, Parkinson and Lauzon (2008) stated that displaced people in Colombia who have fled violence in rural zones are likely to have a hard time guaranteeing any type of livelihood in particular due to a lack of sufficient assets and transferable skills. Telecenters in Colombiaand Thailand have provided some skills-building opportunities to its users (Naivinit, 2009; Parkinson and Lauzon, 2008).

Social assets: In the context of sustainable livelihood, social capital relies on the social source on which a community draw in pursuit of their livelihood aims (DFID, 1999), it is developed through social relationships with family and friends, networking, participation in social groups and mutually-beneficial relationships and vertical connection to formal institutions.

Social relationships with family and friends: These relationships refer to bonding social capital which describes the relations among homogenous groups, ranging from casual to close family bonds and friendships (Putnam, 2001; Woolcock, 2001). A total of 10 studies found that ICTs are employed to communicate with friends and relatives and that the technology diminishes gaps between people and improves their social capital. A study conducted in Nigeria showed that rural inhabitants in the Niger Delta district use mobile phones for several social purposes, for example to communicate with friends and close relatives that live far away in urban areas (stated 109 times) to receive up-to date news on different current events occurring in society (stated 84 times) to send text messages to people (stated 61 times) to connect with friends through Facebook, Twitter and other social networks (stated 77 times) (Baro and Endouware, 2013). Rettie also in 2008 stated that mobile phones facilitate the development and maintenance of social networks.

The results of 2 studies emphasized that mobile phones are mostly utilized for communicating with friends and close family members (Martin and Abbott, 2011; Rashid, 2011). In a study on the NWNP project in Nepal, Saebo and Thapa (2012) found that users are capable of maintaining and improving their bonding social capital by connecting with family members in villages and those working abroad, via email, chat services and social networking sites. In addition, Sey (2011) found that for 43% of respondents in Ghana the core motive for making calls using their mobile phone was to communicate with family and friends. Sife *et al.* (2010) concluded that the most important benefit of using mobile phones is to expand and strengthen social networks, as almost 91.2% of household respondents in Tanzania revealed that mobile phones had advanced their relations and communication with acquaintances and relatives.

Accessing the internet, including web-based email, Yahoo Messenger and Skype for talking and keeping in touch with those who live in urban areas and outside of the country is the main reason why 203 telecenter users from four districtsare Ngara, Karagwe, Magu and Sengerema use ICTs (Chilimo and Ngulube, 2011). The findings of a study focusing on Nangi Village of Ramche, China indicated that telecenter users use web-based email, as a convenient tool for collecting relevant information in need (Soriano, 2007). In a similar case in Thailand, individuals employed the internet through telecenters to

generate or preserve relationships with relatives and acquaintances throughout the country at low cost (Naivinit, 2009).

Individuals use telecenters for similar reasons, as those for using other locally available internet services that is for social purposes or to keep in touch with family or friends despite geographic distance or to develop relationships (Parkinson and Lauzon, 2008). Another view of bonding social capital that is aided by telecenters relates to venues at which users can meet and exchange ideas, information and knowledge (Chilimo and Ngulube, 2011; Soriano, 2007). These conclusions support earlier studies which have established that telecenters lead to improved social relationships.

Networking, participation in social groups and mutually beneficial relationships: This sub-theme refers to bridging social capital which describes the relations among distant friends, acquaintances and social groups, as well as associations (Field, 2003). These relations may in turn lead to others and thus provide numerous links which lead to networks. Out of the 15 studies, 12 examined groups which exist in forms such as formal, informal and multipurpose and have been identified, as one of the major sources of networks for ICT users.

The finding of a study in South Africa showed that microenterprises use formal and informal social groups; the support attained from these groups included business social support and family support (Makoza and Chigona, 2012). The NWNP scheme has also assisted in the formation of bridging relationships among various informal and formal groups for instance, setting up a virtual market place called Haat Bazaar, providing opportunities for peer-to-peer interaction and giving schools access to external networks to share information and search resources on the internet which strengthens bridging social capital and expands social networks (Saebo and Thapa, 2012).

The findings of 1 study also establish that mobile phones are crucial means employed by telecenters to distribute farming information and material to Tanzanian farmers (Lwoga, 2010). Within 8 examined telecenters, WIDA, KIRSEC and FADECO radio stations and telecenters used mobile phones to connect with individual farmers or farmer groups, both to facilitate meetings or training sessions and to provide access to urgent incoming email (Lwoga, 2010). Soriano (2007) reported that telecenters in Menwangzhuang and Pushang, China, provide youth communities with an additional common space in which to exchange information on job opportunities and in nearby settlements and within the community itself. As Parkinson and Lauzon (2008) stated many telecenter users in Colombia share the information they find on the internet informally with friends or family members, most often in relation to homework, entertainment or other informational needs. In these telecenters, the staff play a vital role in enabling problem-solving or information-seeking activities. In Thailand, 32.43% of users were found to employ the internet at telecenters to progress or preserve public administrative and business networks, as compared to individual networks (16.22%) (Naivinit, 2009). Further, Bailey and Ngwenyama (2013) highlighted the analytical role played by access to social network at centers for micro-entrepreneurs in developing areas.

Likewise, a study conducted in Bangladesh found significant evidence that NOUs who tends to borrow phones only from specific individuals more engaged in the exchange about the sense of sharing particularly. In this sense, these forms of exchanges are entrenched in existing social relations and practices (Rashid, 2011). Sife *et al.* (2010) found that some respondents in Tanzania use mobile phones to improve the organization of communal activities such as gatherings, religious activities, assemblies, burials and marriage ceremonies.

Vertical connection to formal institutions: About 5 studies examined the views and perspectives of vertical connections to formal institutions. This refers to linking social capital which describes the relationships between persons and units at dissimilar social levels in terms of wealth, control, social status and prosperity (Field, 2003).

In Nepal, a telemedicine project enhances linking social capital by allowing local health-workers in villages with low levels of formal education to increase their social networks with their health workers and doctors at national hospitals. Furthermore, the NWNP has aided in constructing an association between villages and the central government through websites that provide villagers with access to government information and services in turn, this may expand the linking social capital among the communities and the administration (Saebo and Thapa, 2012). These widened networks of health workers rely on collective norms and values, trust and objectives.

Networks can be linked to others both at local, national and international levels (Grootaert *et al.*, 1995; Krishna, 2013). Naivinit (2009) stated that 32.43% of users studied employ the internet to increase or preserving public governmental networks in Thailand. Similarly as found by Zossou *et al.* (2012), rural radio stations in Benin have official agreements with the Department of Agriculture, particularly extension managers and occasionally researchers to create radio programs about farming acquisition which is taken into account in upcoming agendas in order to ensure capture of the farmer demographic.

Microenterprises have been found not to employ ICT to communicate with societies and interact with institutions that regulate their operations, for example interacting with local council officials to make payments for monthly operating fees. Rather, communication with officials takes place face to face (Makoza and Chigona, 2012).

Financial assets: Financial assets refer to the economic resources that a community uses for the direct achievement of livelihood strategies (DFID, 1999) and is vital in ICT4D projects (Duncombe, 2007). The main financial assets identified are: Access to market information, financial services, savings and income-generating activities.

Access to market information: A total of 10 studies discussed views and perspectives on the improved access to market information provided by ICTs. For example, mobile phones are used for financial opportunity inclined to relate frequently to information-led-business. The results from 5 studies revealed that people use mobile phones to support running their businesses in terms of expanding their production of agriculture and livestock, accessing business information such as prices of materials and services, communicating with customers and suppliers, interacting with business support organizations and so on (Baro and Endouware, 2013; Makoza and Chigona, 2012; Martin and Abbott, 2011; Sey, 2011; Sife *et al*., 2010). These studies frequently referred to information flows involving in markets and participants.

Another example of the transformative nature of telecenters can be seen in Tanzania where villagers are able to bargain with middle man to obtain better prices and provide local products according to the market demand which is made possible by the telecenter staff providing market information in the local language (Chilimo, 2008). Similarly, the results of 3 studies suggest that community telecenters and rural radio stations are important tools by which to provide high-quality market price information to rural farmers which empowers them to bargain for better prices for their products (Lwoga, 2010; Soriano, 2007). Thus, since the majority of respondents use mobile phones and telecenters to communicate with those who offer information on agricultural markets, it is clear that the technology contributes to development initiatives.

Financial transactions: Financial transactions through ICTs give greater access to banking services and provide a safe space for bank, credit and remittance transactions, as mentioned in 8 studies. In Colombia, telecenter users often use computers and the Internetto type and print forms for legal services, banking and so on (Parkinson and Lauzon, 2008). A similar study in Uganda showed that nearly 54% of the participants use their mobile phone to check on financial dealings, such as consulting with money lenders on the accessibility of fiscal loans, retelling farm group members to repay loans accountable to the group as a whole and checking on national and business transactions (Martin and Abbott, 2011).

Periods of post-violence in Kenya have had a negative influence on financial services (cash flow), as well as some Mobile economic facilities (M-PESA) was initiated into the market by Safaricom, Kenya's biggest mobile operator, this is especially true in inner-city areas like Eldoret and Kibera (Morawczynski, 2009). A single mother of 2 stressed that she lost her savings during periods of escalated violence in Eldoret. She requested financial assistance from her sister who lived in central province. Her sister replied to the request and sent money via M-PESA.

Close integration between people living in rural areas and their relatives living in urban areas is also important for rural people in terms of receiving money from migrant family members and helping in times of need. In terms of sending and receiving money through mobile phones, Sife *et al*. (2010) reported that out of 293 respondents in Tanzania, almost half stated that mobile use has enhanced their capacity to transfer money. In addition, focus group discussions and key informant interviews results revealed that mobile phones have been used for trading money, products and facilities (Sife *et al*., 2010). A study conducted in Nigeria showed that using mobile-phone enable the rural residents to connect with family members and friends in urban areas, their relatives in city send recharge cards for them to sell for money and it has assisted them prevent the travel expenses and the risk involve in traveling to connect families (Baro and Endouware, 2013). According to Rashid (2011), a total of 6% of national migrants in Bangladesh use mobile phones to make payments. In another study, 24% of the participants stated that they often call family members to discuss financial matters which reveals the significance of the remittance economy in the nation and the fine line among communal and economic-oriented telecommunications between the study respondents (Sey, 2011). These results are in line with those of McNamara (2008) which denote that remittances are accelerated through mobile telecommunications within developing nations.

Savings: About 6 studies mentioned financial assets like savings. Findings in Uganda highlighted that mobile phones are being adopted for agricultural functions and

lead to savings in terms of both time and money. In most cases, the impact of mobile phones on levels of efficiency referred to increased financial function that results in financial savings (Martin and Abbott, 2011). In Nepal, the Nepal Wireless Networking Project initiated can reduce transaction costs (Saebo and Thapa, 2012) while in Colombia, telecenters deliver several money-saving opportunities (Parkinson and Lauzon, 2008). Some people save money through telecenters indirectly for instance by discovering information that will then enable them to travel and in limited cases, downloading administration forms (Parkinson and Lauzon, 2008).

In most cases, impacts of the mobile phone on levels of efficiency referenced the ability of increased coordination to result in financial savings (Martin and Abbott, 2011). In Nepal, the pilot projects initiated can reduce transaction costs (Saebo and Thapa, 2012). In Colombia, the telecenter precisely delivered some money saving opportunities. Some people saved money by the telecenter for other purposes, such as discovering information that would then require them to travel and in a limited cases, downloading administration forms (Parkinson and Lauzon, 2008). In additional study in Kenya, 1 woman who stayed in a small village near Bukura and her husband was shoemaker, asserted that since her husband started using mobile financial services (the M-PESA application), the inflows of cash were more regular. He no longer wanted to be contingent on his friend to transfer the cash. Likewise, this result was confirmed by other rural informants. There are several purposes why such an increase occurred. The urban migrants asserted that they would add in the sum saved on making the transfer into the amount return back home. In most instances, the total saved was starting from 50-400 KES. The beneficiaries also noticed that they saved money, since they no longer crucial to pay transport fees to save the money (Morawczynski, 2009). On the other hand, the result of study in Bangladesh showed NOUs may be disadvantaged in terms cost-saving strategies compared to owners. Nevertheless, the mobile operator selected, the use of profile-raising cost-saving packages by owners is ever-present. One such advertising is the Family and Friends (F and F) packages prearranged by operators which give call charges at considerably lower amounts to preferred contacts. Approximately, all the owners are very much sensitive of these services and use them widely. Owners who are relatively more compelled financially generate a point of by these cost-reduction strategies (Rashid, 2011).

In a study in Kenya, a female who lived in a tiny community near Bukura and whose spouse was shoemaker, stated that since her spouse had begun using mobile financial services (the M-PESA application), their cash flow had been more consistent (Morawczynski, 2009). Likewise, this result was confirmed by other rural informants. There are several purposes why such an increase occurred. The urban migrants asserted that they would add in the sum saved on making the transfer into the amount return back home (Morawczynski, 2009). The beneficiaries also noticed that they saved money, since they no had crucial to pay transaction charges (Morawczynski, 2009).

In additional study in Kenya, 1 woman who stayed in a small village near Bukura and her husband was shoemaker, asserted that since her husband started using mobile financial services (the M-PESA application), the inflows of cash were more regular. He no longer wanted to be contingent on his friend to transfer the cash. Likewise, this result was confirmed by other rural informants. There are several purposes why such an increase occurred. The urban migrants asserted that they would add in the sum saved on making the transfer into the amount return back home. In most instances, the total saved was starting from 50-400 KES. The beneficiaries also noticed that they saved money, since they no longer crucial to pay transport fees to save the money (Morawczynski, 2009).

On the other hand, the results of a study in Bangladesh showed that NOUs may be at a disadvantage in terms of cost-saving strategies compared to owners. Nevertheless, opting for cost-saving packages when purchasing mobile phones provide numerous advantages. An example of such a package is the family and friends option offered by several operators which allows users to call preferred contacts at considerably lower rates (Rashid, 2011).

Income-generating activities: About 9 studies discussed views and perspectives on ICTs and their impact on income generation. As an instrument for sustainable livelihoods, mobile phones were found to help people generate more income from their jobs. In the Niger Delta District of Nigeria, 50% of the participants mentioned engaging in small-scale businesses by using mobile phone (Baro and Endouware, 2013). This finding reinforces earlier findings by umar (2006) who stated that a large mainstream of small businesses owners disclosed mobile phone have conveyed higher profits, income and increased efficiency, though they are also repaying higher call charges.

The 9 studies discussed the view and perspectives of ICTs usage and its support on income generation. As a tool for sustainable livelihoods, the mobile were just

suitable for people generating more income in their jobs. In the Niger Delta Region of Nigeria, 50% of the participants mentioned engaging in small-scale businesses, such as Call Center Operating include charging batteries for a fee in the communities (mentioned 52 times) as source of their livelihood (Baro and Endouware, 2013).

The results of a study in 2 remote mountain villages in Nepal demonstrate that the NWNP was initiated to support various rural development efforts, such as facilitating access to income-generating activities like eco-tourism which in turn can decrease migration from the mountain (Saebo and Thapa, 2012). In Ghana, respondents use mobilephones for individual and social reasons. This has also been found to be the case in non-urban locations where because of resource constraints, mobile phones might be expected to be used more for occupational or work-related purposes (Sey, 2011). Deliberating that frequently rural households rely on a case of income bases and actions, these results from the Morogoro Region implied that mobile phones can empower people to undertake multifaceted interactions and synchronize physically distant activities. This indicates that the use of mobile phones provides rural households with access to many different activities many of which can translate into increased income and cost savings (Sife *et al*., 2010).

The M-PESA application has been found to aid Kenyans to produce revenue by offering them with novel chances for employment (Morawczynski, 2009). In addition, telecenters are currently influencing entrepreneurial behavior amongst users, as identified by studies which have found that in some countries youth and women are becoming entrepreneurs as a result of the usage of the telecenters (Bakesha *et al*., 2009; Kintu *et al*., 2005; Terry and Gomez, 2010). In Jamaica, support of this type is beneficial and may increase the number of young entrepreneurs in Jamaican societies via the social ties established at telecenters (Bailey and Ngwenyama, 2013). As observed, the role of telecenter staff in reinforcing the entrepreneurial undertakings of individuals using telecenters has become important for increasing entrepreneurial development. Additionally, this might progress the entrepreneurial activities of the telecenters with communal entrepreneurship being reinforced by the social ties that are shaped there (Bailey and Ngwenyama, 2013). In Aguablanca, telecenter maintained this type of strategy insofar as it maintained the business objectives of its users. Around 15% of respondents in the study said that they use the telecenter for business purposes whether they were engaged or independent. These uses were duty specific or one-offs, such as writing letters or contracts or producing brochures. About 5 telecenter users were interviewed and asked whether and how their use of the telecenter was supporting them in seeking work or running their businesses. None of the 5 used the telecenter for either purpose and most did not feel, it was suited to it (Parkinson and Lauzon, 2008).

Souter *et al*. (2005) highlighted that the influence of ICTs has high value for users in terms of saving money on travel and postal services but not when it comes to making money. In terms of financial capital, respondents in Tanzania agreed that telecenter services enable community members to secure employment or self-employment opportunities that provide them with financial capital but that is rare support by most users when it comes to earning income (Chilimo and Ngulube, 2011). Finally, the results of this study in China showed that telecenters have a vast capacity for decreasing poverty by improving rural livelihoods. In Wu'an, telecenters were found to increase the rural poor's access to more livelihood assets which aid in strengthening their agricultural livelihoods and to some degree, motivate rural households to access special livelihood strategies to increase their income (Soriano, 2007).

Physical assets: Physical assets indirectly help people, especially young people to meet their needs by offering access to other assets (Zaremohzzabieh *et al*., 2014). The main types of physical assets presented here are: Access to ICTs and physical infrastructure and reduction in transport costs.

Access to ICTs: Access to ICTs is fundamental for social economic development in relation to the multifaceted challenge of improving the lives of disadvantaged people. For example, the results of a study in Tanzania showed that almost 93% of people used mobile phones rather than fixed line phones which accounted for a mere 2% while houses with no access accounted for the rest (Chilimo and Ngulube, 2011). In this regard, access to mobile phones in third world nations has been discussed in the literature that it should be discussed. Challenges are still present in the form of high charges, network failures, theft of phones and non-availability of phones, network coverage, operators (Baro and Endouware, 2013). In addition, the results from 5 studies outlined necessary circumstances to access ICTs in telecentres and also rural radio station exist while sufficient conditions such ICT skills, knowledge, financial resources, awareness, facilities, staff, relevant content, expertise, affordable costs, funds and funding from the administration for rural ICT expenditures, research on the development of ICTs and trust between macro and micro firms involved in rural

ICTs is still lacking (Chilimo, 2008; Lwoga, 2010; Soriano, 2007; Zossou *et al*., 2012). These challenges highlight a need to reinforce the positioning of physical substructures in order to reach the outermost areas, as well as developing relevant content that suit the needs of the relevant groups and essential abilities through improved education resources and capacity development for upcoming technology adoption (Soriano, 2007).

Physical infrastructure: Physical infrastructure delivers access to information; the absence of such infrastructure frequently reflects a state of poverty and highlights a need for additional resources, such as an electrical infrastructure on which to build the ICT network as mentioned in 4 studies. Since, infrastructure is merely an asset, it is consider as important in terms of its relationship to other assets and potential benefits for the poor.

In Nigeria, the challenges faced by mobile phone owners and the Call Center Operators (CCOs) include the lack of an electricity supply (Baro and Endouware, 2013). In addition, a study conducted in the Kamuli District of Uganda stated that out of 50 female and 40 male mobile phone owners of small to medium-sized farmhouse groups, none had electricity. Mobile phone batteries were charged at a rate of 500 Ugandan shillings (around US $0.20) every 3-4 days at a battery-charging kiosk (Martin and Abbott, 2011).

On one hand, Saebo and Thapa (2012) revealed that to date, numerous projects have been introduced in rural areas to meet community needs where access to ICT infrastructure is a tool but not an end objective of the project given the unstable infrastructure development and the way rural areas lag behind urban zones in terms of access to information and services. Thus, it is of value to increase the number of telecenters and to reinforce the information substructure in order to reach the outermost districts (Soriano, 2007).

Reduction in transport costs: Transport is a fundamental part of life, since it provides access from home to external activities. In this review, 6 studies were found that discussed the influence of ICTs on making transport more affordable. A study that scrutinized the effects of mobile phones on the livelihoods of rural residents in the Niger Delta showed that for the majority of respondents making mobile phone calls saved time and cash by cutting down their need to travel (Baro and Endouware, 2013) (such as to deliver messages). For example, the interviewees stated that a call amount of N25 (US $0.20) per min was less expensive than a typical taxi fare of N1000 (US $8) given that calls were generally completed in <10 min (Baro and Endouware, 2013). This strengthened the previous findings of Ochonogor (2006) and Bertolini (2002). In terms of the impact of mobile phones on financial assets, several respondents stated that mobile phones aid them to bank money which they can then spend on travelling.

In many instances, business people in rural areas highlighted that they place orders from urban regions via mobile phones and that these orders are sent to them through the regular transport system (Chilimo and Ngulube, 2011). Souter *et al*. (2005) found that mobile phones are considered valuable by a great number of users when it comes to saving money. In a similar finding in Uganda, a female respondent said that consulting with her veterinarian via mobile phone allowed her to save cash that would have been devoted to travel (Martin and Abbott, 2011). Respondents also revealed that they use their mobile phones to organize travel to purchase and transport goods to the market place. Not only were the agrarians saving on travel charges from no longer having to conduct transactions face to face, they were also saving on the price of transporting goods to market places in which there was no assurance of a purchaser (Martin and Abbott, 2011). The ability to reduce transport charges was reported by the respondents (Martin and Abbott, 2011). Lastly, several findings revealed that the usage of mobile phones had a significant influence on travelling and transport schedules, thus saving time and money (Morawczynski, 2009; Sey, 2011; Sife *et al*., 2010).

Natural assets: Natural assets is crucial to individuals who derive their entire livelihood from resource-based activities (DFID, 1999). ICTs may reinforce a more sustainable use of natural assets. Here, natural assets comprise access to agriculture input and agriculture emergency security.

Access to agriculture input: Managing access to agricultural input has a direct effect on livelihood efficiency and productivity, as noted in 9 studies. Information from telecenters has also assisted some rural families to adopt new livelihoods or combine these with their present livelihoods. In Pushang and Menwangzhuang, farmers stated that they have learned about raising farm animals, bees and pigeons and planting green vegetables, as well as purchasing and marketing valuable objects such as antiques to complement their traditional livelihood methods (such as nut farming). Education in this regard is provided either during farming periods or off-peak periods (Soriano, 2007). In spite of the advantages of retrieving information from the internet, the investigation results emphasized the need for telecenter

staff to be able to produce useful knowledge from the internet and convert this into suitable media arrangements that will improve the literacy of the poor (Soriano, 2007). Furthermore, the KIRSEC telecenter in Kilosa has disseminated agricultural information obtained from the internet via print media to agricultural officers and farmers. In this way, farmers have been able to access information on natural supply management and agriculture input (Lwoga, 2010). A total of 70% of the content of FADECO community radio is based on agriculture with topics including production, marketing and value addition (Lwoga, 2010). This is especially the case in Magu and Karagwe Districts where women and young farmers are motivated to use telecenters to complement their traditional livelihood strategies (Chilimo and Ngulube, 2011). A study in Uganda also suggested that mobile phones are being adopted for agricultural inputs (Martin and Abbott, 2011).

The ICT4D perspective in projects such as the NWNP emphasizes that mobile telephony can act as a development tool in that it increases communication with institutions responsible for livelihood development (Donner, 2008; Saebo and Thapa, 2012). Since, most respondents use mobile phones and mobile financial services (such as the M-PESA application) both to communicate with those who offer agricultural inputs and markets and to search for information based on practical agricultural knowledge and pest organizations, as well as sourcing and requesting information on numerous agricultural crops, it is clear that rural farmers are using mobile phones for development initiatives (Martin and Abbott, 2011; Morawczynski, 2009; Saebo and Thapa, 2012).

In a similar study in Tanzania, out of 294 respondents surveyed, almost 58.9% said that mobile phones had enhanced their ability to access market information (Sife *et al*., 2010). A study conducted in Benin suggested that rural radio enables illiterate farmers to access material relating to all aspects of farming products, since the radio programs are broadcast in the farmers local language (Zossou *et al*., 2012). According to Odame (2003), Participatory Radio Campaigns pay attention to and can have an important quantifiable impact on information and practice in undeveloped communities. Sey (2011) interviewed villagers in the Ashanti Region who are mainly subsistence farmers; the few individuals who did possess a mobile phone did not seem to employ them specifically for business or work-related purposes, such as farming activities.

Agriculture emergency security: ICTs are used to support sustainable livelihoods for instance by providing emergency agriculture assistance, including communicating with veterinarians or agriculture extension agents when livestock are sick or when agriculture produce are disease or pest-stricken, as noted in 3 studies. According to Martin and Abbott (2011), approximately 57% of the respondents in their study indicated some level of mobile phone use for this purpose. For example, a female respondent noted that using her mobile phone allows her to keep her livestock, particularly pigs, healthier. In a study to understand mobile phone habits in the Morogoro Region, almost 72% of the respondents alleged that mobile phones had enhanced their ability to deal with emergency situations (Sife *et al*., 2010). These findings confirm those of earlier studies (De Silva and Zainudeen, 2007; Gordon, 2007; Idowu *et al*., 2003; Souter *et al*., 2005) which suggested that mobile phones are vital for communicating with emergency services in a wide range of situations. In spite of the results of an earlier study that confirm mobile phones are an important tool used by farmers in case of emergency situations, telecenter and community radio are used by farmers in case of crisis or when they require information about farming activities (Lwoga, 2010). In the Karagwe case, farmers in Tanzania were found to make telephone calls or send SMS messages to the FADECO radio station in order to obtain information on farming (Lwoga, 2010).

DISCUSSION

The discussion reveals several emerging concepts related to the importance of ICTs. The core objective of the present systematic review was to evaluate and examine qualitative studies that have explored the role of ICTs in contributing to sustainable livelihoods. The pattern of evidence suggests that ICTs have particular constructive influences on sustainable livelihoods which include human, social, financial, physical and natural assets. It is, thus capable to recognize information and ICTs as merely 1 segment of a wider development picture and it prevents the overemphasis on technology that can affected ICT for Development (ICT4D) research. The findings show that ICT can be conceptualized, as a tool which has different potential impact on different from one form of asset to another (Orlikowski and Icono, 2001). Though to some point ICTs may be utilized deprived of the users setting the aim to use ICTs. According to Wilson (2000), individuals seek information in order to achieve a desired goal or a knowledge gap; this information can be acquired actively in line with the theory of information-seeking behavior. This was reflected in the information needs recognized under

the 5 capital assets. Indeed, the themes and sub-themes that emerged included the fact that ICTs contribute to the various aspects of livelihoods. With respect to human assets, the technologies lead to skills and knowledge, health improvements, better access to information concerning different livelihood activities and improved education and training. For social assets, ICT services help to improve communication with relatives and close friends, as well as knowledge sharing through networks, social groups and mutually beneficial institutions and vertical connections to formal institutions. In relation to financial assets, ICTs lead to improved earnings and savings and better access to financial services and market information. Finally, the last 2 themes fell under 5 major sub-themes: Issue access to ICTs and IT infrastructure, reduction in transport costs and time, access to agriculture input and agriculture emergency assistance through security and advice.

In addition, ICTs such as mobile phones, telecenters and community radio stations have made a positive contribution to capital assets in terms of improving information flows and providing mobile banking and money transfer services. The agricultural uses of mobile phones were arranged into organizing access to agricultural inputs, retrieving market information, obtaining agriculture emergency assistance, scrutinizing financial transactions and consulting with specialists. The results revealed that mobile phones offer users with rapid and simple forms of exchange, thus expanding their capability to access livelihood assets, assume varied livelihood plans and affect their susceptibilities.

Mobile phones help to eliminate poverty and develop livelihoods in a number of ways. Furthermore, telecenter services have the potential to produce direct positive effects on the 5 forms of assets and advance the livelihoods of rural people. The telecenters serve as tools for entrepreneurs to their maximize time, efforts and resources by bringing information, training and advice to them. Some studies suggested that the purpose of telecenters is to contact friends and family, prepare documents for social events and personal entertainment.

The key themes that emerge highlight several major obstacles for the effective utilization of ICTs for sustainable livelihoods. This is particularly true in terms of under-developed electricity supply systems and access to ICT facilities because of illiteracy, lack of computer skills and training, lack of time, cost of travel and lack of content in the local language.

Radio programs should also be taken into consideration, as they play a part in sustainable livelihoods, as well by providing knowledge and information on agriculture with topics including production, marketing and value addition. According to Arun *et al*. (2004), ICT use may improve sustainable livelihoods. This is accomplished through long and short-term plans via the real use of information and knowledge (Chapman and Slaymaker, 2002).

CONCLUSION

The conclusion drawn from this review adds to the literature on mobile phones, telecenters and community radio in less developed country and developing countries. The study established that in order for ICTs to support positive outcomes toward livelihood activities, it is vital that they consider the human factors mentioned in the SLA. This approach is a tool that assists in planning and assessing the use of ICTs in relation to development. It concentrates on how people deliberately use the resources accessible to them to improve their livelihoods.

IMPLICATION

Thus in order to achieve overall socioeconomic development, contributions to multiple assets through ICT intervention are needed to realize the effective implementation and use of ICTs as a strategy for improving sustainable livelihoods. In doing so, there is a need to raise awareness amongst policymakers in government, as well as development agencies and other investor groups and the global donor public on the potential role of ICT4D in sustainable livelihood assets.

REFERENCES

Arun, S., R. Heeks and S. Morgan, 2004. ICT initiatives, women and work in developing countries: Reinforcing or changing gender inequalities in South India? Institute for Development Policy and Management, University of Manchester, Manchester, England.

Bailey, A. and O. Ngwenyama, 2013. Toward entrepreneurial behavior in underserved communities: An ethnographic decision tree model of telecenter usage. Inform. Technol. Dev., 19: 230-248.

Bakesha, S., A. Nafakeero and D. Okello, 2009. ICTs as Agents of Change: A Case of Grass-roots Women Entrepreneurs in Uganda. In: African Women and ICTs: Creating New Spaces with Technology, Buskens I. and A. Webb (Eds.). IDRC, Ottawa, Canada, pp: 143-153.

Baro, E.E. and B.E.C. Endouware, 2013. The effects of mobile phone on the socio-economic life of the rural dwellers in the Niger Delta region of Nigeria. Inform. Technol. Dev., 19: 249-263.

Bertolini, R., 2002. Telecommunication Services in Sub-Saharan Africa: An Analysis of Access and Use in the Southern Volta Region in Ghana. Peter Lang Publishing Inc., Bern, Switzerland, ISBN-13: 9780820454986, Pages: 186.

Braun, V. and V. Clarke, 2006. Using thematic analysis in psychology. Qual. Res. Psychol., 3: 77-101.

Chapman, R. and T. Slaymaker, 2002. ICTs and rural development: Review of the literature, current interventions and opportunities for action. Working Paper No. 192, Overseas Development Institute, UK.

Chilimo, W.L., 2008. Information and communication technologies and sustainable livelihoods: A case study of selected rural areas of Tanzania. Ph.D. Thesis, University of KwaZulu-Natal, South Africa.

Chilimo, W.L. and P. Ngulube, 2011. Role of information and communication technologies in sustainable livelihoods in selected rural areas of Tanzania. Afr. J. Library Arch. Inform. Sci., 21: 145-157.

Chilimo, W.L., P. Ngulube and C. Stilwell, 2011. Information seeking patterns and telecentre operations: A case of selected rural communities in Tanzania. Libri, 61: 37-49.

Cook, D.J., N.L. Greengold, A.G. Ellrodt and S.R. Weingarten, 1997. The relation between systematic reviews and practice guidelines. Ann. Internal Med., 127: 210-216.

DFID, 1999. Sustainable livelihood guidance sheets. Department for International Development (DFID), London, UK.

De Silva, H. and A. Zainudeen, 2007. Teleuse on a shoestring: Poverty reduction through telecom access at the Bottom of the Pyramid. Proceedings of the Centre for Poverty Analysis Annual Symposium on Poverty Research, December 6-7, 2007, Colombo, Sri Lanka -.

Donner, J., 2008. Research approaches to mobile use in the developing world: A review of the literature. Inform. Soc., 24: 140-159.

Duncombe, R., 2007. Using the livelihoods framework to analyze ICT applications for poverty reduction through microenterprise. Inform. Technol. Int. Dev., 3: 81-100.

Field, J., 2003. Social Capital. Routledge, New York, ISBN-13: 9780415257541, Pages: 165.

Gigler, B.S., 2004. Including the Excluded-Can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach. Proceedings of the 4th International Conference on the Capability Approach, Volume 5, September 5-7, 2004, Pavia, Italy, pp: 1-48.

Gordon, J., 2007. The mobile phone and the public sphere: Mobile phone usage in three critical situations. Convergence, 13: 307-319.

Grootaert, C., R. Kanbur and G.T. Oh, 1995. The dynamics of poverty: Why some people escape from poverty and others don't: An African case study. Policy Research Working Paper, Report No. WPS1499, World Bank, Washington, DC., USA.

Heeks, R. and S. Arun, 2010. Social outsourcing as a development tool: The impact of outsourcing IT services to women's social enterprises in Kerala. J. Int. Dev., 22: 441-454.

Idowu, B., E. Ogunbodede and B. Idowu, 2003. Information and communication technology in Nigeria the health sector experience. J. Inform. Technol. Impact, 3: 69-76.

Kintu, F., D. Obot and L. Elder, 2005. The Uganda Knowledge and Information Society: Early Lessons from ICT Projects. In: At the Crossroads: ICT Policy Making in East Africa, Etta, F. and L. Elder (Eds.). IDRC, Canada.

Krishna, A., 2013. Active Social Capital: Tracing the Roots of Development and Democracy. Columbia University Press, New York, ISBN: 9780231500821, Pages: 192.

Lwoga, E.T., 2010. Bridging the agricultural knowledge and information divide: The case of selected telecenters and rural radio in Tanzania. Electron. J. Inform. Syst. Dev. Countries, 43: 1-14.

Makoza, F., 2011. The Impact of ICT Use on Livelihoods of Microenterprises: Case of South Africa. University of Cape Town, USA., Pages: 196.

Makoza, F. and W. Chigona, 2012. The livelihood outcomes of ICT use in microenterprises: The case of south Africa. Electron. J. Inform. Syst. Dev. Countries, 53: 1-16.

Martin, B.L. and E. Abbott, 2011. Mobile phones and rural livelihoods: Diffusion, uses and perceived impacts among farmers in Rural Uganda. Inform. Technol. Int. Dev., 7: 17-34.

McNamara, K.S., 2003. Information and communication technologies, poverty and development: Learning from experience. Information for Development Program, Washington DC.

McNamara, K., 2008. Enhancing the livelihoods of the rural poor through ICT: A knowledge map. InfoDev Working Paper No. 9. http://www.infodev.org/articles/enhancing-rural-livelihoods-poor-knowledge-map.

Molla, A. and S. Al-Jaghoub, 2007. Evaluating digital inclusion projects: A livelihood approach. Int. J. Knowl. Learn., 3: 592-611.

Morawczynski, O., 2009. Exploring the usage and impact of transformational mobile financial services: The case of M-PESA in Kenya. J. Eastern Afr. Stud., 3: 509-525.

Mulrow, C.D., 1994. Rationale for systematic reviews. Br. Med. J., 309: 597-599.

Naivinit, S., 2009. Gender, access to community telecenter and livelihood asset changes. J. Inform. Commun. Ethics Soc., 7: 128-135.

Nie, F., L. Zhang and C. Qu, 2010. Using the sustainable livelihoods framework to analyze ICT applications for promotion of agricultural livelihoods of rural community in China. http://repository.ipb.ac.id/handle/123456789/41742.

Ochonogor, W.C., 2006. Effects of Telecommunications Services on Rural Women Market Traders in Obiaruku and its Environs. In: Mobile Telephony: Leveraging Strengths and Opportunities for Socio-Economic Transformation in Nigeria, Charles-Iyoha, C. (Ed.). Ezcell Communications, Lagos, pp: 101-112.

Odame, H.H., 2003. Connecting the two stations of agricultural research and rural radio. J. Dev. Commun., 23: 116-132.

Orlikowski, W. and C.S. Icono, 2001. Research commentary: Desperately seeking the IT in IT research-A call to theorizing the IT artefact. Inform. Syst. Res., 12: 121-134.

Parkinson, S. and R. Ramirez, 2007. Using a sustainable livelihoods approach to assessing the impact of ICTs in development. J. Commun. Inform., 2: 116-127.

Parkinson, S. and A.C. Lauzon, 2008. The impact of the internet on local social equity: A study of a telecenter in aguablanca, colombia. Inform. Technol. Int. Dev., 4: 21-38.

Prahalad, C.K. and A. Hammond, 2002. Serving the world's poor, profitably. Harvard Bus. Rev., 80: 48-59.

Putnam, R.D., 2001. Bowling Alone. Simon and Schuster, New York, ISBN: 9780743219037, Pages: 544.

Qureshi, S., 2013. Information and communication technologies in the midst of global change: How do we know when development takes place? Inform. Technol. Dev., 19: 189-192.

Rashid, A.T., 2011. A qualitative exploration of mobile phone use by non-owners in urban Bangladesh. Contemporary South Asia, 19: 395-408.

Saebo, O. and D. Thapa, 2012. Introducing internet-based services in the mountain areas of Nepal: An asset pentagon perspective. Inform. Technol. Int. Dev., 8: 85-98.

Sebba, J., 2004. Developing an Evidence-Based Approach to Policy and Practice in Education. In: Evidence Based Practice in Education, Thomas, G. and R. Pring (Eds.). OUP/McGraw-Hill, Maidenhead.

Sey, A., 2011. We use it different, different: Making sense of trends in mobile phone use in Ghana. New Media Soc., 13: 375-390.

Sife, A.S., E. Kiondo and J.G. Lyimo-Macha, 2010. Contribution of mobile phones to rural livelihoods and poverty reduction in Morogoro region, Tanzania. Electron. J. Inform. Syst. Dev. Countries, 42: 1-15.

Singh, M., A. Molla and J. Sargent, 2008. Exploring the impact of government ICT initiatives on the livelihood of Australian rural communities. Proceedings of the 21st Bled eConference. eCollaboration: Overcoming Boundaries Through Multi-Channel Interaction, June 15-18, 2008, Hotel Golf, Bled.

Soriano, C.R.R., 2007. Exploring the ICT and rural poverty reduction link: Community telecenters and rural livelihoods in Wu'an, China. Electron. J. Inform. Syst. Dev. Countries, 32: 1-15.

Souter, D., C. Garforth, R. Jain, O. Mascarenhas, K. McKerney and N. Scott, 2005. The economic impact of telecommunications on rural livelihoods and poverty reduction: A study of rural communities in India (Gujarat), Mozambique and Tanzania. Commonwealth Telecommunications Organisation for UK Department for International Development, London, UK.

Terry, A. and R. Gomez, 2010. Gender and public access computing: An international perspective. Electron. J. Inform. Syst. Dev. Countries, 43: 1-17.

Thapa, D., M.K. Sein and O. Saebo, 2012. Building collective capabilities through ICT in a mountain region of Nepal: Where social capital leads to collective action. Inform. Technol. Dev., 18: 5-22.

Umar, J., 2006. Mobile Telephony and Sustainable Livelihoods for Rural Women in Nigeria. In: Mobile Telephony: Leveraging Strengths and Opportunities for Socio-Economic Transformation in Nigeria, Iyoha, C.C. (Ed.). Ezcell Communications, Lagos, pp: 41-52.

Van Rooyen, C., R. Stewart and T. de Wet, 2012. The impact of microfinance in sub-Saharan Africa: A systematic review of the evidence. World Dev., 40: 2249-2262.

Wilson, J., 2000. Methodology and moral education. Oxford Rev. Educ., 26: 255-262.

Woolcock, M., 2001. The place of social capital in understanding social and economic outcomes. Can. J. Policy Res., 2: 11-17.

Zaremohzzabieh, Z., B.A. Samah, S.Z. Omar, J. Bolong and H.A.M. Shaffril, 2014. Youths' sustainable livelihood with information and communication technologies: Toward an ICT for development quality model. Am. J. Applied Sci., 11: 947-958.

Zossou, E., D.S. Vodouhe, P. van Mele and P. Lebailly, 2012. Linking farmers' access to rural radio, gender and livelihoods: Case study of rice processors in Benin. Proceedings of the 3rd IAALD Africa Chapter Conference, May 21-23, 2012, Johannesburg, South Africa.