



Communication for rural development: Inventory of communication resources in farmer advisory services using ICTs in Rakai District-Uganda

**A research project submitted to Larenstein University of profession
education in Partial Fulfilment of the Requirements for the Degree of
Profession Master in management of development
Specialisation: Training, Rural extension and Transformation
(TREAT)**

BY

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SEPTEMBER 2009

WAGENINGEN

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Acknowledgements

First of all, let me give a special thanks to NUFFIC, the government and people of the Netherlands who generously funded for my one year of study. I would also like to thank all the staff of VAN HALL LARENSTEIN University of Applied Sciences, Part of Wageningen UR for their teaching and helping during my study.

I would like to express my gratefulness to my supervisor, Mrs. Loes Witteveen, for her advice, comments, suggestions, and encouragements during my thesis. Her supervision helped and encouraged me so much in completing the research. I would also like to thanks Berinya Hilary for his comments, suggestions and guidance at the beginning time of my research. I want to thank to all my classmates who have always given me assistance during my study.

I am greatly indebted to my colleagues of Rakai District Agricultural Training and Information centre (DATIC) for their helps in collecting secondary and tertiary data. My thanks are extended to Mr Luyimbazzi David the Rakai District NAADS coordinator who continuously suggested and encouraged me to carry out my research. I would like to thanks to Mr Ssesanga and Dr Kimbugwe of the Production department for sharing their valuable documents.

I would like to thank people from Kyebere, Kifumba Dwaniro and Kyalulangira sub counties , who participated in focus group discussions which supported relevant documents for my research.

Finally, my acknowledgements are extended to my family for their sacrifices when I was absent to study in the Netherlands.

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List of acronyms

ASPs: Agricultural service Providers

AKIS: Agricultural knowledge and information systems

BROSDI: Busoga Rural organisation for sustainable development Initiative.

CAO: Chief Administrative Officer

CBO: Community based organisation

DATIC: District Agricultural Training and Information Centre

FAO: Food and Agriculture organisation

FARA: Forum of Agriculture Research Association

FM: Frequency Modulation

GTZ: German Technical Cooperation

ICTs: Information communication technologies

ICT4D: ICTs for development

IFPRI: Institute for food production research Institute.

MTN: Mobile telephone network

NAADS: National Agricultural Advisory services

NGOs: Nongovernmental organisation

SMS: Short message service

UNCST: Uganda national council for science and Technology

UNESCO: United national scientific and cultural organisation

WAP: Wire application protocol

Abstract

Communication and information are fundamental building blocks of social and economic development. In recent years, there has been incredible advances in technologies that facilitate communication and hence the flow of information. To some, information communication technologies (ICTs) offer a panacea to the development malaise the world currently faces. To others ICTs are an inappropriate solution and may be part of the problem.

In Uganda, the use of ICTs in all sectors of development is being promoted by the government, but the infrastructure and access to ICTs in rural areas is still lacking in spite the increased access to ICTs like radios and mobile phones. Reaping the benefits of information communication technologies in agriculture remains a challenge for farmers and agricultural service providers as the national extension service is being transformed from the regulatory extension to farmer driven outsourced provision of agricultural advisory services. Based on this a research was carried out to explore how the technology of mobile phone can be integrated with radio to increase the effectiveness of radio as a communication tool for farmers and agricultural service providers in Rakai district.

The research used the strategy of identifying key players in the provision of agricultural advisory services, creating scenarios and analysing them using information which was collected during focus groups discussions, interviews, observations and a discussion during a workshops. The research reviewed the theoretical concepts in relation to communication for rural development and the provision of agricultural advisory services.

The research found out that there is increased access and ownership of radio and mobile phones but the two ICTs are not being effectively used by agricultural service providers in communication of agricultural knowledge and information due limited funding by the district extension service. On the farmers side the type of information provided by radios was not very relevant to them and in addition irregular agricultural radio programmes. On mobile phones there is increased accessibility but usage is limited due language barriers, high calling rates (airtime) problems of charging and infrastructural problems which include limited network coverage in some areas. On the integration of the two ICTs, the research found out that this is being limited by high cost of calling rates and poor programming of radio programmes.

The research concluded that there is great potential in Using ICTs in provision of agricultural advisory services, and the most effective way of reaching farmers with agricultural information and knowledge is to harness the potential of FM radio stations and mobile telephony as technologies for communicating agricultural information.

CHAPTER ONE: INTRODUCTION

In developing countries, information and communication tools are often welcomed as important instruments for accelerated change (Jager and Van Reijswoud, 2007). Knowledge and information are essential for people to respond successfully to the opportunities and challenges of social, economic and technological changes (FAO, 2004). But to improve agricultural productivity and rural livelihoods, knowledge and information must be communicated effectively to the people. According to Girard (2003), FAO has been recognized in the promotion and use of ICTs and media to help rural people to exchange experiences find a common ground for collaboration and actively participate in and manage agricultural rural development activities. Despite these efforts, resource-poor farmers in sub-Saharan Africa have only benefited to a limited extent from many efforts to improve their livelihoods and enhance agricultural development (Nederlof et al, Campilan, 2006). In many countries, low agricultural production has been attributed among other factors to; poor linkages between research-advisory services to farmers and to ineffective technology delivery systems including poor information packaging, inadequate communication systems and poor methodologies (FAO and GTZ,2006).

The availability of new information communication technologies and media, like the internet, rural radio, mobile phones and TV, open more channels for communication and give chance to a wider access to information and to a limited extent interactive communication (FAO, 2003). According to Livingstone (1999) the shift from one-way mass communication to more interactive communication processes between senders and receivers supported by ICTs requires a radical new focus for research. However, all the information resources are still largely available to extension organisations and institutions and the content are in a language that farmers do not use or communicate in and have little relevance to their needs. In addition, no communication activities are expected to succeed without prior understanding of how people to be affected perceive their own problems and development options of communication for development.

Having seen that, Van de Ban and Hawkins (1996 p.128) argue that, Investigations of the effects of mass communication generally gives us little insight into how a chosen communication strategy influences these effects. In addition, the development of computers offers farmers new opportunities to obtain information quickly and the amount of information farmers can and should use for their management decisions is increasing rapidly.

ICTs for rural development

In rural areas of developing countries, the need for ICTs is usually related to emergencies and social reasons such as getting in touch with relatives abroad or calling a hospital. This can be true for rural people since they need communication and personal contacts some of which traditional communication were not able to achieve. There is no doubt that today's society is increasingly globalizing and interacting economically (Zappacosta, 2001 p. 522). This process involves developing people and capital mobility, changing modes of production, consumption, learning, working and leisure, and increasing world-wide competition. Information and communication technology (ICT) includes all electronic and digital means of capturing, processing, sharing, storing and retrieving information which are widely recognised as a catalyst in that evolution. The development of new information communication technologies (ICTs) has the potential to millions of people's lives but issues around ownership of the technology and how and the costs may mean that relatively few individuals benefit to the exclusion of everyone else (Aranachalam, 2005).

From another point of view, it is not a matter of access or ownership to the new technology but the integration of the ICT could be quite important also. The radio and mobile phone are being used but they have different level of use which can be enhanced if well integrated. Girard (2003) emphasises the role of radio by saying that, radio is an important mechanism of communicating knowledge and information in different languages, and radio has received impressive results in delivery of useful information to the people. According to FAO (2003), local radio promotes interaction by bringing people together, stimulating communication and enhancing the value of local knowledge. Radio helps people to be better informed about their own environment and their community problems. In support of this argument, Chapman and Slaymaker, (2002) argue that, local radios for example recognise that their popularity stem from engendering a sense of proximity with the listening community that other medias cannot achieve.

The availability and use of ICTs to rural communities and most especially the farming community should not be taken for granted that it can cause the anticipated development. What should taken into consideration is of what use are ICTs to the farmers in alleviating their knowledge and information needs. Chapman and Slaymaker (2002) put it that, over emphasis on sharing external knowlwdge and information inherent in most ICTs related initiatives, there seems to be less willingness to provide them as a catalyst for development without dictating how they should be used and for what purposes. In an effort to improve communication in rural areas using ICTs, some aspects of local needs have to be put into consideration. Therefore, ICTs could be promoted as open and flexible to enhance information exchange in rural areas based on locally designed priorities.

Communication for rural development

According to FAO and GTZ, (2006, p. 3), rural communication is an interactive process in which information knowledge and skills, relevant to for development are exchanged between farmers, extension/advisory information providers and research, either personally or through media such as radio, print and more recently new ICTs like mobile phones. In communication for rural development approaches, rural people are at the centre of any given initiative. This argument could bring more certainty to communication in rural areas which has been focusing mainly on information provision taking farmers to be information recipients only. In addition to this, traditionally, rural communication focused on supplying information from policy makers to the rural poor. This mainly functions along technical divides and is top down, manifested in poor linkage between research, advisory services and farmers (FAO and GTZ, 2006). However, it has now been recognized that, past systems of communication with the rural people have been ineffective in addressing the needs of rural poor because, transmission of message was basically the order of the day. According to Zappacosta (2001 p. 532), rural people usually get their most valuable information via informal sources such as personal contacts. Although information may be inaccurate and incomplete, they seem to prefer this type of information source because of its proximity that generates a feeling of trust and finally determines the acceptance of data. As suggested by Wilson and Heeks (2000) data are converted into useful information and knowledge only if three crucial stages are fulfilled: data first need to be accessed, then assessed, and finally applied to local conditions. People living in rural areas in developing countries usually experience serious problems in each of these stages.

According to Richardson (2006), Information intermediaries for example extension workers and radio broadcasters can help rural communities access relevant information .However, rural communities are usually only seen as information recipients. In reality they are also providers of relevant information that is frequently inaccessible outside the region. Local data about, for example demography, food production, natural disasters, conflicts, as well as

successful stories of development projects, are worthwhile information that warrants better dissemination. Therefore ICTs are a powerful tool for information delivery reducing 'horizontal distances within communities and between villages and enabling 'vertical 'communication among communities, governmental and non-governmental organisations (FAO, 1998).

Despite their potential for enhancing rural communication, this alone cannot cause rural development. There could be needs for strategies that include communication for rural development as a significant aspect of rural development combined with other communication for development theories. Efforts in this direction are being made but governments have not yet recognized fully the potential of this factor in promoting public awareness and information on agricultural innovators, as well as on the planning and development of rural populations (FAO, 2003).

Richardson (2006) says that, one of the options to improve the situation of effective communication in extension services is to marry the use of new ICTs like mobile phone with traditional ones like radio. According to Girard (2003), radio initiatives are part of a broader initiative by UNESCO and FAO used to exchange knowledge and research findings to multiple stakeholders; farmers, extension workers, community groups and rural businesses. What is at stake here is the need today and in future, to reinvest in radio broadcasts to give farmers free expression. The terms rural radio and community radio has been used interchangeably to describe Frequency modulated radio (FM) stations established to broadcast local and predominantly rural audience (Chapman *et al.* 2003). The Growth of rural radio stations over the past two decades reflects both improvements in information technology and shifting of the development paradigm towards a more participatory style of information and knowledge transfer.

Girard (2000) adds on that, new ICTs like mobile phones and Internet are hailed as the long waited solution for the poor world. The use of ICTs in extension also provides key benefits in relation to traditional communication. However, ICTs also come up with a range strength and weaknesses for example the mobile phone effectively reduces the 'distance' for individuals and institutions, making the sharing of information and knowledge easier and more effective whereby solid networks can be strengthened and individuals empowered by their handsets. However, there is a limited capacity of rural people to use the technology for more complicated applications like sending images. Connectivity (airtime) is also still expensive in many developing countries. Although regarded as traditional, according to Maru (2005) the radio communication is suitable for self-paced learning and conveying information to rural communities where reception is not problematic and literacy levels are low. However, radio lacks visuals and is usually a one-way communication. But linked to with telephone and internet, it allows small holder farmers to call in live programmes and provide immediate, informative and interactive information sharing. To support this argument Warschaeuer (2004 P. 56) says that, too often technology projects focus on providing software and hardware and pay little attention to culture and social systems that inhibit use of ICTs by people. In addition many ICT projects are characterised by poor and non-participatory planning and they lack attempts to integrate with existing media, local communication methods and traditional ones. It is also common for funding agencies to derail from potentially useful projects by continued desire for "magic bullet" solutions that show case technologies and icons. The convergence of ICTs such as the mobile phone and rural radio can provide a powerful support for harnessing communication knowledge and for development. It can also ensure wider access to information to rural areas. Richardson (2003) argues that, the growing complexity of ICT systems due to full digitalization of the network makes communication infrastructure management extremely difficult needing special skills.

According to Munyua (2007-p.16), ICTs have been effectively used for disseminating innovations in some African countries such as the case of BROSDI in Uganda. There is a wealth of information in new and improved technologies and innovation being generated in Africa. Likewise, challenges pertaining traditional indigenous knowledge not being passed on the young generation could be addressed by developing knowledge bases. However, despite the high potential of ICTs in improving small scale agriculture, there is low usage patterns and adoption and there this is attributed to high cost of available technologies, inadequate infrastructure, and ICT skills, poor and expensive connectivity, inappropriate ICT policies, language barriers and high cost of ICT technologies. Gakuru *et al* (2009) says that Innovative information initiatives invite farmers to use and share traditional knowledge using modern ICT. However, this idea is not shared by World Bank (2008) which says that innovation may arise anywhere. It is not the preserve of formal research organisations or processes. In fact innovation in agriculture may come from institutions that do not consider themselves part of agriculture like ICT and natural resource management.

1.1 ICTs in Uganda

The Government of Uganda has recognised the fundamental importance of ICT in any policy for development and creating the conditions for the fullest participation of all sections of the population. However, little advantage can be taken to those opportunities if the information needed to provide users with a meaningful purpose is not available or when it is available, it cannot be effectively transmitted to the people who need it (National ICT policy, 2003). Information can only empower when the user has access to it. Leaving aside mass media such as radio and television, information used to be disseminated in paper form, and it had to be brought physically to the user (FAO-2005). Leeuwis (2004) argues that the challenges to agricultural extension in the 21st century derive on the one hand, from the challenges that farmers and agriculture face in view of their changing social and natural environment. On the other hand, there are changes that are emerging within extension organisations themselves in connection with for example, new funding arrangements, developments in extension theory, and the emergency of new computer –based technologies. The challenges highlighted by Leeuwis are being realised by the Uganda agricultural extension system which is evolving from the traditional extension to demand driven extension. Its under this transformation that the work of traditional extension workers is being gradually been taken over by private agricultural service providers. The main problems still being faced is how to effectively communicate the information services to farmers.

The use of ICTs as a method of improving communication in all sectors of development is being embraced by the government and this has seen the introduction of the ministry of ICT in 2006. Moris (1991) supported this by saying that a range of new technologies seem especially suited for overcoming communication blockages which characterised African agricultural development.

Notably, several FM stations have sprung up in the country and according to Uganda communication commission, 100 FM stations have been registered by 2005. In Uganda, the subject of ICTs has become a 'hot potato' and the challenges are many. They include coherent policies, technical capacity and implementation capacities. According to IMF report (2005), the major development sector has been growth of mobile phones led by private sector. 35 households in Kampala have mobile phones. There are far more mobile connections than landlines. The total tele-density has improved from 0.28 to 2.5 with over 600,000 and 590000 subscribers in the mobile and fixed networks respectively. The telecommunication sector was liberalised in Uganda in 1998 and Uganda tele-density has

grown beyond the minimal sub-Saharan level of 8 in June 2006 to 13.3 in June 2007 (UCC annual report, 2006). Table 1.1 and 1.2 shows the growth of ICTs in Uganda.

Table 1.1. Communications Sector Figures for the Period December 2006 to March 2007

	Fixed Phone Lines	Mobile Cellular Subscribers	Internet Service Providers	Private FM Stations	Private Television	Courier Service Providers	Pay Phones
March 2007	137,916	3,015,493	17	158	32	25	16,059
Dec. 2006	129,863	2,697,616	17	153	31	25	12,889

Source: Uganda Communications Commission, 2007.

With the current trend of development of ICTs in Uganda, mobile phones and FM radios form the biggest part therefore they cannot be ignored in the development of agriculture and the communication of agriculture information to farmers. Oryokot (2003 p.18) says that “In case of Uganda, access and use of ICTs will for the near future be restricted to info-mediaries (intermediary organisations, private sector operators, extension workers, NGOs/CBOs) largely due to the low literacy levels among rural folks”. I don’t agree with Oryokot but this will be proved right or wrong by the research in chapter four when we shall be looking at the results. However, there is still a communication gap between agriculture service providers and farmers which need to be considered. According to Ray (1998), the nature of communication gaps may be of two types; the first one is where the message does not reach the target. The second one is where the message fails to produce the desired impact even if it reaches the target. Where the message does not reach the target, you can use more than one channel of communication and must be in time. This could be what ASPs need to do in order to address the communication gaps. However in Uganda, the agricultural advisory services are still in transition from public to private and we need to look at this transition as it may affect service provision. Since information exchange has a role to play within the agricultural extension system, extension workers could make far more use of new information linked technologies.

Table 1.2 Growth of ICT infrastructure since 1996

Service provided	1996	1998	1999	July 2000	Feb 2001	July 2001
Fixed lines connected	46,000	56,000	58,000	58,000	61,000	56,149
Mobile subscriber	3500	40,000	70,000	140,000	210,000	276,000
National telephone operators	1	2	2	2	2	2
Mobile telephone operators	1	2	2	2	2	3
Internet access service providers	2	7	9	9	8	9
Internet/e-mail subscribers(wireless)				500	1200	6500
Internet/email subscribers(dial-up)				4000	4500	
VSAT international gateways				4	8	8
Public Internet service Providers (cafes)		3	8	14	8	8
Public pay phone Licenses		7	13	19	18	49
Paging service providers	2	3	3	3		3
FM radio stations	14	28	37	40	10	110
Television stations	4	8	11	11	19	20
Private Radio communication operators	453	530	688	688	770	1210
National postal operators	1	1	1	1	1	1
Courier service operators		7	8	10	10	10

Source: Uganda communication commission

1.2 Advisory services in Uganda

In Uganda, the national agriculture extension system has undergone a number of transformations from regulatory in 1980's to advisory in 1990's (Semana, 1999). The decentralisation of extension services retains the public delivery and public funding characteristics of traditional centralised extension but transfers the responsibility for delivery to local governments (districts, Sub County). Anderson, 2007The Poverty Eradication Plan (PEAP) outlined the necessary policy actions for social transformation (Tezikara et al, 2006). In response to these issues, Plan for modernisation of agriculture (PMA) was adopted in order to address the factors that undermine agricultural productivity namely: Poor husbandry (Crop and Livestock), minimum use of improved inputs, limited access to technical advice, poor transport, communication and marketing infrastructures and insecure land reforms

(Heemskerk et al,2007). Reforms to the National extension system by establishing the National Agricultural Advisory services (NAADS) become the main driving elements behind the implementation of PMA. The NAADS programme focussed on increasing farmer's access to improved knowledge, technologies, and information associated services that would address need and opportunities of small holder farmers. (NAADS policy document, 2001).

The core aspects of the NAADS programme include the shift from public to private extension service provision and giving smallholders access to relevant services, which is also achieved by 'outsourcing'. Outsourcing involves contracting out services by local government administration on the basis of the farmers demands. In order for the outsourcing to work, massive capacity development was required for service providers (advisory) and the local government administration. Local government administrations need communication and information strategy and links between ASPs and end users. Therefore, access to information by community members need to be enhanced. Heemskerk et al (2007) emphasises that, the advisory services in Uganda need to be knowledge based and sufficiently flexible to respond to the new demands. But according to Chapman and Slaymaker (2002), Agricultural systems have all too frequently underestimated the importance of free open information flows relating to the introduction of new agricultural technologies. The main problem has been one of providing top-down information of limited local relevance to farmers who also are unable to ask questions or provide a feed back to the extension services and research centres.

In Uganda, the use of radio in agriculture extension has been of much importance of recent, and with the advancement of mobile phones in rural areas, it has greatly improved communication access. Kwami (2007) supports this argument and argues that, what is needed again are extensive and effective channels of communication that combines ICTs and social networks to routinely keep people informed as well as convey peoples voices, problems and information "upwards". Richardson (2006) says that there is a growing consensus that knowledge and information are essential for empowering communities and that convergence of technologies can help to share knowledge and information. It's also recognizable to note that communication is central in this process and knowledge and information are essential for empowering rural communities.

Rakai district is one of the districts located in southern Uganda. It's one of the rural districts which face a lot of challenges in rural communication and access to information by the rural farmers. Extension organisations in the district are expected to play a key role in brokering between communication technologies and the current group they serve. In this role they are expected be able to examine the appropriateness of various ICTs and their accessibility. However this is not the case. The communication infrastructure of the District is weak and the poor communication skills of extension workers hamper effectiveness and efficiency of rural communication. According to Singh (2006), the extension worker is a communicator and carrier of information. The credibility of the communicator and the organisation he represents is important in effective communication. If the communicator can make use of the communication channel available to him, he can improve his communication skills.

1.3 Rural communication in Rakai District

Rakai district has access to a number of ICTs which include; Radio, TV, Internet, mobile phone and Fixed Phone. However it's mainly radio and mobile phones which can be accessed in rural areas as internet is limited to towns where there is electricity. However, despite the availability of a wide range of ICTs in Rakai, the District, extension organisations has not effectively utilised the ICTs in provision of extension services. Many extension organisations still use traditional extension methods which rely on transfer of knowledge from researchers or external experts. The methods which are commonly used include farm and home visits, demonstrations, small group trainings and study tours. Due to government restructuring process of encouraging outsourcing of extension services, the number of extension workers has been going down while that of farmers has been growing hence a need to address the communication gap for extension organisations that are providing the agricultural advisory services. In addition, the communication between research-advisory/information services is top down and there is one way flow of information making all the actors in the agricultural knowledge and information service (AKIS) isolated from each other.

In an attempt to reduce the communication gap and in particular the digital divide, rural areas have been supported by the wide availability of communication technologies and infrastructure like internet, rural radio and mobile phones (FAO, 2003). However, communication between agricultural advisory service providers and rural people is still a challenge. Service providers have to understand the rural context, the connection between information provided by rural people and their behaviour and the value of local knowledge. For effective communication to be achieved through the use of ICTs connectivity content and context all have to be assured and this can be made more possible by converging the new ICTs with traditional ones. Among the new ICTs is the mobile Phone technology

The cellular (mobile) phone technology is seeing a phenomenon growth in many developing countries. A short messaging service (SMS) and wire application protocol (WAP) enabled with cell phone cameras can be effective in offering "always available extensions services between experts and farmers (Maru, 2005). According to Munyua (2007), the cellular phone has become pervasive in Africa; however challenges such as the cost of connectivity (airtime) and charging phones need to be addressed. The integration of community radio with cellular phone need to be further explored and this forms the rationale of this research. Since internet connectivity is still low in Africa, this research focuses more on the integration of radio and mobile phone.

The private agricultural advisory service providers and the government extension workers in the district have been struggling to communicate agricultural information to farmers. However, the communication has been ineffective and this has been largely attributed to the use of traditional communication channels mainly face to face training combined with demonstrations. Farmers training attendance has reduced tremendously as farmers may prefer they prefer to listen to radios instead of walking distances to attend trainings. Additionally, many of the providers lack appropriate communication skills mainly in the use of the most available ICTs of Radio and mobile phones. Though radio has been around for years, its use has been mainly a one -way communication transmitting messages to farmers without feedback. In addition to this Singh (2006) says that, the involvement of the extension worker with radio may be of two types; when the programme is made or field recorded and when the extension worker is invited to deliver a talk or participate in a discussion at the radio station.

In Rakai District, radio has not been widely used for agriculture extension but for political mobilization. Radio and mobile phones are available in the district even though their coverage differs from place to place and not accessed by everybody but their coverage has improved in the last 3 years. Radio has been used for a number of years not only in agriculture extension but also in other sectors but its main limitation has been lack of interactivity. There is a need to address the communication between agricultural service providers and farmers and this can be addressed by integrating the two ICTs which seem to have a lot of potential but not fully utilized. Therefore, the main objective of this research is to explore how the new technology of mobile phone can be integrated with the radio to increase the effectiveness of Radio as an interactive communication tool for farmers and agricultural service providers in Rakai District.

This introductory chapter has explored on role of ICTs in provision of advisory services to farmers. It also looked and the potential of new ICT of mobile phone can be converged with radio which has been traditionally referred to as a one way- communication how it can be made more interactive hence make communication more effective. In chapter two we shall look at the theoretical concepts which relate with communication and ICTs in communication of agricultural information.

1.4 Outline of Chapters

The research report is divided into five Chapters. Chapter one gives the introduction the research by describes the research problem, its justification and the objective of the research.

Chapter two describes the theoretical concepts linked with the research and it gives an overview of the desk research which is used in comparison with analysis and discussion of findings in chapter five.

Chapter three describes the research strategy and gives the methodology used to carry out the research. It gives the research questions; the research area and describes the data collection methods.

Chapter four gives the findings of the research and gives the findings of the research and analyses the potential of using the mobile phone and radio as communication resources in communication advisory services to farmers

Chapter five gives the analyses the findings and discusses them and gives conclusion

CHAPTER TWO: THEORETICAL CONCEPTS

2.1 Introduction

The previous chapter gave an explored to the potential role of ICTs in the context of communication for rural development together with opportunities arising from the continued convergence of ICTs old and new in improving the communication of agricultural information from service providers to farmers. Chapter two examines the theoretical concepts which are being considered to harness ICTs and rural communication. The reviews of rural communication and ICTs for rural development are expected to be important building blocks in building s strategy of for the research and analysing the findings. The concept of building partnerships at the community level based around information sources which are relevant to communication of agricultural knowledge and information also need to be explored. This chapter shall also discuss how advisory systems and ICTs can be used to improve systems for exchange of information sources locally and also providing established intermediaries with the facilities to enhance their capacity for information sharing. The theoretical concepts shall be analysed and compared with the findings of the research in chapter four.

2.2 Communication

Many scholars have defined communication using different perspectives and giving it a different meaning according to what is being used for. Communication can be defined it terms of mass communication, extension communication or even organisation communication. In this context, we shall focus more on extension communication.

Leeuwis (2004) defines communication as the process through which people exchange meanings. He adds on that, human beings can make deliberate attempts to communicate meanings to others. People, who communicate with each other, often do so in the context of previous communications and experiences. Currently, communication is considered as a social process designed to bring together actors such as agricultural technicians and farmers in a two way process. Viewed this way, the parties involved in communication process are both senders and receives of information and co-creators of knowledge (FAO and GTZ, 2006). Across the last two decades, huge advances have been made in communication and these include electronic communication which involves electronic data transmission. According to Leeuwis (2004), extension involves the use of communication of information to help people form sound opinions and make good decisions. Therefore, extension draws heavily on communication as a strategy to look as extension as a communication for innovation so that extension workers can deliver 'innovations' and become communication workers. The term 'extension worker' and 'communication worker' have also been used interchangeably referring to people who 'transfer information from one place to another using different channel. What needs to be understood here is the 'function of extension' and 'communication function'. According Ray (1998) the function of extension is to bring about desirable changes in human behaviour by means of education whereas the communication function is the public receives information.

Having looked at Leeuwis's definitions which emphasises exchange of meanings in communication, Ray (1998) looks at the communication functions and says more critically and says that, there must be some information about what is going on in the environment which concerns people. The getting or giving of information underlies all communication functions. Ambeker (1992) goes ahead to talk about communications models. By looking at communication models it can help to identify which model to consider while looking at rural communication and more especially in the delivery of agricultural advisory services to

farmers. According to Ambeker, the communication models include: the Osgood and Scram model which highlights the behaviour of the main actors and attaches equal importance to both communicator and receiver. The Shannon model however describes communication as linear one and one way process between information source and destination. The Dence model depicts communication as ongoing and dynamic process to which there is a continuous exchange between source and receiving leading through a feedback to required subsequent modification. In studying communication, other relevant factors like social economic and other influencing communication must be taken into account. Singh (2006 p.209) goes further to argue that, when we learn to phrase out purpose in terms of specific responses from those attending messages, we have taken the first step towards effective communication. In chapter two, it was pointed out that in Rakai district there is a communication gap which need to be bridged with effective communication. Therefore in this context there is a need to consider the adoption of the communication model of Dence which emphasis a continuous exchange and a feed back.

In order communication to be successful, it must be target oriented to communicator must know the target, interest, resources, facilities, constraints and even their approximate number and location (Ray, 1998). The ASPs in Rakai have been mainly relying on the one way communication which might not be successful according to Ray and this need to be explored how it can be improved to become a two way two way communication.

Richardson (2003) says that, the two way communication has been used in agricultural extension to coordinate farmer's participation in use of available services. The farmers were able to negotiate and arrive at a decision to be communicated further. Leeuwis (2004) concludes this by proposing that the key role for communication in innovation process is to enhance network building through social learning and negotiation. It is therefore essential for the extension and advisory organisations in Rakai district, to be in position to negotiate and communicate effectively if innovations are to be communicated. By making communication effective, agricultural information could be easily communicated and the ICTs to make communication effective have explored on how they can be to be integrated. This can't be done in isolation but in relation to agricultural knowledge and information system.

2.3 Agricultural Knowledge and Information systems (AKIS)

An agriculture knowledge information system for rural development links people and institutions to promote mutual learning and generate, share and utilize agriculture related technology, knowledge and information. An AKIS integrates farmers, agricultural educators, researchers and extensionists to harness knowledge and information from various sources for better farming and improved livelihoods (FAO and World Bank 2000:2).

Amidst the challenges facing extension, there is a growing recognition that farmers and members of rural communities have needs for information and appropriate learning methods that are not being met (Greenridge,2003,Lightfoot,2003). However, Leeuwis (2004) stresses that although actors in AKIS are frequently dealing with knowledge products (instead of material goods), we cannot usefully understand their practices without looking also at other issues such as reward systems, politics, resource distribution etc. I agree with Leeuwis because, knowledge may be available but due to politics which also affects resource distribution makes it inaccessible to those who need it. This argument is supported by FAO and World Bank, (2000) which says that public decision makers are often unaware of the actual results achieved and the long-term resource allocation needed. Many public decision makers are frustrated by the disappointing levels of coverage or-of actual face-to face contacts between farmers and extensionists and researchers. However, the same

decision makers often constrain outreach programmes through budget cuts that limit coverage.

According to FAO (2000), the know-how and technologies that are produced by AKIS even when relevant, are not taken up by farmers, suggesting a lack of effective transfer. Concerns over cost-effectiveness mean that public research and extension services have trouble ensuring sustainability. However, it should be remembered that lack of systematic collaboration among educators, researchers, extension staff and farmers has limited the effectiveness and relevancy of support services to the rural sector.

Though AKIS links people and institutions, in Rakai district the link is still weak. The information and knowledge is available but the channel is yet to be streamlined. The radio is available and farmers listen to radio but the information they receive is mainly from other sectors not agriculture. Girard (2001) says that low production and distribution costs have made it possible for radio to interpret the world from local perspective and to respond to local needs or information. This might be the case according to Girard but in Rakai though the costs may be low but the distribution is limited hence a need to make ICTs an important communication tool. Alternatively, the development of more flexible ICTs for rural areas based on low cost unit and running cost and information outreach would greatly reduce the tendency towards restrictive control.

The acknowledgement that farmers have relevant knowledge, operate in unique local innovation systems and set their own priorities for development and livelihood plans, is slowly leading to changes in the attitudes of public stakeholders in general, and agricultural service providers (both public and private sectors) in particular. This local and scientific knowledge can be accessed through interactive learning among stakeholders. Indeed, the linear approach is now gradually being replaced by the agricultural knowledge information system perspective (Wennink et al, 2006). The private and public service providers in Rakai district need to be inspired by Wennink suggestions and consider interactive learning and consider ICTs as an important element in information and knowledge communication.

2.4 Information communication Technologies (ICTs) concept.

Information communication technology or technologies by definition is an umbrella term that includes any communication device or application, encompassing; radio, television, cellular phones, computer and network hardware and software, satellite systems and so on as well as the various services and applications associated with them such as video conferencing and distance learning (ICT4D, 2007). According to (Hams, 2004; Kweku, 2006), Such ICTs include technologies and media that capture, store and disseminate data and information and they include tools such as video, tele-text, voice information, systems, radio, mobile telephony, fax and computer-mediated networks among others. FAO and World Bank (2000) says that new developments in communication and information technologies are making it possible to share information widely, quickly cheaply except in extreme remote areas, rural people have access not only to national radio but increasingly to local community-based radio stations. This is reducing the isolation of professionals allowing easier sharing of knowledge. The information technology revolution is starting to expand access to rural people to written and electronic forms of information and communication including distance learning systems. In some cases, ICTs are playing a very important role in supporting and facilitating emerging models of demand driven extension. Kiplag'at (2003) reports on experiences in Kenya, South Africa Sri Lanka and everywhere, noting that there are some important innovations but there is a long way to go before a meaningful impact on extension is seen.

The current trend shows that ICTs have some potential as information processing technologies, providers of new service communication enablers and tools for empowering rural communities (Zappacosta, 2001). It is expected that this trend will also include the development and use of ICTs in developing countries. However, despite all the successes mentioned by different scholars on the development of ICTs more especially in rural areas, writers like Kiplag'at does not mention Uganda in his case study but Munyua (2007) says that a number of organisations in Africa have conducted business training for small-scale farmers including the District agricultural training and information centres (DATICS) the National research organisation (NARO), Uganda National council of science and technology (UNCST) and Kenya Agricultural exchange. Language and illiteracy are mentioned as elements with a sizeable influence the use of ICTs in small scale agriculture especially where content is too technical and available in English only.

In the context of rural development, Information and communication technologies (ICTs) are recognized to support and enhance communication across a broad spectrum of actors and activities through the integration of a multimedia mechanism into daily process (Chapman and Slaymaker, 2002). According to Keri K. Stephens (2007), ICTs become an important component in the process of communication. The role of ICTs in such a scenario is to provide timely information, increase choice, reduce transaction costs, and contribute to improving the efficiency of decision-making to raise rural incomes and improve the quality of life of the rural communities (N.H. Rao, 2006). Rural development is enhanced by the growing availability and accessibility of modern ICTs. This has profound implications on the information products and services required by the various actors, and on the capacities and skills that these actors need in order to bridge the communication gap for information sharing and exchange between the different actors in the agricultural knowledge and information system.

The rural people are engaged primarily in agriculture and related activities for their livelihood, agriculture providers the bulk of their income and their main sector of nutrition (IFAD, 2001). Improved systems for the management and communication of agricultural information can help farmers make informed choices about the opportunities and constraints associated with agricultural development strategies (FAO, 1998). O'Farrell (2001) believed that before one can advocate for the development of ICTs among rural farmers, they must understand the existing information systems of rural areas, how they interact with more formal information and the best way to strengthen before intervening with new information sources and means of access sources. Access to information and knowledge are considered key enablers in poverty reduction in rural areas.

In context of changing paradigms in agricultural extension, where linear information flows are being replaced by pluralistic farmers will become more and more able to access any information they need on their own (Engelhard R., 2003). This development is enhanced by the growing availability and accessibility of modern ICTs. The role of the traditional intermediary is vanishing as all actors within the community take on intermediating functions. This has profound implications on the information products and services required by the various actors, and on the capacities and skills that these actors need in order to bridge the communication gaps for information sharing and exchange between the different actors in the agricultural knowledge and between the different actors in the agricultural knowledge and information system.

The range of technologies is increasing all time and 'there' is convergence between the new technologies and conventional media (Chapman and Slay maker, 2002). This rapid and convergence of ICTs means that, devices such as digital cameras, digital video cameras, personal digital assistants and mobile telephones are compatible with more traditions media

such as radio and TV. The specific concern here is the potential role and importance of ICTs in support of advisory services. Current ICTs tend to focus on infrastructure development and extension of information services from centre to periphery (G8 DOT force, 2001, World bank, 1999). Even in Rakai district the use of ICTs have been focusing on accessibility.

A narrow focus (for some people) on the role of information leads to a more limited perception of the potential role of ICTs. Communication specialists by contrast recognise the potentials of ICTs to support and enhance communication across a broad spectrum of actors and activities through the integration of multimedia mechanism into daily processes.

As with all technologies employed in development processes, ICTs impact on men and women differently yet men and women have different needs (Hafkin 2002). As noted by OECD (2006), In agricultural sector strategies that assume gender neutrality, (for the benefit of the community all') do not necessarily lead to gender neutral outcomes. In order to show the gender inequality in ICT use and its relevancy, Hafkin (2002) raises a question "Is it realistic to expect ICTs to the world's 876 million illiterate people, two thirds of whom are women living in rural areas of developing countries?". Women make up the large proportion of poor countries yet access to agricultural information is very limited.

In order to integrate ICT use into local knowledge and information systems, the underlying control and ownership discussed above needs to be developed by encouraging active participation. Although radio may play or may not achieve the best impact possible, it is important that service providers and existing extension systems develop ways of improving information exchange using ICTs in a participatory manner. FAO (2000) says that in extremely remote areas, most rural people have access to not only radio, but increasingly to local-community based radio stations. Access to telephones has increased spectacularly in poor countries in this era since; rural people are becoming much less isolated from each other from access to sources of information.

2.4 Advisory communication

One of the communications for innovation strategies is advisory communication. According to Leeuwis (2004) advisory communication refers to the situation where a farmer goes ahead and seek information communication worker or extension (from the old perspective) in solving agricultural management problems. Advisory communication can take various forms depending on the media used and the spatial context. According to FAO (2008), national agricultural extension and advisory systems worldwide have undergone major changes during the past decades. These changes are due to several factors including success in green revolution in increasing world food supply; growth of commercial farm sector particularly in developing countries and trade liberalisation. However at the same time, there are nearly one billion small scale households in developing countries, with the vast majority facing ongoing problem of hunger, malnutrition and poverty.

In Uganda, agricultural extension and outsourcing of agricultural advisory services is being spearheaded by the National Agricultural advisory services (NAADS). The program has an innovative public extension service delivery approach With the goal of increasing market oriented production by empowering farmers to demand and control agricultural advisory services (NAADS secretariat, 2001). According to IFPRI (2007), based on observed differences across NAADS and non-NAADS sub-counties, it appears that NAADS is having a substantial positive impacts on the availability and quality of advisory services provided to farmers, promoting adoption of new crop and livestock enterprises as well as improving adoption and use of modern agricultural technologies and practices. However, despite the positive effects of NAADS on adoption of improved production technologies, no significant

differences were found in yield growth between NAADS and non-NAADS sub counties for most crops reflecting the still low levels of adoption of these technologies even in NAADS sub-counties, as well as other factors affecting productivity. Oryokot (2003) agrees with this statement when he says that the NAADS program is developing strategies for scaling up promising innovations in advisory service delivery. The target is to support networking among service providers in order to help address common needs of service providers by exploiting synergies, increasing access to information and improving resource utilisation for the good of the country. It should be noted that, using ICTs to connect communities such as farmers, researchers and all connected to agriculture and its practice would be very beneficial. ICTs are a big tool in advisory communication and are playing a big role in the researchers to communicate to each other and in scientific technical publications (science forum, 2009)

According to Rivera (2003), developing countries need communication policies which would aim to systematically promote rural communication activities especially interactive radio but also other successful media such as tape recorders and video instructional programmes. He adds on that computers and internet may not be accessible but other devices such as mobile phones hold considerable promise for the transfer and exchange of practical information. This confirms Leeuwis (2004) argument when he says that it is important that advisory organisations have a variety of clearly announced modes through which they can be contacted for advisory communication. The extension organisations in Rakai district shall be in position to get different formats of information and knowledge messages communicated with a wide range of ICTs whereby radio and mobile phones should be considered most. Rivera (2003) confirms this when he goes on to say that from reaching the final agricultural and basic needs information users in rural areas today, radio is the most powerful and cost effective medium however, other traditional and modern communication methods are equally valuable depending on the situation and availability.

2.5 Advisory service systems

Agriculture advisory service system is moving from situations which demand is determined by public sector (e.g through the Training and Visit system), to a system in which other stakeholders (notably NGOs) but also farmers groups and organisations are influencing the agenda of the overall system (Heemskerk et al, 2007). Van de Ban and Hawkins (1996 p. 169) says that advisory systems can include support systems and expert systems. Resource poor farmers in some countries also benefit from agricultural advisory services to develop their ideas into 'business plans' to receive information. With the increasing improving communication technologies, farmers are in position to demand what services they need, In this new context, service provision is no longer solely determined by available supply or try the government, but by increasingly by the users. In this aspect of, communication between advisory service providers and farmers is quite important. The acknowledge that farmers have relevant knowledge, operate in unique local innovation systems and set their own priorities for development and livelihood plans is slowly leading to changes in the attitudes of public stakeholders and agricultural service providers (Heemskerk et al, 2007)

Table 2. 1 showing the provision of agriculture advisory services by category

Provider of the service	Public sector	Private sector: Farmers	Private sector: Companies	Third sector: NGOs	Third sector: FBOs
Public sector:	(1) Public sector advisory services, no fees different degrees of decentralization	(5) Fee-based public sector advisory services	(9) Private companies contract staff from public sector advisory services	(12) NGOs contract staff from public sector advisory services	(16) FBOs contract staff from public sector advisory services
Private sector: Companies	(2) Publicly funded contracts to private service providers	(6) Private sector companies providing fee-based advisory services	(10) Embedded services: Companies provide information with input sale or marketing of products	(13) NGOs contract staff from private service providers	(17) FBOs contract staff from private service providers
Third sector: Non-governmental organizations (NGOs)		(3) Publicly funded contracts to NGO providers	(7) Advisory services agents hired by NGO, farmers pay fees	(11) Private companies contract NGO staff to provide advisory services	(14) NGOs hire own advisory staff and provide services free of charge
Third sector: Farmer-based organizations (FBOs)		(4) Publicly funded contracts to FBO providers	(8) Advisory service staff hired by FBO, farmers pay fees	(15) NGOs fund advisory service staff who are employed by FBOs	(18) FBOs hire own advisory staff and provide services free to members

Source: *Source:* Birner et al. (2006: 18), adapted from Anderson and Feder (2007, p. 8).

Demand driven extension involves a shift from public sector extension delivery to a negotiated system through which farmers and rural community members determine and identify their own needs (Richardson, 2006). This might be the case but it should be noted that as the agriculture sector becomes more commercialised, there is a worldwide trend

towards shifting more the cost of extension and advisory services to the farmers themselves or, in effect to privatise specific advisory activities and services. While commercial farmers can and will pay for these technical and management advisory services, it is more difficult to shift these costs to small scale poor farmers (FAO, 2008)

Oryokot (2003), says that the issues that must be addressed in all ICTs in the use for provision of agricultural advisory services concern; skills development, timeliness of information, cost and mechanisms for feedback. I agree with Oryokot because when information is provided not in time it might be irrelevant to the users and there is always a need for a feed if the information communicated in to be effective. ICTs must be seen as providing tools and means to access specific information types.

As extension organisations struggle to achieve this, it should be noted that demand driven advisory services emerges when farmers are motivated, have reliable profitable market opportunities and have adequate organisations to formulate their demands. However in rural areas, communication needs and available channels are facing tremendous changes through structural transformations: subsistence oriented farming remains the basis of food security especially in disadvantaged area.

According to FAO and GTZ (2006), the availability of new information technologies and media like the internet, rural radio, mobile phones and TV, open more channels for communication and give chance to a wide access to information and to a limited extent the interactive communication. Forno (1999) says that traditional media and new ICTs have played a major role in diffusing information to rural communities and have much more potential. There is a need to connect rural communities, research extension networks and provide access to the much needed knowledge technology services .Munyua (2000) argues that traditional media has been used very successfully in developing countries and rural radio in particular has played a major role in delivering agricultural messages. Print media, video, television, films, slides .pictures, drama, dance, group discussions, meetings, exhibitions and demonstrations have also been used to speed up the flow of information. New ICTs however, have the potential of getting vast amounts of information to rural populations in a timelier and cost effective manner and could be used together with traditional media.

Traditional communication channels have been used successfully but these have been monologic and have not allowed for much interaction with users. Radio for example has been very effective for disseminating information to all types of audiences, but broadcasting times are not appropriate for most people but radio could be linked to internet (Munyua 2000). In case of Rakai district, internet connectivity is still very limited but the convergence of radio and mobile phone where farmers can call in during radio programmes can be of good use in information dissemination hence in improving communication.

In case of Rakai district, with the current trend of reducing extension workers in line with the government policy of outsourcing agricultural advisory services, there is a need to consider Engelhard (200) argument that farmers will become more and more able to access any information on their own but what is important now is the accessibility to modern ICTs. Once the communication gap is bridged poverty reduction can be realised

2.6 Service provision by advisory services providers

2.6.1 Radio

With the advent of low cost FM-transmitters and receivers, local radio stations were set up in remote areas of many developing countries. Community driven and above all local, these stations were distinct from their predecessors because of proximity to their communities which enabled them to be used for participatory communication (Gerard, 2003). The frequency modulated (FM) radio stations, which are mostly private sector initiative, has become handy tools in improvement of small scale agriculture in rural areas. Munyua (2007) goes on to say that the initiatives by Panos institute of West Africa (PIWA), FAO, UNESCO and CTA among ones have demonstrated the convergence of radio and internet technology and how this technology can provide new opportunities for rural development.

Though radio is popular to the rural people, sometimes the development aspect is missing (inter media, 2005). Music dominates the programmes and entertainment surpasses education and information dissemination where by majority of people listen to entertainment or political programmes making agriculture and rural development less important. Van de ban (1996) also argues that Radio is much cheaper and will be effective when information need not to be presented visually.

The challenge for Agricultural communicators today is develop package messages and content that appeal to their target audiences.(Farm radio international,2008).Though broadcasters need to develop relevant content, but they also need to be concerned about whether or not farmers listen to their programmes. In order to enhance this, radio need to be linked with new ICTs. Oryokot (2003) argue that the proliferation of FM radio stations and the expanding mobile phone connectivity in Uganda offers the opportunity for not only advisory service providers, but also farmers to link to sources of information and knowledge. However, Ray (1998) says that, accessibility of farm radio depends on the extent of radio ownership, the reception of radio signals understandably of the message and convenience of listening time. Though in Uganda radio accessibility is increasing but other problems are associated with radio. According to Intermedia (2005), many stations lack quality programming. Stations try to cut across education, informational and entertainment needs, but often its entertainment that dominates. Even on many stations, programmes tend to be full of drama created by comical presenters with lack of systematic flow of programme to programme. Now with the advent on mobile phone, the interactivity of the two ICTs is of more importance to advisory service providers.

2.6.2 Mobile telephony

According to e-agriculture policy brief (march 2009), mobile telephone offers some unique opportunities which include providing a direct global communication channel to rural communities and extending the impact of established rural media such as rural radio, making local content available

The mobile telephony is a reliable and timely communication channel in the content of markets, extension advice and also offers accessibility for illiterate users through videos and images. Mobile phone like all technology does face limitations including high costs, especially for the new generation handsets and limited networks and low band width in some rural areas. There is also limited capacity of the rural people to use the technology particularly complicated ones and low awareness of the technology benefits. However according to Munyua (2007),the cellular phone is now being considered one of the most emerging ICTs that has not only revolutionised the manner in which business is transacted, but also enabled a large constituency of agricultural producers to access markets and

market information using phone-in and short message service (SMS). According to CTA ICT update issue 50 (2009), SMS service in particular, has become extremely an important way to send and receive information. These SMS are simple, convenient, and affordable and they are (usually) free to receive

Gakuru et al (2009) says that among the new innovative ICTs in provision of agricultural advisory services include radio dial-up. This system allows farmers to ask questions and through SMS of calling in during radio programmes. Monitoring the impact of the impact of rural mobile telephony in the agricultural sector requires better understanding of the farmer's context for the adoption and adaptation of innovative information tool. The interaction between mobile phone and radio has already been tried in Uganda and according to Oryokot (2003), the NAADS programme in has employed the radio as one of the key channels for communicating NAADS messages. The radios were chosen on the basis of regional distribution and the popularity and listenership. In order to make the radio programme more interesting, the target audience call in. The NAADS call –in programmes are very popular because writing and calling in allow people to voice their concerns, questions and ideas. Radio phone-ins have also been easy by the recent growth and expansion of mobile phone coverage across the country.

In Rakai district, the extension service has also taken advantage of the expansion of the mobile phone technology to communicate particularly urgent messages. However, according to science forum (2009), there is a need to improve communication infrastructure and band width, investing in lower cost hardware, software and applications that connect science right along the development chain. Also there is a need to increase and improve formal education and training in information and communication science that contributes to innovation in the use of new ICTs in agriculture.

Based on the potentials of the two ICTs of radio and mobile phone in the provision of agricultural advisory services to farmers, one main research question for the research was formulated as;

How can the potential of Radio and mobile phone be strengthened to communicate agricultural information between advisory service providers and their clients?

To answer the main research question, four research sub-questions had to be explored and these are:

- What is the level of availability of the communication technologies of radio and mobile to rural farming communities?
- To what extent are advisory services providers currently use radio and mobile phones in development of advisory messages?
- Which one among the technologies of radio and mobile phone can be used more effectively in reaching farmers with timely agricultural information?
- How can the radio and mobile phone be converged to enable effective communication of advisory services?

CHAPTER THREE: RESEARCH PROJECT

This chapter describes the research strategy for conducting the research and it includes the description of the research areas, the methods of data collection used and how the analysis was made.

3.1 Research strategy

This research aims to explore the potential of mobile phone and radio can be integration to increase their effectiveness in communicating agriculture information between farmers and agricultural advisory service providers in Rakai District.

This exploratory study was undertaken in Rakai district between July and August 2009. The researcher used his professional experience and personal connections in the area to open up the research issue with the district production department which is responsible for provision of extension service in the district. The research wanted to explore the potential of rural communication and the provision of agricultural advisory services. The advisory service system had to be tackled during the research and the system included the service providers, the clients (farmers) and the service provided. All these players which were to be consulted during the research and this helped him to design the strategy.

The first key players were the farmers who receive the and utilize the agriculture information (services) through different channels and different ICTs, the agricultural advisory service providers (ASPs) who communicate the information (service users) using the ICTs and other traditional methods like training and Visit (T&V), these service providers has been locally known as extension workers until recently when the extension service was transformed. But from time to time this title shall use mainly referring to government service providers. Other players included the radio producers who design extension programmes to be presented to farmers. These people have a role to play in communication since the extension workers are more technical in the content to be presented but the delivery mechanism is mainly done by radio producers. The last category of stakeholders considered were the district senior staffs who head the production department. Being the policy makers they determine which communication channel to use in the communication of agriculture information.

The study was started with a desk study and followed by field work. The desk study involved reviewing literature and theoretical concepts. The field work was to assist the researcher in the practical aspect of verifying the theoretical concepts about the use of ICTs in the provision of agricultural advisory services there relations with agriculture knowledge information system and accessibility and interactivity of radio and mobile phones in the research area.

The researcher had worked with the Rakai District Training and Information centre (DATIC) which was a training and information centre. The researcher made a case study of a workshop as a strategy to meet all the key players in one place at the final phase of data collection. During the preceding weeks, observations, group discussions, and interview were conducted and this helped the researcher to get the scenarios which were to be discussed during the stakeholder's workshop.

Scheduling the workshop was possible because the researcher had interacted with the key players before during the observations and these service providers were interested to be part of the research. The researcher collected their mobile phones and sent SMS invitations for the workshop. Though the researcher was not a staff of the production staff, his previous

interactions with the district officials during different training sessions and the district agricultural stakeholders forum which took place at the district headquarters during the period when the research was being carried out, helped the researcher to meet and schedule interview the three (3) district key informants which included the district NAADS coordinator, The District production coordinator and the District information officer.

For the farmers groups, the selection was made among the NAADS farmer groups since all the sub counties are under NAADS program Eight (8) farmer groups were selected two from each sub county in the study area. The study areas were the most rural in terms of communication. The area has no electricity with a hilly terrain and poor road network but with a lot of agricultural production activities. The farmers in these areas has less access to extension workers and ASPs due to their physical location.

For extension workers and ASPs, two were selected from each sub county one representing government and another from the private sector (notably NGOs and CBOs). Although the researcher had been a staff of DATIC, he took time to study the documents in the resource centre on the centre because for the period he had been away so many changes had taken place including the change of ownership from Danida who were the funders to direct responsibility of the District production department.

3.2 The research area

The study was carried out in Rakai District which is located in southern Uganda about 200km from Kampala the capital city. The research area was the 4 sub-counties of Rakai district namely Kyebbe, Kifamba, Dwaniro and Kyalulangira. The two sub counties of Kyebbe and Kifamba are located in Kakuuto County while Dwaniro and Kyalulangira are located in Kooki County. More description of the district administrative structure shall be given in chapter 4.

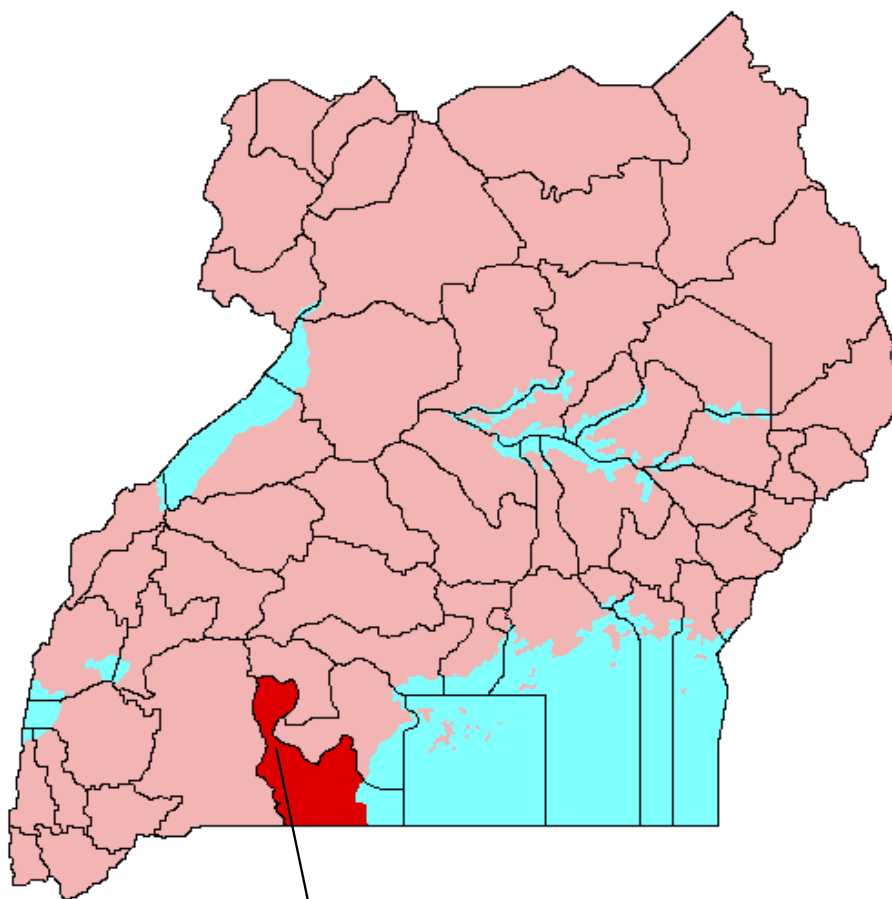


Figure 3.1 Map of Uganda Showing Rakai District and research area

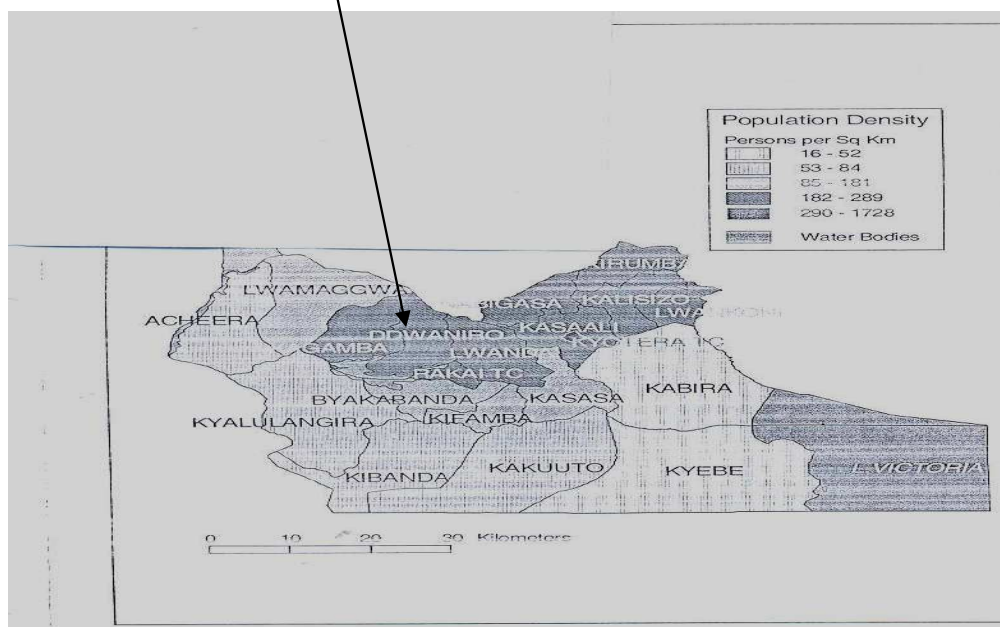


Figure 3.2 Map of Rakai district showing research areas

3.3 Data collection

The data collection process integrated multiple participatory methods. The methods are sequenced in such way that the outcome was used as an input for the next chapter of results. The methods include; observations, interviews, focus group discussions and a stakeholder's workshop.

3.3.1 Observations

The observations were done throughout the data collection period. The observation was done on farmers, extension workers and advisory service providers. During observations, visited private agricultural advisory service providers' locations mainly agro-input suppliers and offices and chatted with ASPs. From the observations, the researcher was able to obtain information related to the channels used by service providers to access information as well information gaps and communication inadequacies

3.5.2 Interviews

The researcher interviewed three key informants (n=3) in the district production department and these included the district production coordinator, the District NAADS coordinator and the district information officer. These informants were able to provide information on the current use of ICTs in the district, the level of ICT use and the district plans and policies on the promotion of ICT use in agriculture extension. In addition to information's obtained from the key informants, the research the researcher listened to radio programmes on the local radio, interacted with radio producers of agricultural related programmes, and discussed them the programmes they broadcast and how they are programmed

3.5.3 Focus group discussions

Focus group discussions were carried out in 4 sub counties with a total of 8 farmer groups (two from each sub-county) were involved. The four sub counties were selected from two counties of the district which are the most rural and inaccessible for service providers. Two farmer groups were selected from each sub county randomly and this was done to obtain balance views. The focus group discussions provided information on level of ownership of radio and mobile phones, the type of information assessed through radio and mobile phone. The farmers also gave their perception on how the convergence of radio and mobile phone can strengthen agricultural information communication

3. 5. 3 Scenarios

Using the information collected, general trends and factors affecting accessibility and use of radio and mobile phones in the provision of Agriculture advisory services were to be identified. These factors and trends were used as a source of scenario writing in the context of ICT use in Rakai District. The scenarios were put to discussion during the stakeholders workshop and they formed part of the research discussion in Chapter 5.

3.5.4 Workshop and Scenarios

The workshop was intended to bring all stakeholders together. The stakeholders included; Farmer representatives, private service providers, radio producers and district extension staff. The workshop as intended to discuss the way forward in the integration of radio and mobile phone in improving communication between agricultural service providers and farmers. The workshop was also used to discuss and develop after studying a scenario on the future of radio and mobile phones in provision of agricultural advisory services and

develop a strategy on the use of the two ICTs by the year 2025. A second scenario was developed after the workshop and it will be presented in chapter 4 and discussed in chapter 5

3.6 Data analysis

The data collected from the focus group discussion, interviews of key informants and observations and discussions of the stakeholders workshop was analysed separately and compared with the literature reviewed. Basing on the description of theoretical concepts, the outcomes were discussed in chapter 5 before conclusions were drawn.

CHAPTER FOUR: RESULTS

This chapter presents the results of observations, interviews, and discussions conducted during the field work and other relevant studies. It begins by introducing the research area, and presents the results in relation current ICTs used in Rakai district by focusing on the accessibility, ownership and use radio and mobile phone in the provision of agricultural information by service providers in Rakai district.

4.1 Overview

The area for the research was Rakai district Rakai district is located in the south western region of Uganda, west of Lake Victoria. It lies on longitude 31s E and Latitude 0s south. Its southern boundaries are part of the International boundary between Uganda and Tanzania. It is boarded by Masaka District in the East, Kalangala District in the south East, Lyantonde in the North and Isingiro in the Southwest. The district headquarters located in Rakai town which is located about 190kms from Kampala the capital city.

Rakai district is comprised of three counties; Kooki, Kakuuto and Kyotera. The counties are comprised of 18 sub counties and 3 town councils. The research was carried out in two of the three counties and in the four sub-counties. The first two sub counties are located in Kakuuto county namely Kyebe and Kifamba, and the other two sub counties from Kooki included Dwaniro and Kyalulangira. The two counties are the most rural with poor communication attributed to hilly terrain and lack of electricity.

Rakai district is a decentralised district hence known as Rakai district Local government. The district has 5 departments namely: Finance and planning, Production and marketing, Health, Education, works and water and sanitation. The district is head by a chairman and all civil servants reports to the Chief administrative officer (CAO)

The farming community in Rakai District (Clients)

About 96% of the population in Rakai district are rural, a situation which reflects the basically agricultural nature of the district economy. In rural environment, settlement, patterns vary depending on a number of factors such as climate, vegetation, water supply, and terrain and soil fertility. Kakuuto county is the least densely populated with about 60 people per square Km. The total population of Rakai District is 404,326 Of which 51.20% are females. (2002, population and housing census.)

Agriculture is the main economic activity and majority of farmers are subsistence farmers using rudimentary tools with minimal modern farming techniques. They grow seasonal crops like beans, maize, and ground nuts. They also grow annual crops like Banana and coffee. Other economic activities include livestock farming which is the second important activity with cattle goats, sheep and poultry. There is also fishing mainly in kakuuto and kooki counties. (Rakai District profile ,2008).

The overall literacy rate of the district is 57.95 %(29.7% male and 30.2% female.) The district has a total of 92,160 households with 793 which are child headed, 599 headed by men and 194 headed by female (population and housing census, 2002)

The gender dimensions of poverty differ among women and men in Rakai district. This is attributed to different livelihood strategies for men and women in communities. Men tend to do more less agricultural activities than women who do much of the cultivation .Rakai district

also has a problem of market access to its agricultural produce being far from the capital Kampala

4.2 Rural advisory services

Infrastructure

Rakai district is covered by four main telecommunication companies who offer mobile telephone services and these include: Mobile telephone network (MTN), Zain Uganda, Warid Telecom and Uganda telecom (UTL) the network coverage varies with MTN having the biggest coverage followed by Zain and Uganda telecom respectively. Warid telecom has very limited coverage mainly in town and Orange is almost nonexistent being a new company launched in 2009. The district has access to six news papers two of which are available in local languages and four in English.

Table 4.1 *News papers accessed in the district (n=6)*

News papers	Language	Rate of publicity	Percentage of readers (%)
The New vision	English	daily	27
The Daily monitor	English	daily	35
Bukedde	Local language	daily	20
Orumuri	Local language	weekly	10
The weekly observer	English	Bi-weekly	6
The red pepper	English	daily	2

Source: district information office

Table 4.2: **Mobile Telecommunication Network**

Telecommunication network	Coverage %
Uganda telecom(UTL)	14
Mobile telephone network(MTN)-Uganda	50
Zain Uganda	30
WARID telecom	5
Orange Telecommunication	1
Total	100

Source: field work

The district accesses more than 10 FM radio stations. Among these, 8 of them are the most prominent. The district administration office has access to internet but limited to only one computer used by the district planner and the district information officer. During an interview with the District information officer, he said that, his role is to advise district staff on information dissemination. However, he is rarely consulted by the production department during planning meeting for provision of agricultural information. The district uses e-mail service when communicating to the central government but uses the traditional channels of communication while communicating to rural farming communities. The methods used include; writing letters and face to face communication. Sometimes Radio announcements are used if the information to communicate is urgent. The district has a radio programme on

Radio Buddu called “*Muna Rakai*” on one of the nearest local radios. The radio programme is not regular and goes on air only when funds are available. This Radio programme is mainly used by the political wing of the district in mobilising the population for different community activities.

Table 4.3 Radio stations in the district.

Radio station	Type of coverage	category
Central broadcasting service(CBS)	Regional	Commercial
Radio Buddu	Local	Private
Star Fm	National	Government
Uganda Broadcasting service(UBC)	National	Government
Mbabule FM	Regional	Private
Voice of Africa	Regional	Religious
Radio West	Regional	Private
Grace Radio	Regional	Private

Source: District information office

4.3 Agricultural service providers

In order to integrate farmers, agricultural educators and extensionists, the district has a directorate of production and marketing. It comprises of the District Agricultural office, the veterinary department, the District Agricultural Training and Information Centre (DATIC) and the NAADS programme.

The production department

This directorate is responsible for the provision of agricultural extension and advisory services, is divided into three departments: The Agricultural office, the veterinary office and the natural resource management. It's under the production department that the NAADS subsection is located. The production department also supervises a semi autonomous department of District agricultural training and information centre (DATIC).

The production directorate has access to internet connection but connected to one computer used by the district production coordinator. The main communication between farmers and extension workers is still traditional which involves farm visits, demonstrations and small group training. According to the District Production coordinator, all extension workers have mobile phones which they use for personal communication and communicating various messages to farmers mainly during mobilisation for training. The main method of communication used by farmers has been method demonstration. The department rarely uses radio as a means of communication due limited funds. The information from the production department indicated that the department has one radio programme sponsored by the NAADS programme as the one by the district (*munna Rakai*) is not regular either.

The NAADS Programme

The NAADS Programme is implemented in collaboration with the three departments of the production department i.e agriculture, veterinary and DATIC. The programme overall mission is “*Increased farmer access to information knowledge and technology through effective, efficient, sustainable and decentralised extension with increasing private sector involvement in line with government policy.*” Among the pillars NAADS addresses include:

- Having an active listening function through radio and phones to ensure stakeholders have the opportunity to ask questions and take ownership over the programme.

- Training service providers and farmer organisations in how to access agricultural information and how to translate into formats and media that can be used for training and learning of farmers

According to the District NAADS coordinator, the programme uses three main channels of communication; Radio, mobile phones and the traditional ones of group meetings method and result demonstrations and study tours. He also says that, radio could be more effective but they don't have enough funds to run radio programmes regularly. However when the programmes are on air, they encourage interactive communication whereby they invite farmers to participate during the radio programme and share their success stories with other farmers. However, usually extension workers are given more time to answer farmer's queries. He added on that the radio interaction is limited due to the limited airtime available for the radio programme. He emphasised that mobile phones are widely used between extension staff and farmer group leaders mainly in mobilisation of farmers but rarely used in delivery of advisory messages. He attributes this to lack of skills to use mobile phones even by extension workers themselves. However he is optimistic that the network coverage of mobile phone and access to phones has greatly improved

On the capacity of extension workers to use ICTs, the NAADS coordinator says:

"If any organisation can help us to train our extension staff in use of various ICTs, our communication shall greatly improve"

During an interview with the radio producer of Radio Buddu, he said that they have radio programmes which is available by the radio in support of agriculture and rural development. He said there are other radio programmes sponsored by different organisations both public and private. He cited NAADS being one of those organisations. He also said that the problem is that the programme is not regular. When asked about how long are the programmes, he responded that radio programmes related to agriculture and rural development last between 30 minutes and one hour. However, entertainment programmes last for two hours and more. The reason why entertainment programmes have more airtime is because they are sponsored by companies which sell consumer items like beer and they tend to have more funds compared to Local government who are always cash strapped. However he noted that during radio programmes like the NAADS programme is on air, farmers listen and they call in during the programme but the calls are limited due to traffic and the available time being short.

The District Agricultural Training and Information Centre (DATIC)

Rakai District Agricultural Training and Information Centre was a semi autonomous department of production and marketing. In the last one year, DATIC has undergone transformation which led to phase out of Danida funding and being taken over by the district administration. According to its policy guidelines, the centre is mandated to produce three main outputs and these are:

- Training and information centre which is responsible for planning and conducting farmers training at and pro
- Expansion and improvement of agriculture education. This includes a Farmer school which conducts training for youth who come and train at the centre and obtain a young commercial farmers certificate.
- Strengthening linkages between research, DATIC and advisory services.

The centre is equipped with six computers and none is connected to internet. The centre also has a resource centre with Agricultural journals, agricultural textbooks and newsletters. The centre's training relies mainly on traditional means of information dissemination of method demonstration, training and visit. The centre has seven demonstration sites two for livestock and five for crops. According to the records, the demonstration sites are visited regularly by farmers while the resource centre is rarely visited due to outdated information in it.

In order to disseminate information, the centre organises short training courses for farmers and refresher courses for agricultural advisory service providers. However, in the last three months, no course has been organised since the main funder of the centre handed the centre to the production department of the district. According to the District production coordinator, the district which has no f to sponsor such courses yet the farmers and service providers don't have capacity to pay for the courses.

The centre tried to initiate a radio programme but this was done once in the last five years. The programme intended to sensitize the public about the services provided at the centre, but due to lack of funds, the funds this arrangement with the local radio programme was closed. At the moment, the centre has no activity going on in terms of information dissemination apart from the maintenance of the training demonstrations.

When the question "Apart from radio and mobile phones what are other sources of information on agriculture" was asked during the farmer group focus discussion, 12.5% of respondents mentioned DATIC as a source of agricultural information. This agrees with FAO and GTZ (2006) statement that "poor linkages between research-advisory services to farmers and to ineffective technology delivery systems including poor information packaging, inadequate communication systems and poor methodologies can be a problem in AKIS.

Though Rakai DATIC is an 'Agricultural training and information centre' of the district, it has done much of the training but little communication has taken place when you analyse the results of this study.

4.4 ICT accessibility and ownership

The research investigated the factors of ICT accessibility and ownership taking into account the gender element. The researcher indicated that most female respondents did access radio or mobile phone but did not own it. This was the trend and it does not differ from the Country perspective. In Uganda most households are headed by men. This means that the husband is the head of the household hence he has a greater say in all home affairs. Hence this has a further implication whereby the female partner may not be able to decide which programme on radio that may be listened to given that the radio set is in total control of the husband. During the focus group discussions more females attended more than males hence the reason why many respondents said that they access the radio but do not own any.

According to table 4.4, the research indicated that 48.6% of the respondents do own a radio and the from this study that 100% of farmers in Rakai district have access to Radio and 88% have access to mobile Phones (table 4.4). The study found out that, although the agricultural advisory service providers in Rakai district strive to communicate agriculture information through traditional means of extension, accessibility to radio is high. However the farmer does have to use radio as a means of obtaining other types of information ranging from entertainment to politics and other social information. From the research it was also found out that 88% of the farmers have access to mobile phones. But mobile phones are not used for accessing and sharing agricultural information but other non-agricultural information and

communicating with others about other social issues. It was found out that farmers get information from their fellow farmers through group meetings, exchange visits than training workshops organised by service providers.

Table 4.4 Showing ownership and accessibility of radio and mobile phone

Sub county	Own radio	access radio	Own phone	Access phone	Limited phone access	Totals
Kifamba A	8	4	7	1	4	12
Kifamba B	4	7	4	7	-	11
Dwaniro A	3	4	4	3	-	7
Dwaniro B	7	1 4	6	14	1	21
Kyalulangira A	5	6	3	8	-	11
Kyalulangira B	3	6	6	3	-	9
Kyebe A	8	8	8	6	2	16
Kyebe B	13	5	5	7	6	18
Totals of farmers	51	54	43	49	13	105
Percentage of farmers	48.6	51.4	40.9	46.7	12.4	100

Source: field work

4.4.1 Accessibility and use of radio

From the focus group discussion with farmers, it was found out that 48.6% own radio sets and 51.6 % access and listen to radios in their homes. This means that 100% of farmers in Rakai have access to radio. However, as elaborated above, accessibility does not mean control and use. 70% of the respondents said that they listen to agriculture related programmes while 20 % said they listen to politics and family issues. 10% said they don't listen to any agriculture related programme and they only listen to music and sports. Therefore the issue of accessibility does not automatically lead to good use of radio as a communication tool but other variables like the type of programme broadcasted and ownership also has an impact. Many respondents said that despite of accessibility to radio, they lack control on the programmes of interest for example, a wife will definitely fail to listen to her favourite programme as long as the husband has the control of the gadget.

From the focus group discussions with farmers, the use of radio varies from individuals. The farmers said they use radio for a number of uses which include listening to development related programmes, announcements, family issues, politics, market information, agricultural

programmes and sports. From the research, 70% of the respondents said they listen to agriculture and development related programmes, 20% they listen to politics and family issues while 10% don't listen to agriculture or development but they listen to sports and entertainment programmes. The number of hours spent listening to radio also has an impact to the effective use of the radio. From the research 50% of the respondents said they listen to radio for about 7 hours a day and 50 % for about 4 hours a day (Figure 4.2). This listening does not mean active listening (looking for particular information) but it also included passive listening (for relaxation purposes) and for entertainment. Women responded that they usually listen to radio while cooking while men listen while drinking in the evening.

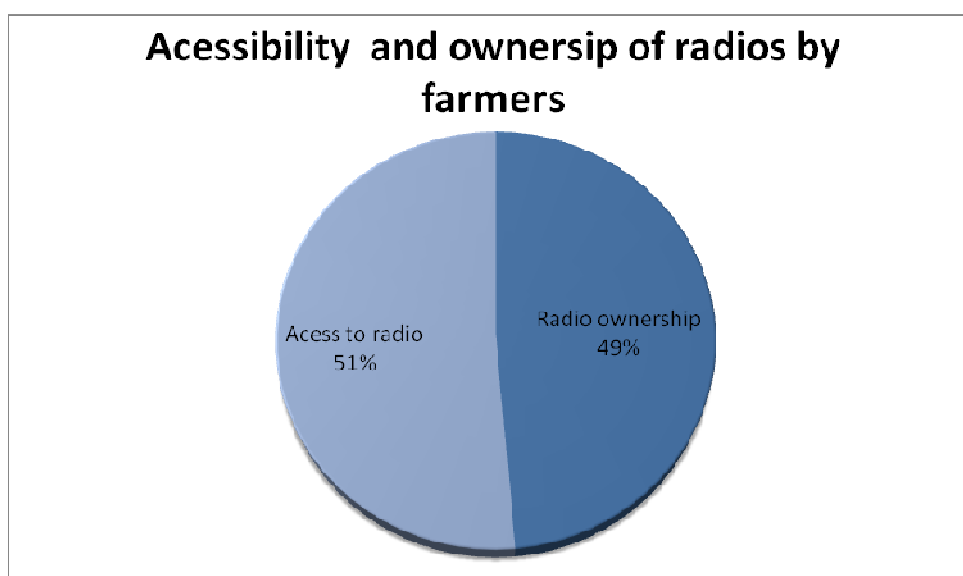


Figure 4.1 Showing radio accessibility and availability to farmers (Source: field work)

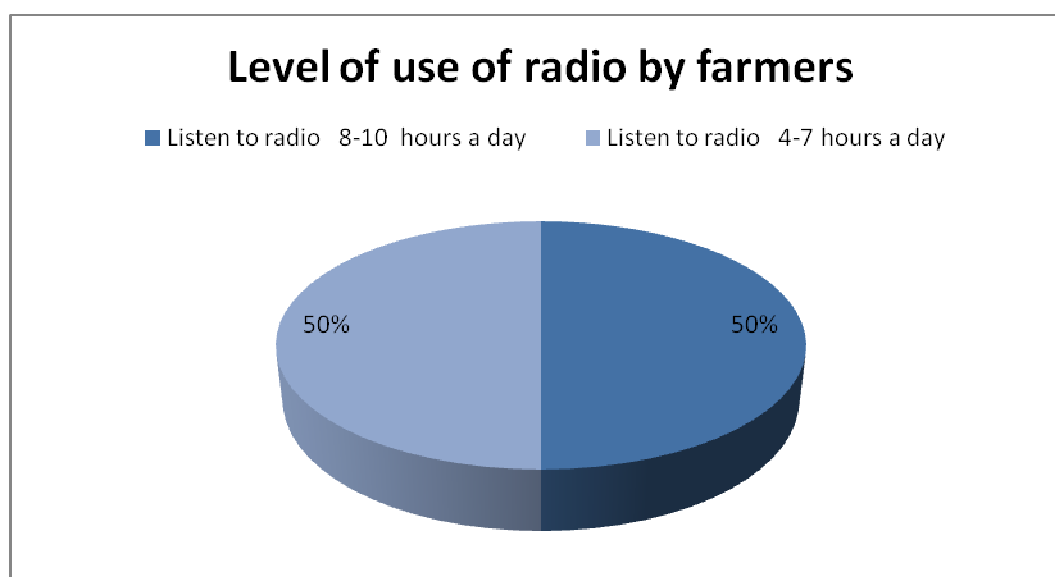


Figure 4.2 Showing Source: field work level of use of radio by farmers (source: field work)

The respondents who said that they listen to radio more than 10 hours a day were men and they do so in the evening and at night while in bed. Some go with the radio and listen while

they work not necessarily in the garden and also early in the morning, and some do listen while in their gardens. However on average, a radio owner listen to radio for an average of 7.5 hours a day.

Though farmers listen to radio programmes, 48% said they don't know the specific time for agricultural related programme on radio but they just get them by 'luck'. Only 12% were able to name the exact radio programme on a specific radio and time for the programme. When farmers asked to name the programmes they have interest in, 78% named none agricultural programmes being their best programmes on radio. This trend also means that it's not the matter of ownership or accessibility to radio which determines its effectiveness but also other factors like type of programme and its time of radio. Some farmers listen to radio but only during specific times and if the programme which carries the information they need is not programmed at such time, they are bound to lose it.



Figure 4.3: Photograph of Farmers discussing after listening to radio programme

4.4.2 Accessibility and use of mobile phones

Access to mobile phone in this context means that a person had proximity to use a phone either from a family member or a neighbour. When the phone was available for more than three households then the accessibility was considered less to be limited. The research found out that, although the areas where the research was carried out is remote, 41% of the respondents own mobile phones, 47% having access to phones and 12 % of the respondents have limited access. (Figure 4.2). The respondents said that they use mobile phones for a number of uses including: communication with fellow farmers and share information. Obtaining market information and communicating with family members who stay in towns. The farmers noted that the mobile phone saves money in terms of transport and this has been most effective during funeral ceremonies where quick communication is more important to many people. The district information officer had also earlier noted that death

announcements had tremendously reduced due to the use of mobile phone where family members call each other or send short message service (SMS).

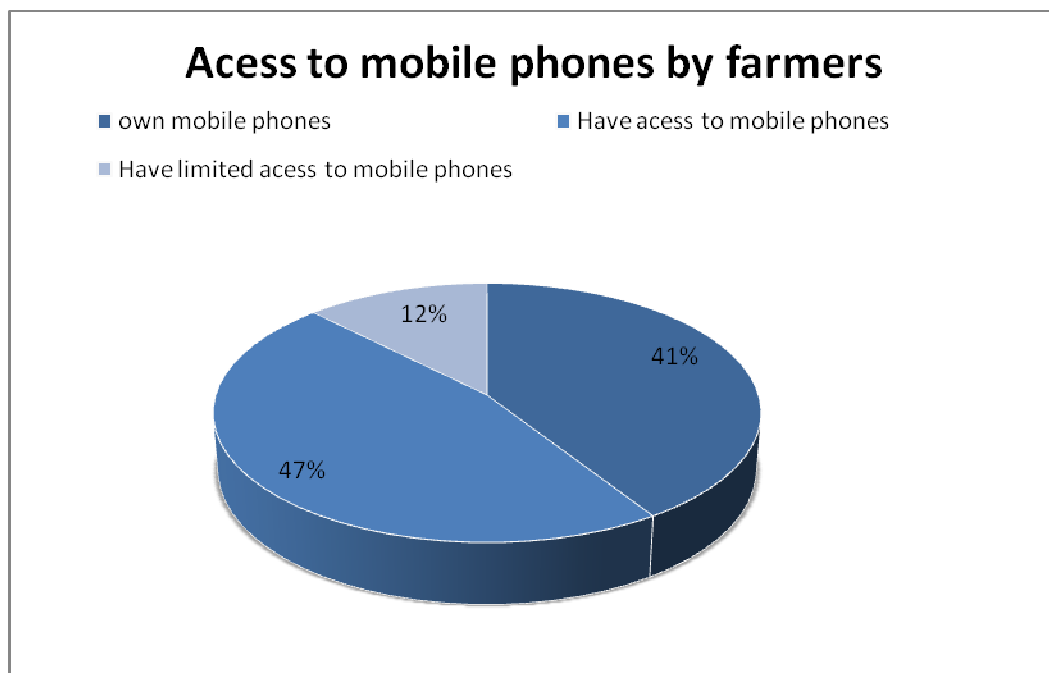


Figure 4. 4: access to mobile phones by farmers (Source: field work.)

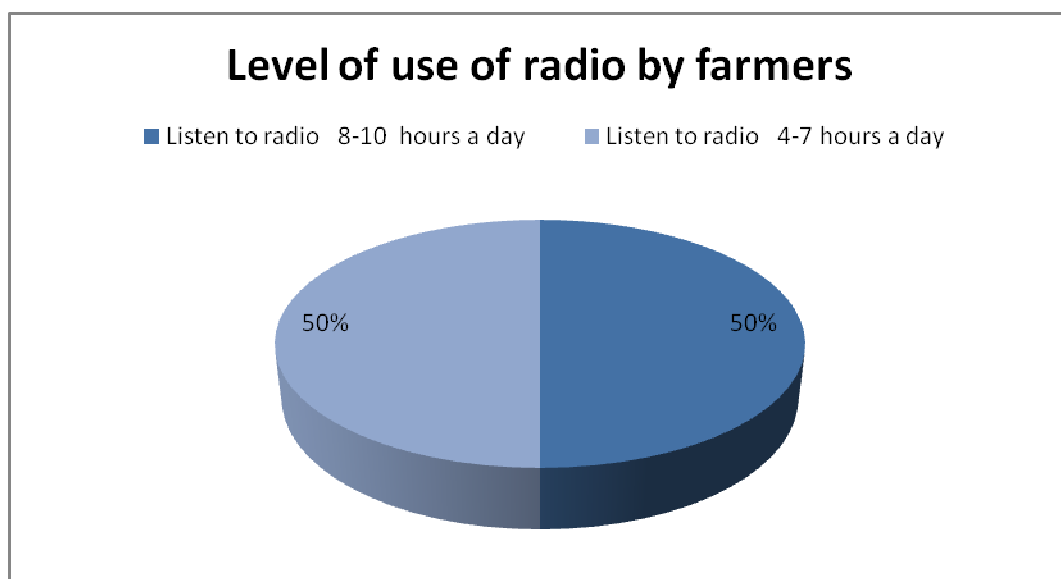


Figure 4.5 Level of use of radios by farmers (Source : field work)

As presented in figure 4.5, 49% of the farmers use the mobile phone at least 3 times a day while 38% said they use it for at least twice a day. This indicates that farmers not only access mobile phones and use them for different communication needs.

Considering the above findings, accessibility to the services is less a problem compared to utilization of the technologies for effective by the farmers. What looks to be missing is what

information is available. It had been cited in the introductory factor that, despite the availability of ICTs, the district still uses the traditional methods. Such methods may no longer be popular with farmers hence the reduced attendance of farmers during training sessions.



Figure 4,6 shows farmers displaying their phones (Source: field work.)

Rakai district the research area in particular, is geographically made of rugged hills and valleys covering a greater area of the district. Communication channels would be supported by a good road network as well as other social and economic infrastructure which is missing. Road transport has become expensive because of poor roads and the high fuel prices. Therefore the emergence of the mobile phone communication gadget has revolutionized communication and saves time. It takes very little money perhaps quarter a dollar to make a phone call to one person which would previously have made a thousand shilling for travel expenses.



Figure 4. 7: Photograph of a farmer communicating on mobile phone

4.5 Role of Radio and mobile phone in advisory communication

During the stakeholder's workshop, agricultural advisory service providers said that, farmers listen to radio programmes which are provided by different organisations. Rakai district has very few such programmes on radio due to insufficient funds. The Extension workers added on that radio would be effective in delivery of information as farmers listen to radio programmes where private service providers like agro input suppliers of inputs like fertilizers, seeds and agrochemicals announce prices and also other information about their use. Also through radio, the government gives farmers updates on weather forecast so that they plant in time.

Currently in Rakai district, there are two constraints for accessing information. The constraints include long distance to training venues and few extension workers who can't reach all the farmers, and the duplication of information by service providers. From subsection 4.3 it was noted that farmers have access to radio and mobile phones and what is missing is relevant information and how to access it.

One farmer angrily said during a plenary session that;

"We stopped going for training session due to duplication of knowledge by extension organisations and the long distance to the training venues"

Miss Nalugo mastula farmer from Kyalulangira Sub County adds on that:

"If the district can bring back our radio programme we can easily learn because for me am old and am finding it hard to walk all that distance to the sub county"

On the use of mobile phones the service providers said that mobile phone offers quick information delivery from extension workers to farmers and farmers usually call extension workers and private service providers to get advisory services. Also farmers usually use their phones to call during radio programmes where they obtain agricultural information in addition to what is provided by the district extension service. However, although there would be potential to use the radio and mobile phone in agricultural extension, the district extension service still use the traditional means due to the fact that funds to sponsor radio programmes are not available and even the extension workers still lack skills in the use of mobile phones in sending information to farmers. On a quick survey of extension workers, 90% can send SMS from their phones and only 10 knew how to send voice messages. Though 47% of the farmers have access to mobile phones the use of its functions is not satisfactory (figure 4.4)

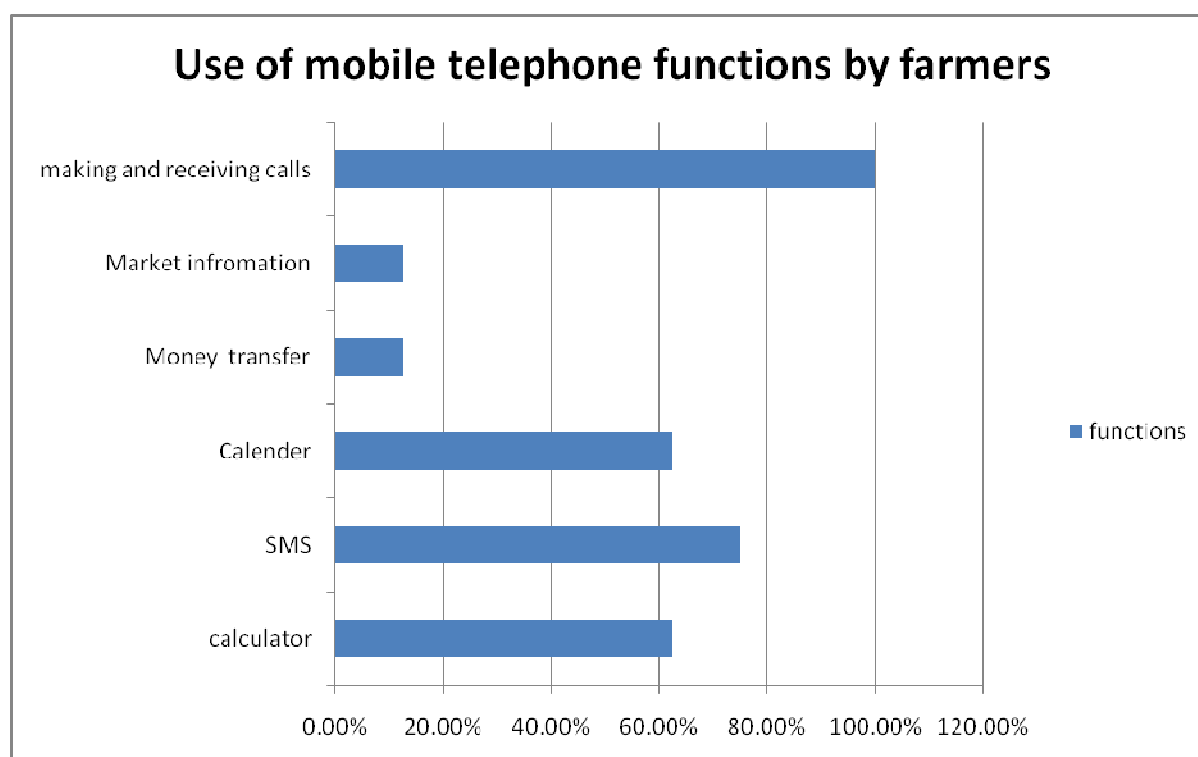


Figure 4. 8 Use of mobile phone functions by farmers (Source: field work)

During the research, farmers said that some of the constraints of accessing information also include uncoordinated information and little follow-up of what is taught. When radio and mobile phones are used, service providers can reach many farmers without making them to walk long distances but the information should be coordinated. Though 80% of the farmers have access to mobile phones but its use is limited to use of calendar and its calculator. Accessing market information and other agricultural information is limited even though 75% of the farmers who have access to phone know how to use SMS. One farmer noted that

“I have a phone and was taught by my son how to access and send sms but I gave up reading SMS because all those messages we receive are in English and i don’t know English. If they can help us make phone which use our language life will be easy for us”

On the issue of using mobile phones to communicate agriculture information, service providers said that farmers don't have capacity to access it. However, during the focus group discussions, farmers had said that they have received a number of sms on their phones about health programmes like immunisation and entertainment but agricultural messages are not existent apart from market information which is not always up to date. Many farmers said they even don't know how to access market information which needs specific codes unlike other messages.

The use mobile phone cannot be the only way improve the communication gap between farmers and service providers though it may have some potential. It was also noted though the district is covered by four mobile telephone communication networks, some areas have limited network coverage and the access to phones is limited. In hilly areas even radio reception is poor and they listen to specific radios only.

4.5 .1 The role Radio and mobile phone in provision of advisory services

Traditionally, farmers have been accessing information through social networks and broadcast media particularly radio. The spread of mobile phones in rural areas is substantially expanding affordable and timely access to relevant and timely information with positive effects for farmers and information providers. In addition, the two ICTs can be converted to make information access even more effective. (Munyua 2007)

During the research, farmers said that they need to interact with fellow farmers during radio programmes by calling in and share information. Nakamatte Joan a farmer representative from Kyebe says that;

"I also want to give my opinion to those extension workers so that they can also use my knowledge which I have gained during my 40 years experience as a banana farmer."

Unfortunately, this farmer says when he calls during the radio programmes, his call doesn't go through. During a discussion with Mweruka Pascal radio a producer from the local radio, he says that:

" we always need many farmers to call in but our ' machine' can only allow in two calls at a time keeping other callers out".

From the research findings on it was found out that, apart from the radio programmes sponsored by the district on the local radio, the radio also has a self sponsored programme dedicated to agriculture and rural development. This radio programme is called 'Twezimbe' and it lasts for one hour per day for five days a week from 10.00-11.00am local time. But it's not every day that they talk about agriculture; some days it addresses other development issues. In this programme, different agricultural extension workers are hosted and they allow farmers to call in and ask questions. On average every day 5-6 farmers call in and give their views on the topic of the day. During one programme one farmer calls in and says

"We also need to be hosted on radio and we also share our knowledge". When the researcher listened to this programme for five days, i only two callers out of 23 callers in a week are from Rakai district. The radio being located in Masaka district a district neighbouring Rakai district, though it serves 5 districts, farmers in Rakai district find it hard to access it.

The convergence of radio and mobile phones could be desirable in improving timely access to information more especially about transport arrangements and costs, about locations and

desires of buyers. It could also be of good use to issues such as weather forecast. During a focus group discussion, 65% of the farmers said that every Saturday they listen to a radio programme on Central broadcasting service (CBS) called 'Agafa mu Butale' which gives market information and allows farmers who are selling their produce to call in and announce what they are selling, their locations and their telephone contacts. The farmers who listen can call in later and inquire about the information they have received.

From the observations made, not only farmers utilise this kind of convergence of radio and mobile phones but also agro-input suppliers. Usually companies have radio programmes in which they give advice to farmers on how to use effectively the inputs they sale like seeds, fertilizers, agro chemicals and animal feeds. They also allow farmers to ask questions and at the end of the programme they give out their telephone contacts.

Good interactivity is still limited by a number of factors which include the high cost of connectivity (airtime) for mobile phones. This is even made worse by high interconnection charges of different telecommunication networks. Another problem being that, radio programmes on agriculture and rural development are irregular. Sometimes these radio programmes they are on when farmers are in their fields working making it hard to listen and call if there is a need. Mukasa Mohamed farmer from Kifamba says:

"These people are not serious, why do they put on our programmes when we are working? Do you expect me to hear when am carrying my grass to the plantations with all the noise and also you expect me to carry and phone and call? The programmes should be there when we are at home".

Nakazzi Rovinsa says.

"We need to interact during radio programmes but it's expensive for us, they should provide toll free telephone lines for us farmers instead of paying fuel to extension workers who doesn't come to our fields".

Though the mobile phone is highly portable, even portable radios are quite common today. From the perspective of another group, they argued that a radio is more effective in delivery of agricultural information. Radio is better because its coverage is far much better in terms of listenership compared to mobile phones and the radio uses dry cells which are cheaper to phone batteries which need charging regularly and in villages with no electricity this become even more difficult. They also said radios are cheaper than mobile phones and can easily be stolen

Farmers in Rakai district has already realised the usefulness on radio and mobile phone interactivity and this is manifested in their request that the government should provide them with solar chargers so that they can easily charge their phones since many don't have access to electricity and also to be availed with phones with more functions like radio and camera. They say such phones are expensive and they should get the on loans payable in instalments. An in order to access radio, agriculture programmes should be provided with toll free telephone lines.

4.6 The future of radio and mobile phone scenarios

From the collected the information collected, the researcher came up with two scenarios looking at communication dilemma and how ICTs can be a solution. The scenarios look at the variables of accessibility, ownership, and effective use of the ICTs

Scenario 1 'mobile phone and radio interaction, a dilemma for farmers'

Maria is a chairperson of Twegatte women's group in Kyebe Sub County. Though being in one of the most remote sub counties, Maria is 'lucky' she owns a mobile phone and a radio set. Though a farmer, Maria's favourite radio programme is the 'Famous court Yamaka' (Domestic court) aired on the national radio station (Star Fm) a subsidiary of Uganda broadcasting corporation (UBC). This is an interactive programme where listeners can call in and give their opinions on the day's topic. Maria also likes to call in and give her views but the airtime is expensive for her. In addition to higher fees of airtime Maria has a problem of charging her phone. She travels 5 kms to the nearby trading centre where her battery is charged with a solar powered charger. The phone has to be collected after 2 days and by the time she collects it, the only agriculture programme on the local radio has passed. Maria is interested mainly in listening to family related programmes because the only agricultural programme she knows on the local radio is aired during working hours when she is busy attending to her crops. She doesn't carry a radio to the field since she saves her batteries. She also says that the information provided is less relevant to her compared to other programmes on the radio.

Scenario 2 'Mobile phone the magic solution to rural communication'

Mr Ssempaka is a chairman Twegatte farmers group in Kifamba County. He has a meeting with a researcher at 2pm, due the urgency of the meeting and the short time he had to mobilise the members, he used short message service (SMS) to invite the group members. The strategy worked well and 25 members out of the 30 have turned up for the meeting

As the group members wait for the researcher, they start discussing the issues which were raised in the previous discussion. But in the middle of the discussion, Mr Ssempaka receives a phone call on his mobile phone from the area extension worker informing is him about an urgent meeting about the visiting District agricultural officer. This meeting is urgent and is to be held at the District head quarters. He is needed together with 3 other farmer's representatives. As the meeting progresses, Mr Ssempaka excuses himself from the meeting and makes 4 more calls. He is lucky the 3 farmers have a good telephone network and he passes on the messages without delay. He decides to contact the two remaining farmers through short messages (SMS) which they can retrieve later on their handsets.

CHAPTER FIVE: DISUSSION AND CONCLUSION

5.1 Introduction

In the previous chapter we presented the results of the research in comparison with the theoretical concepts on ICTs roles in relation with communication of agricultural information between advisory service providers and farmers. This chapter discusses the results and gives the conclusion on how radio and mobile phones can be integrated for effective communication of agricultural knowledge and information.

5.2 ICT accessibility and use in Rakai district.

From the research it was found out that 100% of the farmers have access to radio and 88% have access to mobile phones. This indicates that ICTs accessibility has improved as compared to level in the last five years. It can now be deduced that ICTs can as well be used to communicate agriculture knowledge and information basing on the level of accessibility. This is in disagreement with Oryokot (2003) who said that "In case of Uganda, access and use of ICTs in the near future shall be restricted to info-mediaries (intermediary organisations, private sector operators, extension workers, NGOs) largely due to the low levels of literacy among rural folks.) In chapter 4(4.1) It was indicated that the literacy level of Rakai district is 57.95% .This is not a very high literacy rate but this does not prevent farmers from using mobile phones. From the findings, many farmers know the basics on how to use mobile phones despite the fact that they complained of too much information in English. Even the completely illiterate farmers can answer phone calls since they memorised the two important keys, the yes key (usually green) and no key (usually red). An excited farmer with a mobile phone proudly said.

"Who told you that we illiterate people can't use mobile phones? When I bought my phone, the service providers (mobile telephone operators) adjusted my phone in such way that when I press any key I can answer my calls"

However, some phone functions are still not well exploited and such functions can be very beneficial in effective use of the mobile phone. From figure 4.4, some functions like accessing market information are not widely used and this is linked to language barriers. Most of the market information provided is in English and farmers don't have the capacity to read English texts. This agrees with Munyua (2007) who said that people in Africa share phones through different arrangements. She added on that, some of the unexploited potentials of mobile phones include voice, images and video applications. The researcher is in agreement with Munyua. mobile phones have the capacity not only to provide written texts but also voice messages. If farmers can be trained in accessing them, it will be a great contribution in increasing ICT utilisation. However, even the service providers themselves lack skills in the use of some more complicated telephone functions and that is the reason why the NAADS coordinator was requesting for training of extension workers.

Having looked at mobile phones, we also have to consider the radio. From the findings, radio is widely accessed but what needs to be analysed is the ownership, the type of information obtained from radio and how programmes are planned. From the findings it was realised that that farmers listen to radio for an average of 7.5 hours a day. It was also found out that farmers listen to radio mostly early in the morning and in the evening while in bed. However from the observations, most agricultural related programmes are aired during day time when most farmers are in the field. In this context, listenership varies. Some listen to radios without any specific purpose looking for specific information but other listen just for leisure. It was

also found out that some farmers go with their radios to the field but this listening is rarely for information but for entertainment mainly. Though the radio producers said that farmers take with them their radios to the field, a few of them listen during this time, this can be confirmed from the study when 48% Of the respondents said that they don't know the exact time for agriculture related programmes. This now points to radio programming and as Gerard (2003) puts it that rural radio programming must be based on the concerns of the rural world and be presented in the form of an ongoing dialogue with the community. Priority should be given to field production techniques involving local participation and close interaction with community members.

Having seen it from the results that ICTs are available, the issues that have to be addressed in all ICTs are their use for provision of agricultural advisory services. The concern is in skills development; timeliness; cost, and mechanisms for feedback. ICTs have to be seen as providers of tools and means of accessing information from various sources. With the different ICTs in place, and radio being the most widely accessed, Orykot (2003) says that "It is an easy access to FM radios as they are easily affordable, and information is easily packaged and made available to farmers through the medium. Radio therefore can provide a very important medium for delivery of information". But from the research, farmers said that the problem is not owning or accessing the radio but even maintaining it is a problem. Since they have no electricity they depend on dry cells to power their radios and they can barely last for a week. It's common to find a farmer with a radio but he or she can listen to it only one hour a day due to power problem

5.3 Rural ICT service provision

5.3.1 The mobile phone

Despite the great importance of these communications gadgets, it was established that enormous problems do exist in acquiring of these gadgets, their maintenance as well as their use.

Majority of the people (62%) said that, the cost of mobile phones was prohibitive. These are people who access mobile phone services but do not own any mobile of their own plus those who neither own nor access one. They said that if the prices of mobile phones were reduced, they could afford to own one. This is the trend in all the areas where the researcher reached. This problem stems from the fact that mobile phones are manufactured from other countries and just imported by private sector traders hence expensive.

Having been realised that a mobile phone is becoming an important communication tool to farmers, and a lot of information can be communicated to farmers using the mobile phone and radios, the number who can't own a mobile phone presents a big challenge to the development efforts. Even for those who own mobile phones, several problems were pointed out and they included poor network coverage. Most of the areas where the research was carried out are hilly and hence a problem of accessing the network as well as some radio frequencies. One needs to move either on the top of the hill or climb a tree in order to make a successful call. Others have to move for long distances in order to access the network.

Mobile phone users also face a problem of charging. This is a reality to most rural areas in Uganda. This was also the problem in the research areas. As indicated in chapter one, all these sub counties have no access to electricity. All respondents who own mobile phones said charging were a problem.

To make the point even stronger, Mrs Mukalana Noelena said: *“All people here can afford mobile phones but they we fear to buy them because of the charging problem. We have to take our phone to Kyotera¹ for charging and I spend a lot of money on charging a month.”*

In Uganda, most rural areas have no electricity and therefore lack regular power to charge mobile phones. Those who have generator for charging, ask for so much money whereas those who own solar systems that can charge mobile phones are few. Even when one successfully gets his/her phone charged, there are more problems as on many occasions the phones are not fully charged and hence spends a few days and has to be brought back for charging and more money has to be paid. Moreover, many correspondents angrily reported that many workers at phone charging posts remove phone batteries and replace them with old ones which make then phone loose power quickly. This finding agrees with Munyua (2007 p.23) findings which said that farmers in Africa experience challenges with mobile phones due to poor infrastructure such as electricity to charge phones, while solar chargers are still too expensive.

In line with the above, respondents did complain of the fact that call rates (air time) are too high hence limiting the use of mobile phone. This also affects interaction between radio and mobile phone.

5.3.2 Radios

Radio is an important mechanism for disseminating knowledge and information in different languages and formats (Gerard 2003). From the research findings, some limitations were raised by the correspondents. One issue was the ownership, though 100% of the respondents have access to radio, only 48.6% owned radios and these were mainly men. This has a link to use and listenership. Many female respondents reported that although they have access to radio but the radios belonged to men and they could not listen to their favourite programmes when men are at home.

During the focus group discussions, respondents also reported the high cost of dry cells which power the radio. They reported that since they have no electricity they have to buy batteries for their radios but the batteries can only last a week. So in order to save batteries, they have to reduce the number of hours they listen to radio which means missing ‘good’ programmes.

According to the findings, accessibility to radio is high but usage of radio is communication of agricultural knowledge and information was lacking. The District radio programmes are not regular and the time for the agricultural programmes of radio not very conducive to farmers. Even though the district officials said that the radio programme are not regular due to lack of funds by the district but even the extension workers reported that they have no access to radio programmes sponsored by the district since they give more time to politics than agriculture and rural development. However, the farmers were more concerned about the programming. They want radio programmes which are aired when they are at home so that they can listen or even interact within the programme. However despite the radio programme being irregular they also don’t know when they are to be presented. The farmers also complained of the high call rates which stop them from calling in during radio programmes.

According to African radio international (2008) farm radio is more effective when linked with new ICTs and one of the ICTs is a mobile phone, and According to e-agriculture policy brief (2009) the mobile phone is no longer an audio communication tool but capable of providing

¹ Kyotera town is located 50km from the location of the respondent

integrated functions. Therefore by integrating radio and mobile phones can strength the effective of radio and promote interactive communication of agriculture advisory services.

5.3 Scenario analysis

The two scenarios in 4.6 forecast the future of phone and radio in provision of advisory services in Rakai district. They also tries to analyse how the two variables of accessibility and capacity to use the two ICTs can influence the communication of agricultural information and delivery of advisory service to farmers in rural areas. From the research findings, it was discovered that although many farmers access the two ICTs there usage varies depending on the ability to integrate them and to use them effectively.

When you consider scenario one and the findings, its common to find farmers like Maria who have access to the two ICTs but due to poor integration of the two ICTs, the outcome is not good and it reduces the effectiveness of communicating agriculture information. This is shown when respondents say that radio programmes should not only be interactive but they should also provide toll free telephone lines so that farmers can easily call in and interact with advisory service providers.

In scenario 2, the mobile phone seems to have solved the rural communication puzzle. It shows that when farmers have capacity to use mobile phones, communication between them and extension workers shall be greatly improved. This is also manifested during the stakeholder's workshop when extension workers request for training in ICT use and farmers also show their need to be trained on how to use their phones more effectively. Farmers not only need training in ICT use but also they need government to provide them with phones with more functions like radios at a subsidized price and loans. All this means more interaction of the two ICTs to increase agricultural information communication.

5. 4 Conclusions

From the research there has been an increased use of ICTs in Rakai District mainly Radio and mobile phones and the rural communities are beginning to enjoy better access to the flow of information. It is important to realise that farmers should not be treated as mere generic consumers of information and knowledge. The Agricultural service providers should also find the best channels of communicating the information and ICTs can play a big role here.

Mobile phones appear to be especially beneficial as they enable people to access instant information and they stimulate communication between people and strengthen social networks. Therefore, there should be increased use of ICTs mainly mobile phones and radio as well as more interpersonal interactions.

Since it was realised from the research that literacy has little influence on use of mobile phones, the agricultural service providers and the district extension service might need to rethink on the way they provide their services. The traditional methods can be abandoned and new ones on using modern technologies adopted. It could be of great use if the extension service can provide toll free telephone numbers which are easy to memorise like 88888 for farmers to call and get agriculture information and knowledge.

Radio accessibility is high and FM stations are of high importance at the moment and there is great need to promote the current interactive call-in radio programmes which can be harnessed by provision of toll free lines and taking radio to the community to increase interaction. The use of community radio should be enhanced because it gives farmers more avenues for interaction with ASPs.

With the great potential for accessibility of ICTs, implementers of ICT initiatives need to intervene in the provision of affordable and accessible ICTs and improve the infrastructure, address the prevailing inadequacy of ICT skills and capacity. There is also a genuine need to address gender inequalities languages and media preference.

There is great potential in Using ICTs in the provision of agricultural advisory services in Rakai District mainly during this transformation process of extension services. Networking among information providers and service providers to share experience and training service providers in ICT use is important to allow the development of full potential of ICT tools.

The district programme on use of ICTs in extension are not adequate and the funds allocated to use of ICTs in extension like radio programmes are insufficient and transferring responsibility for the 'public good' of advisory services to private sector appear not to be sustainable unless government funding continues.

The most effective way of reaching farmers with timely agricultural information and knowledge is to harness the potential of FM radio stations and mobile telephony as technologies for communicating agricultural information.

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Appendix 1: Check lists

Checklist for focus group discussion for Farmer groups

- How many own radios?
- How often do you listen to radios?
- How many do access radio but don't own one?
- What role does radio play in your lives?
- How often do you listen to agricultural related programs on radio?
- Which types of information do get from radios?
- How relevant is the information from radios to you?
- Which radio stations do you listen to?
- What are your favourites programs?
- How many own mobile phones?
- How many do access mobile phone but don't own one?
- How often do you use your mobile phones?
- Which telephone networks do use here?
- Which network is clearer?
- How do you combine mobile phones and radios in communication?
- Other than radio what other sources of information do you have?
- What problem do you face in accessing information using ICTs?
- What benefits do you get from using ICTs?

- What do you can be done to increase effectiveness in use of ICTs?
- Do you have any other issue relevant to ICTs use in promoting agriculture extension?

Appendix 2

Semi structured questions for key informants

1. Name of key informant :

2. Designation :

3. Duties in the agricultural extension service:

4. Which ICTs are being mainly used by the district in provision of agricultural extension and advisory services

List all the used ICTs:

.....
.....
.....
.....
.....

5. Which of those ICTs are more widely used?

Record them:

.....
.....

6. How do you rate the use of Radio as one of the communication technologies in provision of extension services?

Record the

rating:.....
.....
.....

7. How do you rate the use of a mobile phone as one of the new communication technologies in agricultural extension?

Record the rating:.....
.....
.....

8. Do you think these two technologies can be merged to enable effective communication between farmers and agricultural service providers in improving communication?

Write down the answer:
.....
.....

If yes in which way can this be done?

Answer:.....
.....
.....
.....
.....
.....
.....

9. If the radio and mobile phone can improve communication between farmers and extension workers, what needs to be put in place to have this work out?

Record the

response:.....
.....
.....
.....

10. As a district do you have any policy in place or in offing to improve the use of these ICTs in agricultural extension?

Answer.....
.....

11. What is the level of ICT use by extension workers and agricultural service providers?

Record the

response:.....
.....
.....
.....

12. As the district extension service, what do you have in place to facilitate ICT use by extension workers and farmers to promote agriculture and rural development?

Record the

response:.....
.....
.....
.....
.....
.....

13. If not what plans do you have?

Record the

response:.....
.....
.....
.....
.....
.....
.....

14. Is there any project which has been promoting the use of ICTs in Rakai District?

.....

If yes what is the name of the project?

Record the response:

.....
.....

15. What were its activities?

Record the

response:.....
.....
.....
.....
.....
.....

16. What are the problems you are encountering in trying to implementing policies on ICT related programmes?

Record the

response:.....
.....
.....
.....
.....
.....

17.If there is an organization which intends to promote ICT use in agriculture extension and rural development, what issues should it address first?

Record the

response:.....
.....
.....
.....
.....
.....
.....

a) On farmers support

Record the

response:.....
.....
.....
.....

b) On extension workers

Record the

response:.....
.....
.....
.....

c) On infrastructure

Do you have any radio programme in as a district to increase interaction between farmers and extension workers

What is your opinion on use of ICTs in agriculture extension and rural development as a way of improving communication?