

**THE EFFECT OF COMMUNICATION CHANNELS ON THE ADOPTION OF
ORANGE FLESHED SWEET POTATOES (OFSP) IN UGANDA: A CASE
STUDY OF GULU DISTRICT**

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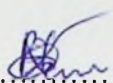
**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
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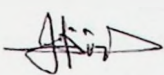
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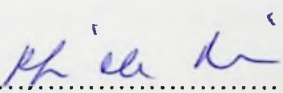

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DEDICATION

I dedicate this book posthumously to my parents, Mr. Jecco Isabirye and Mrs Ida Isabirye and to my brothers, sisters, children, friends and relatives.

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LIST OF ACRONOMYS

ASARECA	Association for strengthening Agricultural Research in Eastern and Central Africa
BCPR	Bureau for Crisis Prevention and Recovery
CIP	International Potato Centre
DOI	Diffusion of Innovation
DONATA	Dissemination of New Agricultural Technologies in Africa
FARA	Forum for Agricultural Research in Africa
FGD	Farmer Group Discussion
Fig	Figure
ICT	Information Communication Technologies
IDT	Innovation Diffusion Theory
IMSFM	Integrated Soil Fertility Management
IT	Information Technologies
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
TV	Television
USAID	United States Agency for International Development
OFSP	Orange Fleshed Sweet potatoes
SMCRE	Source Message Channel Receiver Effect
SPSS	Statistical Packages for Social Science
SRLF	Sustainable Rural Livelihood Framework
Ugshs	Uganda shillings
UNDP	United Nations Development Programme
UNCST	Uganda National Council for Science and Technology

NGO

Non-Governmental Organization

Gov't

Government

ABSTRACT

Sweetpotato is a key food security crop with the potential of generating income and improving human nutrition for smallholder farmers in Uganda. It is a major drought resistant root crop with a unique potential of low soil nutrients needs and a short maturity period of three to five months. Orange Fleshed Sweetpotato (OFSP) requires little effort, to be considered as high-value crops in marketing. It also supplies substantial amounts of vitamins A and C. Efforts have been made by several organizations and projects to develop numerous varieties and technologies that can enhance its utilization and disseminated through various pathways. However, most of the technologies generated hardly reach farmers. OFSP is constrained by lack of market, sourcing consistent supplies of good quality roots, insufficient coordination, insufficient attention to institutional linkages, poor communication channels affecting the flow of information and insufficient involvement of the private sector. Various studies have been undertaken to address these constraints, however, little has been done to stimulate the effectiveness of communication channels in adoption of OFSP. It is against this background that a study was designed to investigate the effect of communication channels on adoption of OFSP in Gulu district, in Northern Uganda. The study particularly sought to recommend communication channels and strategies that could raise the adoption of OFSP in Gulu district. The objectives of the study were to identify the communication channels employed in dissemination of OFSP and investigate their effectiveness in adoption OFSP. This was in view of the fact that the types of communication channels and their operational effectiveness have changed yet the adoption rate of OFSP among farmers have remained fairly the same over the years.

The study was conducted in three project sites: first site consisted of four farmer groups namely: the Urib Can group, the Rubanga Lakica group, Can Miyo Ryeko group and Pit-tek

group in Koro Sub county, Achoyo parish, Koch village in Omoro County. The second site was Bungatira Sub county, Layik, Laroo, Bwobo, Lawiyadul and Punena villages all in Aswa County while the third site was Unyama Subcounty in Ajuko village, Aswa County where individual respondents were interviewed. The study adopted household survey research design as the main investigative design, using semi structured questionnaires, FGDs and key informant interviews administered to 218 respondents out of a total population of 1,100 from three sub counties based on purposive sampling method. Data was analyzed using SPSS technique and results presented in tables and figures.

The study established that the most common communication channels used in order of importance by respondents were interpersonal - farm demonstrations by 88%, Mass media - radio by 10%. The adoption rates of OFSP were found to be 2% in 2009, 13% in 2010 and 85% in 2011. In relation to the most informative source, 86% strongly agreed that it was extension agent, followed by farm demonstration (76%). In terms of coverage capacity, informativeness, frequency of use and accessibility, interpersonal channels were significant in adoption of OFSP compared to mass media channels.

The majority of farmers who used OFSP channels were 100% adults, 84% are married, typically female (65%), with 36% income, had some formal education (30%) while 56% belong to a group. Therefore, farmers' socioeconomic characteristics should be considered in technology adoption.

The study also recommended that multiple channels including mass media and interpersonal specifically farm demonstrations should be considered as strategies for agricultural information dissemination and communication respectively.

INTRODUCTION

1.1. BACKGROUND INFORMATION

Sweetpotato (*Ipomoea batatas* L.) is a key food security and income generating crop. Its origin is traced from the lowlands of South America (Woolfe, 1992), and it is considered the seventh most important crop in the world (Yada et al. 2010). Sweetpotato was introduced into Europe by Columbus and spread to Africa by the Portuguese from the Atlantic coast regions of mid-latitude America (Woolfe, 1992).

Today, sweet potato is globally cultivated for almost half of the world's population for its significant importance people's diets in terms of taste and texture (Woolfe, 1992). In production monetary value of food commodities, sweet potato ranks thirteenth globally and, in developing countries, sweet potato ranks as the fifth most valuable food crop, accounting for one third of the production of root and tuber crops (Woolfe, 1992). The International Potato Centre in Lima, Peru, maintains an international sweet potato germplasm collection consisting of about 900 pathogen tested accessions (Laurie in Nideler Wieser, 2004). A sweet potato breeding programme under the ARC-Roodeplaat Vegetable and Ornamental Plant Institute has released not less than 22 cultivars and other cultivars are yet to be released.

Nearly all sweet potato production and consumption takes place in developing countries (Woolfe, 1992). In Malawi, Angola, Mozambique and the Democratic Republic of Congo, where maize is the staple food and sweet potato is an additional crop, the per capita consumption of sweet potato is in the region of 5 – 50 kg per person per annum (Minde, Ewell and Teri, 1999). In Uganda sweet potato is grown in all districts. The major sweet potato producing districts in Uganda are as follows: in the Eastern region, they include Mbale, Iganga, Kumi, Pallisa and Kamuli. In the Northern region, the districts of Kitgum, Gulu, and Apac are known to be high productivity areas. In the west, Hoima and Masindi are

known for high production of sweetpotato while in the central region there are the districts of Mukono and Rakai (Yanggen and Nagujja 2006).

According to McEwan and Mayanja (2012), in Uganda, Sweet potatoes are planted from March to July and harvested during the months of July to November. In rural communities, farmers often harvest only enough sweet potatoes to feed their family, leaving the plants in the field to prolong availability (McEwan and Mayanja, 2012). Sweet potato can be kept in the ground for some time, having a longer keeping time than most root crops (Weiss et al, 2000). It is a hardy crop that has relatively low demands on soil nutrients, while also being more drought tolerant than many other vegetables, offering flexibility in planting and harvesting times as it has a shorter growing cycle than other root crops (Weiss, et al, 2000). It has a short maturity period (Kanguongo et al. 2010). The average crop growth period for sweet potato is 140 days and, for cassava, 330 days (Weiss et al, 2000).

Sweet potato is one of the most efficient food crops in terms of energy per land area (Van Oirschot, Rees and Aked, 2003). Sweet potato is however, produced and sold in large quantities by the informal sector, which is not reflected in the official production figures (Domola, 2003). An estimated total acreage under sweet potato production is 2000-3000 hectares with an average yield of 5-10 tn/ha (commercially the average yield is 40tn/ha with a field size of up to 30ha) (Domola, 2003). The sweet potato industry is relatively small, hence the need for development of OFSP and promotion of its production through multiple communication channels.

The Orange fleshed sweet potato (OFSP) types supply substantial amounts of vitamins A and C. Mazuze (2004), noted that it was predicted that massive adoption of OFSP by farmers would have a major impact on reducing vitamin A deficiency. According to Yanggen and Nagujja (2006), the green leaves of the plant can be consumed by both humans and animals

providing additional protein, vitamins and minerals. Brauw et al. (2012), stated that the biofortified OFSP crop has several benefits, it is cost effective, it can be distributed to vulnerable populations in remote areas that do not have access to commercially-marketed fortified foods and it does not have adverse effects on productivity and may even increase yields. OFSP flesh colour varies from light orange to a dark orange colour and the skin from cream to orange to purple (Weiss, et al, 2000). The orange colour is an indication of the beta-carotene content of the sweet potato cultivar (Whitney and Rolfes, 2002).

A few programs like the Dissemination of New Agricultural Technologies in Africa (DONATA) and international agricultural research centers and foundations have worked towards the scale-up of agricultural technologies that would contribute to food and nutrition security and economic growth in Africa (McEwan and Mayanja, 2012). Sweet potato based technologies were selected for scaling-up in selected target country sites across Sub-Saharan Africa, including Uganda. Nevertheless, the improvement and articulation between demand and supply for both roots and planting material had a challenge in existing sweet potato value chains. There are various challenges along the value chain - farmers cited lack of market, traders and processors referred to challenges in sourcing consistent supplies of quality roots, other actors in the value chain referred to insufficient coordination, insufficient attention to institutional linkages, poor communication channels affecting the flow of information, insufficient involvement of the private sector. These challenges pointed to the need for effective information and communication systems and strategies. The study will thus focus on the effects of communication channels in the adoption of OFSP in Uganda, with emphasis on Gulu District.

1.2. PROBLEM STATEMENT

There has been a marked decline of agricultural growth in Africa specifically in Uganda. Uganda's agricultural sector registered positive growth at 2.6 percent and 1.3 percent in 2008/09 and 2007/08, respectively (ASDSIP, 2010). However, these rates of growth are below the country's population growth rate of about 3.2 percent per annum; per capita agriculture production (ASDSIP, 2010). This is because of the low production and productivity; low value addition to agricultural produce and limited market access; weak implementation of agricultural laws and policies; and weak public agricultural institutions (ASDSIP, 2010). Among one of the many challenges stated, organizations like the International Potato Centre (CIP), ASARECA and FARA, identified low adoption of technologies as one of the main constraints to agriculture growth. It is a recognized fact that most of the technologies generated by researchers hardly reached the clients (McEwan and Mayanja, 2012).

To this end, the Dissemination of New Agricultural Technologies in Africa (DONATA) project under FARA was initiated. The DONATA project was to build the African agricultural research knowledge management capacity and to support the adoption and dissemination of proven agricultural technologies, and thus reducing poverty, increasing income, developing pathways and technology dissemination along the value chain (ASARECA, 2011).

The Innovation Platform for Technology Adoption (IPTA) is one of the approaches that have been used to promote and disseminate the adoption of new technologies, particularly OFSP in Gulu district. This approach is a multi-stakeholder arrangement contributing to the promotion, uptake and practice of OFSP technologies. Through the IPTA approach, adoption of technologies is expected. However, this was not the case for the OFSP technology, a project implemented by FARA in Northern Uganda, 2009.

Other projects that have used IPTA like the innovations on Quality Protein Maize project show success (ASARECA, 2011). Therefore, other factors apart from IPTA approach are likely to lead to adoption of the technologies. These include the use of appropriate and effective communication channels. FARA came up with OFSP information and communication channels which have been used to disseminate OFSP, but adoption has been low.

High impact agricultural communication technologies have been reported in other areas for technology adoption and have contributed to improve livelihood and welfare of the poor in isolated areas (Kagoungo et al. 2010). The promotion of OFSP within the Ugandan context of a population suffers from a myriad of challenges including the use of ICT. This has not been exclusively investigated as yet. Therefore, this study was to investigate different types of communication channels and their effectiveness in the adoption of OFSP in Uganda, Gulu district.

1.3 JUSTIFICATION OF THE STUDY

The body of knowledge of this research will be useful for the improvement of livelihoods and increased economic growth for resource poor farmers in the region.

The study will enable research organizations to understand the most common communication channels used by farmers for effective dissemination of technologies. With the changing trends in communication channels, farmers will be convinced to comprehend and explore other cost effective channels used by organizations in dissemination of OFSP for efficient information sharing. The study will help Agricultural Information and Communication researchers to create tools and models for knowledge enhancement and information dissemination as knowledge revolution in agricultural development is a nascent stage. The study will also help future planners and policy makers in formulation of policies suitable for

rural communities. The academia will be provided with relevant information for future research in regards to the types and effectiveness of communication channels for a new technology transfer. The results of the study will guide government institutions, private sector, local and international organizations in designing appropriate communication strategies for communication and dissemination of technologies in rural areas.

1.4 OBJECTIVES

The overall objective of this study was to explore the types of communication channels employed and their effectiveness in the adoption of orange fleshed sweet potatoes (OFSP) in Gulu District, Uganda.

1.4.1 Specific objectives

Specifically, this study aimed to:

- i. Identify the communication channels employed in dissemination of Orange Fleshed Sweetpotato.
- ii. Investigate the effectiveness of communication channels employed to disseminate Orange Fleshed Sweetpotato technologies for adoption.

1.5. RESEARCH QUESTIONS

- i. What are the key communication channels employed in dissemination of Orange Fleshed Sweetpotato?
- ii. What is the effectiveness of communication channels employed in the dissemination of Orange Fleshed Sweetpotato?

CHAPTER TWO: LITERATURE REVIEW

This chapter provides a review of literature on the types of communication channels and the effectiveness of communication channels for technology adoption. It also provides the theoretical and conceptual framework for the relationship between communication channels and adoption.

2.1 Communication channels

Communication channels are essential for technology promotion. According to Wiese, et al, (2010), communication is the transfer of a message from a sender to a receiver via a channel or medium. Rogers, (2003) asserts that a communication channel is the means by which messages get from one person to another. According to Akinbile and Otitolaye, (2008), communication channels are pathways through which information or messages are transmitted to an audience or receiver. Mass media are diversified media technologies or channels of communication that are used when addressing a mass audience with the intention of reaching a large number of people in a short time. Mass media includes radio, print media, audio,visual media, utility media and traditional media (Fofanah, n.d., para 2). Communication programmes should focus on the metaphorical “tree” but much more on the “forest”, to manage behavioral change (Unicef, 2005). Some mass-mediated channels include radio, television, large-circulation print publications (newspapers, magazines, and posters), the cinema, and public video viewing centers (Okwu, 2011). All these explanations agree that communication channels involve a message transferred to a receiver via a channel. However, they ignore the feedback mechanism which is considered a useful ingredient in communication.

Appropriate communication channels are needed to enhance the sharing of knowledge. According to Adolwa et al. (2012), there are groups of channels; disseminative and communicative. Dissemination refers to the uni-directional (or one-way) flow of messages,

information or knowledge from source to the recipient while communication is the multi-directional (or two-way) flow of information/knowledge between source and recipient (Adolwa et al. 2012). Communication is a process which entails use of effective channels to reach out to a larger audience at the same time in different places (IRR, 2000; Gundel et al. 2001). For scaling up to occur, sufficient attention must be paid within a project, to the development and implementation of a sound communication strategy (Kaplan and Ashley, 2003).

According to Wiese et al., (2010), word-of-mouth as a personal source gives the recipient an opportunity to reduce risk before accepting a new idea because of immediate feedback associated with the innovation's experience from those who are aware and have tried using it. Interpersonal channels usually refer to verbal and nonverbal interactions in one-on-one or small group settings. Personal channels refer to communication shared by friends, family or reference groups (Wiese et al. 2010). It occurs every time we talk or signal with others. It can be direct involving a face-to-face relationship between the sender and receiver of a message or mediated, involving technology that links the sender and receiver. According to Akinbile and Otitolaye, (2008), group media includes seminars, farm demonstrations, workshops, and agricultural shows; and information communication technologies (ICTS) such as Internet, E-mails, audio-visuals.

In view of the discrepancies in the definitions above, the definition of communication channels for this study is derived from Rogers, (2003), Akinbile and Otitolaye, (2008), Wiese, et al, (2010) and Adolwa et al. (2012). Communication channels are pathways through which one or two-way flow of information/knowledge is transmitted between the source and the receiver while the later necessitates feedback. This definition is considered appropriate because it indicates that the source can only tell that the idea initiated has been received and

understood through an appropriate medium after receiving a negative or positive response from the receiver about the technology disseminated. This can be in form of adoption or seeking for detailed explanation about the innovation to enable adoption or rejection.

Several theories are advanced to describe the relationship between communication channels and technology adoption. According to Okwu (2011) adult literacy programs are organized to teach farmers the skills of reading and writing, for purposes of using newspapers, newsletters and extension bulletins in obtaining agricultural information. Akinbile and Otitolaye, (2008) suggest that extension agents' knowledge of communication tools should be improved through relevant in-house training to ensure the use of diverse channels, to enhance the adoption and continued use of innovations.

Although people benefit from explicit knowledge in their individual learning process as Jarvenpaa and Staples (2000) noted, it is also true that they are heavily dependent on each other. Learning is as much a group processes as an individual process, and is also heavily dependent on accumulated knowledge of previous generations in all part of one or more communities, whether of interest, practice or intention (Nonaka and Takeuchi 1995). Today, communication and knowledge-sharing is widely held to be inherently necessary to the adoption of most agricultural projects. Research showed that a willingness to share is positively related to profitability and productivity and negatively related to labour cost (Jarvenpaa and Staples, 2000). According to Gupta and Gonvindarajan, (2000) knowledge sharing should be a corporate value, which defined how work gets done and how everyone thinks. In short, a culture of knowledge sharing goes deeper than superficial behaviors and captures the heart and minds of the people in an organization.

These propositions suggest that knowledge of extension agents and farmers should be enhanced to access communication channels. However, they both fail to address the issue of

using familiar channels. According to Onasanya et al. (2006), “change agents should be posted to communities where they are well known to make adoption easier at the grassroots level”. For farmers to reduce on the numerous knowledge based challenges faced, interaction through channels which are common and support feedback should be emphasized. Pika, (2006), suggests that “infrequent opportunities for in-person meetings create opportunities for forming common ground through quick interactive exchanges”. In view of the issues raised above, the relationship between communication channels and adoption should be characterized by farmers’ skills of reading and writing, extension agents’ knowledge in using diverse channels and feedback.

On investigation of the relationship between communication channels and adoption of improved rice varieties, Jirgi et al. (2009), found out that the high rate of awareness was attributed to the use radio, extension agents, television and pamphlets. Onasanya et al. (2006) conducted a relatively similar study in communication factors affecting the adoption of innovation at the grassroots level in Ogun State using a sample of 200 farmers and 25 extension agents. Onasanya et al. found out that farmers ranked that their highest source of information was radio, television, audiotapes, group discussions/meetings shows/exhibition, Small plot adaptive Techniques. On farm adaptive research, result demonstration, method demonstration and then posters. Majority of the agents gave the same assertion about the use of the method except for audiotapes, which is used by only 36.0% of the agents. Both studies support radio as the most suitable and fastest means for technology dissemination affordable by most farmers to listen to farming programs (Rogers, 1976, 2003; Jirgi et al. 2009; Adolwa et al. 2012). They however, fail to support the feedback aspect.

In the study on the adoption of improved rice production technologies by youths, Umar et al. (2009), concluded that frequent contacts with extension workers and social participation is

very essential as the former guides the farmers right from awareness to adoption stage in adoption of a technology and the later with more access to source of knowledge and information on new technology, are expected to influence farmer's desire to adopt innovations. However, extension agents are fewer than farmers in developing countries (Lawal-Adebowale and Adebayo, (2008) in Okwu (2011) and are highly knowledgeable in the use of only a few communication channels (Akinbile and Otitolaye, 2008). Besides, when it comes to sales interaction, agents may not sell to a family member the way they sell to strangers (Miller, 2010).

According to Adwola et al. (2012), communication channels include print-based channels (Brochures, books, newspapers and posters) but farmers prefer radio because of its numerous benefits while farmer field days are more interactive (Adolwa et al, 2012). Okwu, (2011) suggests that "radio, television, newspapers—should devise ways of reaching out to rural areas instead of concentrating on urban centers" However, television requires electricity which rural farmers cannot afford. According to Okwu (2011), radio was used to broadcasting an agricultural program series in English. Nevertheless, Kreuter and McClure (2004), notes that linguistic strategies are crucial for creating program information in different native languages of a given audience. According to Onasanya et al. (2006), some information could not be understood by farmers due to language barriers. Wiese et al. (2010), adds that communication involves the creation of shared meaning between participants.

Worth noting is also the communication tools. Generally, there are two types of communication tools known as synchronous and asynchronous communication tools.

According to Kaplan and Ashley (2003), synchronous and asynchronous communication tools can be used to create a full, rich learning experience and sense of community for their members. Synchronous tools enable real-time communication and collaboration in a same

time different place mode. These tools allow people to connect at a single point in time, at the same time. Synchronous tools possess the advantage of being able to engage people instantly and at the same point in time (Kaplan and Ashley, 2003). The primary drawback of synchronous tools is that, by definition, they require same-time participation-different time zones and conflicting schedules can create communication challenges. In addition, they tend to be costly and may require significant bandwidth to be efficient. Examples of synchronous tools include audio conferencing, web conferencing, video conferencing, chat and instant messaging.

Asynchronous tools enable communication and collaboration over a period of time through a different time-different place mode. These tools allow people to connect together at each person's own convenience and own schedule. Asynchronous tools are useful for sustaining dialogue and collaboration over a period of time and providing people with resources and information that are instantly accessible, day or night (Kaplan and Ashley, 2003). Asynchronous tools possess the advantage of being able to involve people from multiple time zones. In addition, asynchronous tools are helpful in capturing the history of the interactions of a group, allowing for collective knowledge to be more easily shared and distributed (Kaplan and Ashley, 2003). The primary drawback of asynchronous technologies is that they require some discipline to use when used for ongoing communities of practice and they may feel impersonal to those who prefer higher-touch synchronous technologies. Examples of asynchronous include messaging (e-mail), databases and web site links.

2.2 The effectiveness of communication channels

Information amassed from research as well as indigenous technology in the modern world is enormous. This is even more true in the field of agriculture where the systems that form the

entity are stratified into a highly educated technology generation system (researchers), a relatively well educated technology dissemination system (extensionists) and a mass of technology utilization system (farmers) who have little or no formal education (Onasanya et al. 2006). Sitaram in Vinod Dar & Marcia Levis, (1974) defines effective communication as "the art of understanding and being understood by the targeted audience" while Akinbile and Otolaye (2008), define effective communication as "a means of actualizing desired change in both the social and economic transformation of developing nations". According to Tziovaras, (2008), the source must be characterized by reliability, likeability and honesty for communication to be effective. These definitions agree that effective communication entails that the receiver should understand the message. However, they ignore the fact that the information might never reach the audience in need of it, most especially if the channel is not agreed upon by the utilizing group.

According to Kreuter and McClure (2004), communication effectiveness is linked to the three components of the McGuire's model - source, message, and channel factors which describe how each affects communication and persuasion. Hartman, et al, (2014) adds that "communication channel factor is considered to influence reach" Wiese, (2010).

Four areas to evaluate the information source include; accessibility, ease of use, technical quality, and frequency of use. (Vinod Dar & Marcia Levis, 1974). However, "Every medium has its own unique attributes such as sensory appeal (e.g., visual versus not), level of interactivity, and reach to certain audiences" (Kreuter and McClure, 2004). Information may reach the target population more effectively if communicators employ channels consistently used by a community to improve on information's persuasiveness (Hartman, et al, 2014). Besides, some communication channels first emerge for the primary purpose of promoting a technology (Kreuter and McClure, 2004). This conflicts with source credibility, because it is

assessed after being used by an audience.

In view of the discrepancies in the definitions above, the definition of communication channels for this study is derived from the definition of communication effectiveness for this study is derived from Kreuter and McClure (2004), Okwu, (2011) and Adwola et al. (2012). Effectiveness of communication channels may be conceived of as the means through which the source succeeds in convincing a given audience to understand and take up an idea. This definition is considered appropriate because it indicates that specific channels are intended for persuading different audiences.

Several theories have been advanced to describe the relationship between effectiveness of communication channels and adoption of OFSP. According to Jirgi, (2009), a farmer should be aware of an innovation before adopting it. Okwu, (2011), suggests that for farmers to adopt new technologies and continue utilizing them, information about these new ideas must reach them through effective extension and mass media channels.

Adwola et al. (2012) believe that to ensure faster and more efficient information delivery, ICTs should be used by extension workers and research institutes to balance with community-based channels in technology dissemination. Both propositions suggest that a farmer requires a channel to know about a technology. However, they fail to address the process through which an innovation finds its way among farmers. One can gain knowledge through observation; therefore, a farmer will not necessarily need a channel to be communicated to about a beneficial technology. OFSP promoters should also ensure that efforts of early adopters encourage others to adopt the technology. In view of the issues raised above, the relationship between the effectiveness of communication channels and adoption should be characterized by reliability, likeability, honesty, accessibility, interactivity, credibility, familiarity, usefulness and technical quality.

Akinbile and Otitolaye, (2008), investigated the relationship between extension agents' knowledge in the use of communication channels for agricultural information dissemination to 80% of the Ogun State Agricultural Development Project extension agents. The researchers found out that radio was the most effective communication channel because of the coverage capacity and cost effectiveness of radio was the least cited reason for its use. Okwu (2011), conducted a similar study in Benue State, Nigeria and found out that radio had the highest frequency of use, while the newspaper, and film shows had very low frequency of use, and concluded that the low or nonuse of print media (e.g., newspapers, extension bulletins/newsletters) can be attributed to the low literacy level of rural farmers. Adwola et al. (2012), believes that, some level of literacy is needed for farmers to access and acquire useful information. Jirgi et al. (2009) found out that the high response to radio was because most farmers have radio. However, it is important for communicators to use a channel which the target audience understands. A farmer does not have to own a radio to hear about a technology, because information can be accessed from someone else's radio. The low use of television and pamphlets may be due to low income and low educational level of respondents (Jirgi, et al. 2009).

According to Adwola et al. (2012), interpersonal channels like farmer field days, on-farm demonstrations and workshops enhance interaction and feedback between a source and receiver. Nevertheless, Tziovaras, (2008) states that information is easily delayed and sometimes even lost if it is delivered from person to person. According to Adwola et al. (2012) community-based and mass media channels were the most accessible, reliable, informative and comprehensible in relation to ISFM knowledge transfer whereas the ICT and print-based channels were the least effective. Okwu, (2011), suggests that community rural television stations should be established to feature special programs targeted at rural farmers. However, mass media channels such as radio can be affected by disturbances that prevent

successful transfer of messages known as noise (Wiese et al. 2010; Akinbile and Otitolaye, 2008). Poor television signal can also affect effective communication.

According to Ntwoku, (2011), communication factors influencing communication usage and effectiveness differ in every society. Channels referred to in an urban setting are totally different from rural areas, just like schools and farms. In investigating the usefulness of communication channels that prospective students consult during their selection process in South Africa, Wiese et al. (2010), found out that white students preferred visits and open days white students, while black students preferred university websites as the most useful communication channels. According to Hartman et al. (2014), women in Netherlands used interpersonal communication with peers and the TV programs. Extension agents should endeavor to observe which channels are preferred by farmers in a given society before information dissemination of agricultural innovations (Okwu, 2011). The researcher also found out that television and newspapers were hardly accessible to farmers. Television offered few advantages to farmers because they are costly and offer only one-way communication to the educated group (Adolwa et al. 2012). A high-income earner is more likely to belong to a mass media user group than a low-income earner (Okwu, 2011). A target audience must have access to the channel through which a technology communication is being delivered (Kreuter and McClure, 2004).

Wiese et al. (2010) asserts that the usefulness attached to each channel will influence the strategies institutions need to follow, to ensure effective communication. Akinbile and Otitolaye, (2008), found out that the age of an extension worker in a field determines his qualification and experience to communicate efficiently. The communicator's choice of a channel sometimes depends on the urgency and complexity of the idea which is communicated (Jayasree, n.d., para, 5). "Mass media channels, such as agricultural

magazines, were satisfactory for less complex innovations, but interpersonal contact with extension change agents was more important for innovations that were perceived by farmers as more complex” (Rogers, 1995). According to Brauw et al. (2012), information related to the health benefits of OFSP was disseminated through farmer groups; community theatre sessions radio spots, and billboards. Therefore the researchers used multiple channels of both interpersonal and mass media respectively. Besides, farmers will trust a new idea if it is communicated through more than one channel (Vinod Dar & Marcia Levis, 1974). Interpersonal contact requires in-depth discussions and explanations for, more complex innovations to clarify unclear issues for the farmer. Herein, “Feedback which makes communication a two way is essential because it helps to evaluate the effectiveness of the communication”. (Adolwa et al. 2012). Small and Medium Enterprises in Cameroon equally adopt internet in order to receive feedback from recipient (Ntwoku, 2011).

According to Akinbile and Otitolaye (2008), “Farmers need to adopt innovations to increase production, but perception and adoption of innovations depends on the communication strategies and channels used by extension agents”. A channel can only be effective if the receiver (farmer) is convinced and clearly understands the technology (OFSP) being communicated through it. In choosing an institution, Wiese et al, (2010), found out that students were strongly influenced by both the information and the channels through which the information was provided. The perceptions of communication approaches and messages linked to their channels might also be attributed to characteristics of ethnic groups, such as culture and educational level (Hartman, et al, 2014). Well-structured messages in a way that suits the farmer’s interests, values or characteristics stimulate their adoption (Tziovaras, 2008). However, the fact that mass media is not seen as useful in decision making does not mean that it is inadequate or misleading, but that it may not communicate the details required for decision making(Wiese et al, 2010). Therefore, physical appearance is essential as it

enables the farmer to understand and appreciate the detailed information.

Even though the traditional channels of communication (extension system) will remain important, the new Information Communication Technologies hold greater potential for broadly disseminating knowledge gaps (World Bank Report, 1999). The government and development agencies have been encouraging the adoption of ICT in an attempt to boost economic growth through Small and Medium Enterprises especially in developing countries (Ntwoku, 2011). A meticulous planning and systemic approach is required in providing the efficient demand driven extension services in response to farmers demands, based on the partnerships of Government and private sectors, NGOs (Heeks, 2002). Recent advances in microcomputer based products provide extension with the opportunities to revise and update historic delivery system. Strategically located integrated Information Communication Technology based systems provide further opportunities for public service innovations (Walters, 1995 and Taylor et al. 1996).

The intensification of information exchange between farmers, agribusiness and state agencies has a growing impact on the application of IT which has become a key instrument in planning and operation of modern extension services so as to enhance the farmer's ability to manage the available resources efficiently. Future Agricultural adoptions will depend largely on the economic and political environment and knowledge system and the level of IT that can be effectively used. It will take time to get tuned to new interventions (kiosks) and a time will come that they realize the worth of information (Ramkumar et al. 2003). The fact that mobile and wireless technology systems are characterized by digitalized networks, affordable technological devices and ease of use, have facilitate their penetration into different localities. (Ntwoku, 2011). However, the Digital Divide issue between those with and without access to certain ICT can affect information deliverance Kreuter and McClure (2004).

Besides a farmer will prefer to share and exchange information about a technology through a group discussion rather than the mobile phones because there are no costs of communication incurred. (United States Agency for International Development [USAID], 2011). Furthermore, success and failure of ICT also depends on the size of gap that exists between current realities and design conception of the information system (Heeks, 2002; Walters, 1995). However, the efficient use of information system on a long-term basis depends on the variety of new information a user can find and the degree of interactivity in case of a kiosk, which is an important criterion for evaluation of communication media especially in computer assisted learning situation. This suggests updating the information at frequent intervals along with the static information.

ICT is basically a network that connects other networks (Rhodes and Booth, 1992). The internet is a prime example of ICT that have changed the way people carry out their daily activities. Data and information on an almost infinite amount of topics are available in a timely fashion on the internet at the click of a mouse. Agricultural information is part of a continuum that begins with scientific knowledge and understanding and ends with the evaluation of the information (Chambers and Ghildyal, 1994). However, there are other forms of communication that can actually work even better than ICT. According to Nonaka and Takeuchi (1995), often the preferred way of transferring any information is through face-to-face communication. This is especially true in forms of education or learning that depend on apprenticeship. Much learning, however, makes use of explicit knowledge, again in the form of documents and tools, in order for somebody to assimilate the associated knowledge into the world view (Nonaka and Takeuchi 1995). Complementary to this form of learning is apprenticeship system whereby a junior acquires tacit knowledge by working alongside an expert. This form of learning has long been recognized in consulting engineers and other organizations.

2.3 THEORATICAL FRAMEWORK

Based on the analysis of the effectiveness of communication channels disseminated by National Agricultural Crop Research Institute, CIP, Harvest plus and Gulu University in the adoption of orange fleshed sweet potatoes (OFSP) in Gulu District, Uganda, this chapter focuses on theoretical, conceptual framework, and related literature on the two objectives of the study which include; the types of communication channels and their effectiveness.

This study was guided by the Diffusion of Innovation (DoI) theory, also known as the Innovation Diffusion Theory (IDT) and observations of Gabriel Tarde, (1903) a French sociologist and legal scholar. There are four major theories that deal with the diffusion of innovations namely: the innovation-decision process theory, the individual innovativeness theory, the rate of adoption theory, and the theory of perceived attributes (Rogers 1995)

This theory was used by Adolwa et al. (2012) in the analysis of communication and dissemination channels influencing the adoption of Integrated Soil Fertility Management in Western Kenya. The researchers found out that farmers prefer to use community-based and mass media channels as the most suitable for adoption of ISFM technologies in Western Kenya. Farmers want accessible, reliable, informative and comprehensible information sources and channels such as own experiences, farmer field days and farmer groups. ICT and print-based channels were the least effective on all four counts. The theory postulated that media is an object of diffusion as cited by Everett Rogers (1962, 1983, 1995, 2003), explaining how, why, and at what rate new ideas and technology are disseminated through a particular group of individuals (Sophonthummapharn, 2008).

Based on agricultural extension work in US and East Africa, this theory explained the progression over time by which members of a community adopt new or different practices.

(Servaes, 2008), (e.g. Ryan and Gross 1943). Adoption and diffusion are interconnected concepts describing the choices to either use or not use an innovation (Mukuruba, 2012). Adoption was defined as a user's initial acceptance of an object (Youngseek and Crowston 2011). According to Rogers (2003), diffusion is the process by which an innovation (OFSP) is communicated through certain channels over time among the members of a given culture. An innovation is an idea, practice, or object (OFSP) that is perceived to be new by an individual (a Farmer) or other unit of adoption (Ndah, 2010).

As applied to this study, the theory held that communication channels would influence the adoption of OFSP. This is true considering the fact that appropriate channels were used for dissemination of specific innovations, while others most effective at certain stages of the diffusion process (Akinbile and Otitolaye, 2008). Thus if communicators believe that communication channels affect the adoption of OFSP, then the communication process should not only be accomplished through the media but more effectively through interpersonal channels to achieve major changes. However, in adopting this theory, the researcher was not ignorant of its shortcomings. According to Hailu (2008), diffusion of any innovation is not a one step process as it took time for individuals to adoption it. Rogers categorized five adopter groups depending on the speed of adoption of a new idea: innovators, early adopters, early majority, late majority, and laggards. These categories followed the S-shaped course of diffusion curve, whereby very few innovators (brave people) adopt the innovation in the beginning at 2.5%, early adopters (respectable people) 13.5% then, the early majority (thoughtful people) at 34%, the late majority (skeptical people) 34% and lastly, the laggards (traditional people) at 16%. Nevertheless, Rogers diffusion theory did not explain why the size of the five adopter groups should be 2.5% for innovators, as stated above, regardless of the product being adopted (Ntwoku, 2011).

Roger's asserts four key components of behavior change: the innovation itself, communication channels, used to spread information about the innovation, time and the nature of the society to whom it is introduced. This study focused on the communication channels component. Rogers (2003) defined that communication is a process by which participants create and share information with one another in order to reach a mutual understanding. Information exchange is a way in which people request, provide, and share information with the aim of reducing uncertainty. Rogers (2003); Ntwoku, (2011), highlighted the different roles of 'mass media' and 'interpersonal' channels, with the former especially useful for creating awareness amongst potential adopters and the latter being more effective in persuading actual adoption.

Rogers (1995) further published five attributes to predict when and where adoption occurs under a given situation: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage examined the degree to which an innovation was seen to be better and beneficial than what already exists. Compatibility was the degree to which an innovation is seen to be consistent and familiar with the existing values and past experiences of a society. Trialability was when an individual prefers to first find out how it works or waits to see the innovation in use by their peers and understand its benefits before adoption. Observability was after seeing the visible product for purposes of easy communication. Complexity was the degree to which an innovation was perceived to be difficult and complicated to understand and use.

Past adoption studies

In examining the adoption of improved rice production technology among young farmers in Gbako Local Government Area, Niger State, Umar, et al, (2009), found that income, extension contacts and social participation had significant relationship in adoption. Jirgi et al.

(2009) reported that the major reasons for not adopting improved rice varieties were that they were expensive and lacked inputs.

Several research studies have indicated that off-farm income and availability of information influence technology adoption choices through affecting risk aversion levels of smallholder farmers. Risk aversion is linked to non-adoption because farmers are uncertain about the profitability of new technologies. (Kagoungo et al. 2010) further observed the mean age of non-adopters was slightly higher than that of adopters but the difference was not statistically significant. The number of years of formal education for adopters was significantly higher than that of non-adopters representing a connection between education and adoption of OFSP. The other significantly different attributes between adopters and non-adopters were total number of household members and available labour (Kagoungo et al. 2010).

Modeling adoption and communication theory

Rogers (1962) posited that it was crucial to conceptualize the diffusion and adoption of innovations in terms of a framework based on information and uncertainty. The use of these key concepts helped us to understand the diffusion of technological innovations as one type of communication process. The nature of the diffusion process was the information exchange by which one individual communicates a new idea to one or several others. The process involved: (1) an innovation, (2) an individual or other unit of adoption that had knowledge of, or experience with using, the innovation, (3) another individual or other unit that did not yet have knowledge of the innovation, and (4) a communication channel which connected the two units (Rogers, 1962).

Rogers compared diffusion to the communication process basing on Lasswell's communication theory. Harold D. Lasswell in his formula (1948) suggested that a convenient approach to illustrate an act of communication was to answer the following questions: (see

fig. 2), and the corresponding “SMCRE”- model (Source-Message-Channel-Receiver-Effect) (Pape, 2009).

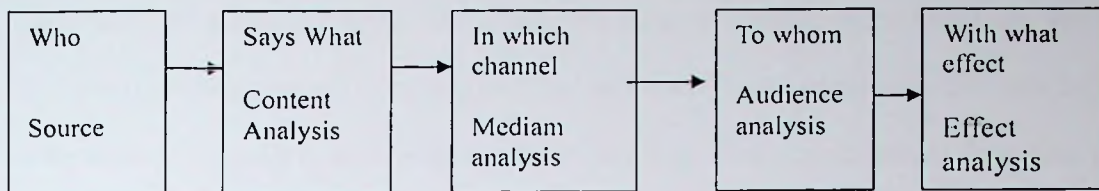


Figure 1: The Lasswell Formula with corresponding fields of communication research.

(1). The ‘Who?’-The inventor replaces the “source”, (2). ‘What?’ has been used in context analysis and the innovation replaces “message”, (3). The ‘whom?’ has been used in the audience analysis (“receiver”) is replaced by adopter (4). ‘In which?’ has been used in the media analysis (“channel”) replaced by channel, (5). ‘With what?’ has been used in the “effect” analysis replaced by adoption.

This model introduces the persuasive process. It also has a powerful effect of mass communication, which entails that the approach gives a lot of power to the mass media.

However, the model was criticized for not having feedback but it is useful in the study of communication processes.

Another communication theory is the Use and Gratification approach which reversed the study of what the media do with people to what people do with media (McQual and Windah, 1981). The behavior of the audience is expressed by needs and interest of a person. This model deals with the receiving process but the communication process as a whole is not embedded.

This study will be modeled on the Two-step flow approach advanced by Katz and Lazarsfeld. This theory was formulated after revising the classical stimulus-response approach. This theory was also incorporated in the diffusion of innovation of Rogers work (1962). Katz and

Lazarsfeld revealed that;

(1) communication process includes individuals who are active in receiving and passing on ideas from the media and those who depend on personal contacts for information. Diffusion is a social process that involves interpersonal and mass media communication relationships. Interpersonal channels (Opinion leaders, Face-Face) are thus more effective than mass media (Television, Radio) in persuading individuals to adopt an innovation as most individuals depend on subjective evaluation of an innovation conveyed by previous adopters rather than scientific evaluations in order to adopt or reject an innovation (Rogers, 1995). This is exemplified in the case of the Iowa hybrid corn, where neighbours were said to be the most influential channel in persuading a farmer to adopt an innovation after hearing about it from the salesman (Rogers, 2003). With this observation, Ryan and Gross were the first authors to recommend that an individual passes through different stages (knowledge and persuasion) under communication channels (see fig.1) to adopt a new idea. Therefore, different communication sources/channels function at different stages in an individual's innovation-decision process.

(2) The response to media messages will not be direct and immediate but passed on through and influenced by these social relationships. Interpersonal channels are most important at the persuasion stage of the innovation-decision process, especially where there is homophily or similarity between the individuals. According to Miller, (2010), "dialogue and interpersonal communication build social worlds and create human spirituality that binds us together as human beings". Interpersonal channels are effective in the communication of innovations considered complex. For example, farmers have the opportunity to discuss with extension workers to help them understand the innovation and adopt it faster (Rogers, 1995).

(3) It involves the decision of acceptance or rejection of influence or information (McQual

and Windah, 1981). Knowledge versus the persuasion stages exist for both opinion leaders and followers (Rogers, 1962). Interpersonal communications are important to earlier as well as later adopters, though more important to later adopters who do not have as much access to other communication channels. Laggards usually gain awareness knowledge from interpersonal channels, explaining the slow rate of adoption among that group due to slow progression through the process (Rogers, 1995).

In adopting this theory, the researcher is aware of its shortcomings. The original two-step flow model assumed that mass media was the only source of information and yet non-media channels like organizations also apply. As applied to this study, the theory holds that communication channels influence the adoption and non-adoption of OFSP. The social economic characteristics, mass media and interpersonal channels used in persuading farmers to take up OFSP influence the rate of adoption and non-adoption.

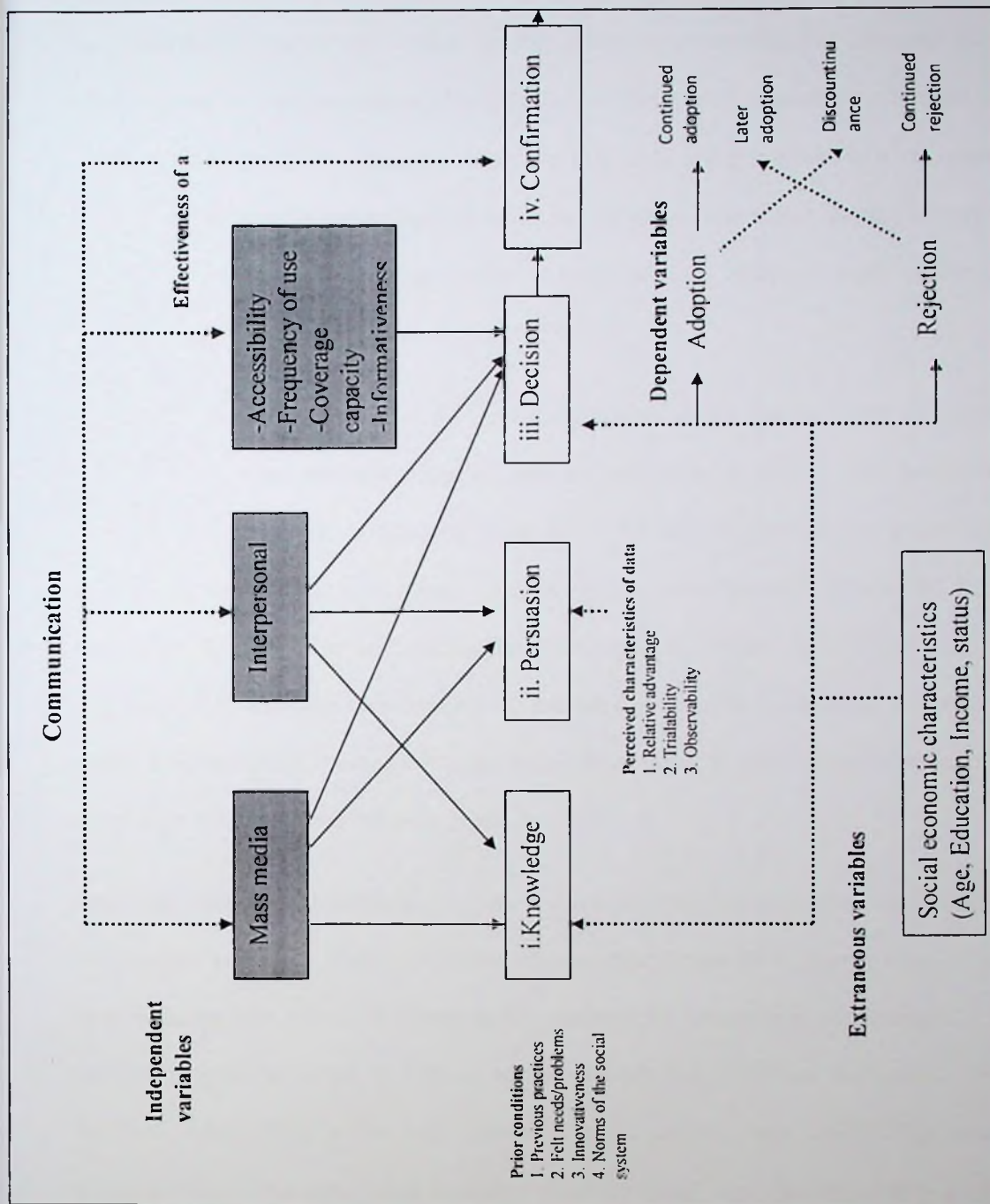


Figure 2: A conceptual framework for the relationship between communication channels and adoption. Source: Rogers, 2003. Adapted and modified from (Adolwa, et al, 2012).

In the scheme in Fig. 2, the independent variable is conceptualized as communication channels (mass media and interpersonal) and effectiveness of communication channel, and the dependent variable as adoption and non-adoption. Extraneous variables are identified as age, education, income and status. In this scheme, communication channels can lead to effectiveness of communication channels. A communication channel is effective when it is adopted, therefore it is an indicator when it is effective, and it is effective when more farmers are exposed to it and have accepted to use it for efficient information sharing with researchers and extension agents. But generally, communication channels and effectiveness of communication channels lead to adoption of OFSP.

The framework postulates that the type of communication channel and its effectiveness, directly affects the farmer's adoption and non-adoption of OFSP. The model chosen to illustrate this approach is adopted from the Diffusion of Innovations and it states that individuals experience five stages of accepting a new innovation; namely, Knowledge, Persuasion, Decision, Implementation and Confirmation (Rogers, 2003). However, this study will deal with the first three stages of Knowledge-persuasion-decision sequence through which a farmer gains initial knowledge of an innovation, to forming an attitude towards the innovation and decides to adopt or reject it.

The first stage is knowledge, in which mass media channels are used to expose the innovation's existence to the farmer but with no information about how it works. The second stage is persuasion, in which interpersonal channels are effective in convincing the farmer to become actively involved in finding out any knowledge about the innovation. The next is decision, where the farmer gets involved in the activity and weighs the benefits and shortcomings of the innovation to either adopt or reject it. However, a farmer can still be persuaded through mass media and gain knowledge through interpersonal channels to make a

decision. The fig. 2 further indicated that the farmer evaluates the new idea and chooses to either integrate it into on-going farming activities or not. The farmer may also develop a need after finding out that the innovation exists. The newness of an idea, associated with communication frequency may affect adoption in some social cultural settings.

According to Akinbile and Otitolaye, (2008), a communication channel has a number of indicators which among others includes: type which is the form through which a message is transmitted. With a list of mass media and interpersonal channels, the type of channel used can be measured by several means, indicating whether the farmer always uses, sometimes uses, and never uses specific channels Okwu, (2012). The effectiveness of a mass media or interpersonal channel will differ depending on the stage through which an idea is passed on to a farmer. The coverage capacity of a channel is another indicator which can be measured on a 5-point scale if farmers strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD). Accessibility which is ease of use and informativeness or understanding of the message through a specific channel are other indicators which can be measured by the suitability of existing OFSP channels Adolwa et al., (2012).

However, this relationship may be modified by age, education, income and household size of the farmer. Adoption can be attributed to income levels of how much a farmer earns (in Ug.shs) from farm yields and from other sources in a year to access a television, radio or meet in a focus group. Elders may not be interested in modern technology; therefore, age will be measured by a farmer reporting his/her age (in years rounded off) at the time of the interview. House hold size will be measured by counting the number of people living in the same house hold and feeding from the same land. The education level will be measured as the total cumulative number of years an individual has spent in school to acquire an educational qualification as follows: no formal education, primary school certificate, secondary school

certificate, diploma level, bachelor's degree, masters. (Okwu, 2012).

According to the Sustainable Rural Livelihood Framework (SRLF) adopted by Mangong et al. (2006), livelihood asserts and agricultural technologies are connected to pursue an agricultural product and this result into livelihood outcomes. Adoption of OFSP has a number of indicators which include positive attitude and behavioral change leading to increased farm-household income, reduced vulnerability, interactive community groups and food security. Non-adoption of OFSP is costly to the organizations disseminating technologies through unfamiliar channels to famers and thus results into negative livelihood outcomes of low income, poor health and food insecurity.

CHAPTER THREE: MATERIALS AND METHODS

This chapter highlights the research design, sample size, sampling technique, quality control, methods of data collection and instruments, processing and analysis in which the study was carried out. The chapter also highlights the limitations and problems that were encountered while collecting and analyzing data

3.1 Research design

Saunders et al, (2007), defined research design as the general plan of how the research questions would be answered. This study was conducted through social research using a household survey research design as the main investigative design. A household survey research design presents oriented methodology used to investigate populations by selecting samples to analyze and discover occurrences (Oso and Onen, 2009). The survey was a method of data collection in which people were asked to answer a number of questions (in the form of interviews, household questionnaire and Focus Group Discussions). The design was selected because it constituted a blue print for the collection, measurement and analysis of data. It was a conceptual structure within which research was conducted. The relationship between the types of communication channels and their effectiveness was established.

Social phenomena had to do with extremely varying human conditions in different environments which made it difficult for social science researchers to choose appropriate research approach and methods to investigate the specific problem concerned. However, this adopted a case study approach for investigating the phenomenon. As defined by Yin (2003), a case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context especially when the boundaries between phenomenon and concept are not clearly evident. The case study constituted Gulu District. The sampling in this study relied upon recruited respondents based on personal knowledge and contacts. Recruitment also

relied on purposive method of putting together respondents rather than the snowballing.

3.2 DESCRIPTION OF THE STUDY AREA

3.2.1 Geographical Location

Gulu District is located in northern Uganda between longitude 30-32° east; latitude 02-4° north (Appendix A). It is bordered by Amuru and Nwoya district in the west and southwest respectively, Lamwo district in the north east, Pader district in the east, Lira district in the south east and Oyam district in the south. ("Overview of Gulu District", n.d.,para 1).The total land area of Gulu District is 3,449.08 sq km (1.44% of the Uganda land size). 96.9 sq km (0.8%) is open waters (Gulu District Local Government, 2013).

It has a population of 374,700 (Ministry of Water & Environment, 2010). The district now comprises two counties: Achwa and Omoro, 16 sub counties: Awach, Bar-dege, Bobi, Bungatira, Koro, Lakwana, Lalogi, Laroo, Layibi, Odek, Ongako, Paicho, Palaro, Patiko, Pece andUnyama. Kilak County was converted to Amuru District, and Nwoya County is now Nwoya District. In the past, Kilak and Nwoya were counties in Gulu District. Nearby towns included Barogal, Palenga, Kilak, Amuru, Atanga I, Nadiang, Atiak and Kitgum.

Gulu has two Agro-ecological zones. "The Northern Gulu district is found in the North Western Savannah Grassland Agro-ecological zone".

Gulu district has one rainy season from April to mid-November which ranges from 1340 mm – 1371mm. August to mid-October and a secondary peak in April/May". (United Nations Development Programme [UNDP], Bureau for Crisis Prevention and Recovery [BCPR], 2013). A long dry season of up to 4 months from mid-November to late March takes place. The driest months are December to February. During the rainy months of May, August and September rainfall exceeds evaporation. ("Agro-ecological zones in Uganda,"n.d.,para

3). It is one of the districts with the highest temperatures—up to and above 35° C. (UNDP, BCPR, 2013).

UNDP, BCPR; (2013), further notes that South-western Gulu is found in the Para Savannahs Agro-ecological zones and there is one long dry season in this Agro-ecological zone of about 3½ months (December to mid-March) (UNDP, BCPR, 2013).

3.3.2 Study site

The study was conducted in three project sites namely: first site, the Urib Can group, the Rubanga Lakica group, Can Miyo Ryeko group and Pit-tek group in Koro Sub county, Achoyo parish, Koch village in Omoro County, second site was Bungatira Sub county, Layik, Laroo, Bwobo, Lawiyadul and Punena villages all in Aswa County and the third site was Unyama Sub county in Ajuko village, Aswa County where individual respondents were interviewed. Therefore, three sub counties, two counties and seven villages were sampled, (see appendix A for Map of study area with sampled sub counties).

3.3.3 Population

According to the 2002 national population census, Gulu district had a total population of 298,527, when Amuru and Nwoya were still under Gulu, it increased from about 211,788 in 1991 Census and in 2013 it was projected to 407,500 people (Gulu District Local Government, 2013). This figure was not taken into account during sample size calculation, because the study focused on only farmers growing OFSP. The annual population growth rate was 2.9 percent as compared to the national growth rate of 3.2. Therefore, Population density was at 111.5 persons per Km². Given those statistics, it is estimated that the population of Gulu District is now 374,700 (Ministry of Water & Environment, 2010).

3.3.4 Economic activities

According to Gulu District Local Government (2013), the economic activity of 80 per cent of the population is subsistence or slightly super subsistence agriculture. In the rural areas, most of the men and women are involved in agriculture while in urban areas; most men are involved in professional associate work while most of the women are social service workers (Gulu District Local Government, 2013). South-western Gulu is known for livestock ranching and the soils are suitable for crop production. There are on-going Smallholder Agricultural projects and Uganda Wildlife Authority programmes. ("Agro-ecological zones in Uganda,"n.d.,para 4). Farm lands which were abandoned over 20 years ago have since reverted back to forest ecosystems with tree crown cover of more than 10 % to 30 % which is within the minimum thresholds forest for afforestation/reforestation projects ("Gulu Carbon Compensation Scheme,"n.d.,para 2).

3.4 Determination of sample size

3.4.1 Study population

All the items under consideration in any field of inquiry constitute a population. It was presumed that in such an inquiry when all the items were covered, no element of chance was left and the highest accuracy was obtained. Sekeran, (1990) reported that population referred to the entire group of people, events or things of interest that the researcher wished to investigate. Quite often the researcher selected only a few items from the population for the study purposes. The items so selected constituted what was technically called a sample. Sekeran, (1990) defined a sample as a portion of the population that attributed as the entire population. The total number of OFSP individual farmers was 150. The sample size was determined using published tables which provided a sample size necessary for given combinations of precision, confidence levels and variability (Oakland, 1953). According to Oakland (1953), the sample size n is given by Equation 1.

$$ME = z \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Equation 1

Where ME the desired margin of error
desired

n is the sample size

$\hat{p}$ is the confidence interval

Z is the Z score

From the Tables, if N (Where N is the population) = 150, for precision (e) $\pm 5\%$, which is 95% confidence level. Oakland's table, (1953) was used to select the 110 respondents who completed the household survey questionnaires.

3.4.2 Sampling

Gulu district was purposively selected based on sub-counties where OFSP was disseminated in 2009. To get that sample, the researcher was assisted by the District Agricultural Officer to obtain a list from the members of the OFSP management committee of all farmers in the three sub counties of Koro, Bungatira and Unyama. The list had a total of 150 individuals. Simple random sampling was used by writing names of each respondent on slips of papers, which were thoroughly mixed up in a container and the required number of slips drawn as a lottery, to obtain a sample of 110 households who were interviewed. Out of the 150 individuals, 100 respondents were randomly selected in 4 FGDs comprising 25 per group. In addition 8 key informants completed the semi structured questionnaires, with the aim of capturing additional information on the types of communication channels used in dissemination of OFSP.

3.5 DATA COLLECTION

The two main procedures for collection of relevant data were theoretical and empirical. Theoretical refers to secondary data, which was collected by earlier research where the purpose of that data was relevant to the study. On the other hand, empirical data is primary data, which the researcher used to directly investigate the specific problem. This type of information was sourced from the field. To find suitable information, the researcher used relevant resources at the institution and its literature concerning OFSP and existing theories within the subject.

3.5.1. Primary Data

Primary data was more qualitative and it was collected through Participatory Rural Appraisal (PRA) tools. These included using household survey, Focus Discussion Guide and key informant interviews. The individual interview guide was administered to all the eight (8) categories of Country manager, Research associates, Project managers, Department Head, Technicians, Research assistants, Extension workers, OFSP informed natives of Gulu and Household respondents that were ear marked for the purposes of the research, and the respondents on their opinion on the issues of the study. This was used to further enhance and validate data collected through pre-testing using purposive sampling of three interviewees. Pre-testing aimed at ensuring whether the questions were clearly stated for the required OFSP data. The interviewees identified some questions which were irrelevant, those with missing details and incorrect vocabulary. The questions were re-designed and others removed from the questionnaire. This exercise of pre-testing also helped to find out the interviewees' thoughts and understanding of the questionnaire and study. The focus group discussion guide was administered to four farmer's groups comprising 25 participants per group. Therefore, 110 individual farmers completed the household survey questionnaires, 100 respondents

completed the focus group discussion questionnaire and 8 Key informants were interviewed.

3.5.2 Secondary Data

Secondary data was captured mainly through desk reviews in the attempt to address various issues ranging from the assessment of the effect of communication channels, cost effectiveness by National Agricultural Crop Research Institute and other collaborators in the promotion of orange fleshed sweet potatoes (OFSP) in Gulu District, Uganda.

Triangulation of these methods was necessary in order to gather as much information as possible but also to increase the validity of the findings, as each technique had its merits and weaknesses.

3.6. DATA COLLECTION INSTRUMENTS

3.6.1. Interview Guide

Semi-structured interviews were held with the participants at times as a group or as individuals where greater detail was necessary. The interviews were also collaborative and intended to generate data, which contributed to an understanding of the ways in which OFSP impacted on the social economic lives of the people. The interviews were conducted in English and Luo (local language) spoken by all residents. Therefore, field assistants carried out data collection throughout the study. In Gulu district, questionnaires were administered with the assistance of a group comprising local residents, and a group of native young Technicians and Agronomists graduates from the local institution (Gulu University) of agriculture.

Household interviews were conducted with key informants in National Agricultural Crop Research Institute, CIP, Harvest plus, World Vision, Gulu district extension worker and Gulu University. Meetings with key informants were organized within the facilities of the sectors' common room with writing boards at the researcher's disposal. Key informants were asked to name grown plant cultivars, then one at a time to classify if it is either grown by many or few households on large or small areas or vice versa, then farmers were asked to broadly describe the already mentioned cultivars with comments (see appendix 1). This interview was for purposes of understanding how effective information was transferred from the researchers to farmers. The procedure was demonstrated first, and then group members elected through nomination by their peers which facilitated the exercise.

A cassette recorder was used with the consent of the participants. The researcher then transcribed the recorded interviews. In order to elicit in-depth response from the informants, a number of key sub-questions formed the basis of the inquiry and initiated discussion.

3.6.2 Focus Group Discussions (FGDs)

FGD and scoring on agricultural practices, noted the facilitation of a group member. A focus group interview was carefully planned in sessions with 5-10 individuals and was designed to obtain perceptions in a defined area of interest in a permissive, non-threatening environment (MacFie and Thompson, 1994). This made a valuable contribution towards understanding the attitudes and behavior of consumers (Jenkins and Harrison, 1992). A skilled moderator conducted the interview and the discussions were relaxing and enjoyable for the participants.

Focus group discussions were aimed at providing insights into how OFSP products, services or opportunity were perceived. The moderator was skilled to encourage participation by all the participants (MacFie and Thompson, 1994; Jenkins and Harrison, 1992). Caution was taken to generalize the findings to the population at large, so even though respondents were

recruited based on regular use of OFSP products, it was not possible to ensure a representative sample of the public on all relevant demographic variables (Jenkins and Harrison, 1992).

Semi-structured interviews were used during individual contacts. Male and female headed households, earlier identified, were interviewed with at least two days prior notice.

Quality Control Methods (Validity and Reliability)

According to Komba, (2006) validity is briefly defined as the degree to which the findings are interpreted in a correct way and reliability is the degree to which the findings are independent of accidental circumstances of the research. Garbich, (1999) defined validity as the ability with which the results of a study can be verified against the stated objectives. Baker (1999) explains that doing social research is not just a matter of collecting facts based on careful observation. It is only by interpreting their complex meanings and relationships and understanding the way they are created in social life. It is against this background that the issue of validity will be discussed.

In order to ensure high quality results, efforts were made to institute quality control measures at each main phase, notably: Selection of sample units (i.e. villages and households), Preparation of a questionnaire (content and wording), Questionnaire editing and coding, to ensure completeness of answers.

The data collection tools were pre-tested before being deployed in the field data to check their validity, consistency, the flow of questions and ensuring that it captures right responses and questions for which right responses are provided. Field assistants with a minimum level of education were employed and trained to collect the data. During field data collection, the researcher supervised data collection exercise to ensure that right data was collected.

3.7. DATA ANALYSIS

The researcher reviewed the interview data sheets for accuracy and completeness of information given. Data was then organized according to the various categories of respondents in the study such as Household respondents, Key informant and FDGs. Recorded interviews were transcribed and analyzed. The theoretical framework was compared with the answers which, in turn, guided the researcher to conclusions regarding the investigated topic. Interviews in Gulu district and the National Agricultural Crop Research Institute were long and therefore, evening recaps were necessary.

The audio recorded interviews of the day were analyzed, and helped to understand further and interpret some of the findings. Digital photographs were also taken throughout the study period and helped to better understand the study area as well on the interpretation of the findings.

All interviews and interactions transcribed verbatim and emergent themes generated for each transcript from a line-by-line microanalysis using a coding approach (open, selective, and axial) characteristic of grounded theory (Strauss and Corbin, 1990). The data collected from the public texts, fieldwork, interviews, and media representations were coded. Statistical Packages for Social Science (SPSS) was used to bring out the numerical figures of all the variables and also to test the statistics. Other useful information captured included socio-economic factors influencing access to these sources and channels, and the eventual implementation of OFSP adoption by farmers. Informal interview sessions with farmers and extension agents took place in order to gain additional information.

3.8 Ethical Considerations

The research proposal was presented to the Department of Agricultural Economics at

University of Nairobi for approval. An introductory letter which enabled the researcher to retrieve organizational information, collect data from Gulu District, and undertake field work without doubt was obtained from the Agricultural Department authorities. The District Agricultural Officer introduced and gave the researcher permission and contact phone details of Gulu OFSP management committee who introduced the researcher to the farmer groups to undertake research in their area.

Participants from collaborative organization and individual farmers were interviewed after giving their permission. For ethical and confidentiality purposes names of respondents were not included in the data collection instruments and they were informed that data collected was for academic purposes only.

3.9 Limitations

This study acknowledged limitations that included the influence of dominant participants and those with limited exposure to the product as OFSP was not used by all farmers (Lawless and Heymann, 1998). The researcher had difficulties in meeting the key informants because they had other commitments. The visited OFSP sites were far, too dusty and transport was another problem. Data was often complex to analyze and, although the groups provided rich dynamics, these were difficult to interpret and therefore analysis took time and thought. Groups were often difficult to assemble and translating from English to Luo was time consuming (Casey and Krueger in MacFie and Thompson, 1994).

The other challenge the researcher faced is interestingly stressed by Punch, (1998). It concerned generalizability. Punch asserted that properly conducted case studies, especially in situations where our knowledge is shallow, fragmentary, incomplete or non-existent, have a valuable contribution to make (Punch, 1998).

The information gathered from dominant participants was confirmed to be useful from OFSP users. The researcher sent emails, revisited and often made calls to key informants who were difficult to meet. The easiest means of transport were motor bicycles the researcher, research assistant and extension agents. Native field assistants, conversant with the Luo language were recruited to translate and gather information from accessible OFSP sites. At least four groups were represented to balance idiosyncrasies amongst groups.

CHAPTER FOUR: RESULTS

4.1 Characteristics of respondents

Table 1 indicates a high response of farmers in Koch (64) and Ajuko (24) compared to other villages who responded by 2-6. This was due to the fact that all the four groups: the Urib Can group, the RubangaLakica group, Can Miyo Ryeko group and Pit-tek group were from Koch village, Koro Sub County of Omoro county (64) and thus the positive response. Out of the total number of 110 respondents, 108 responded and 2 did not respond.

Table 1: Geographical distribution of respondents

SUB-COUNTIES	VILLAGES	COUNTIES		GRAND TOTAL
		ASWA	OMORO	
BUNGATIRA	Bwobo	2		2
	Lamiyadol	2		2
	Laroo	2		2
	Lawigadul	6		6
	Layik	6		6
	Punena	2		2
	Koch		64	64
KORO				
UNYAMA	Ajuko	24		24
Grand Total		44	64	108

Table 2: Key informant respondents.

Organization	Title	Sex	No.
CIP	Country manager	Male	1
CIP	Research Associate	Female	1
Harvest plus	Country manager	Female	1
Harvest plus	Seed specialist	Male	1
NARO	Researcher	Female	1
World vision	Project manager	Male	1
Gulu university	Technician	Male	1
Gulu resident	Extension worker	Male	1

Table 2 shows the key informants who participated in the study on OFSP dissemination, this included country manager (2), researchers (2), seed specialist (1), project manager (1), Technician (1) and an extension worker (1). These respondents work closely with farmers' groups and other parties to ensure widespread OFSP. The focus groups had four famer's groups, comprising 25 participants per group. Therefore, 110 individual farmers completed the household survey questionnaires, 100 respondents completed the focus group discussion questionnaires from four sub counties, 7 villages in 3 counties and 8 Key informants were interviewed, making a total of 218 respondents who participated in the survey.

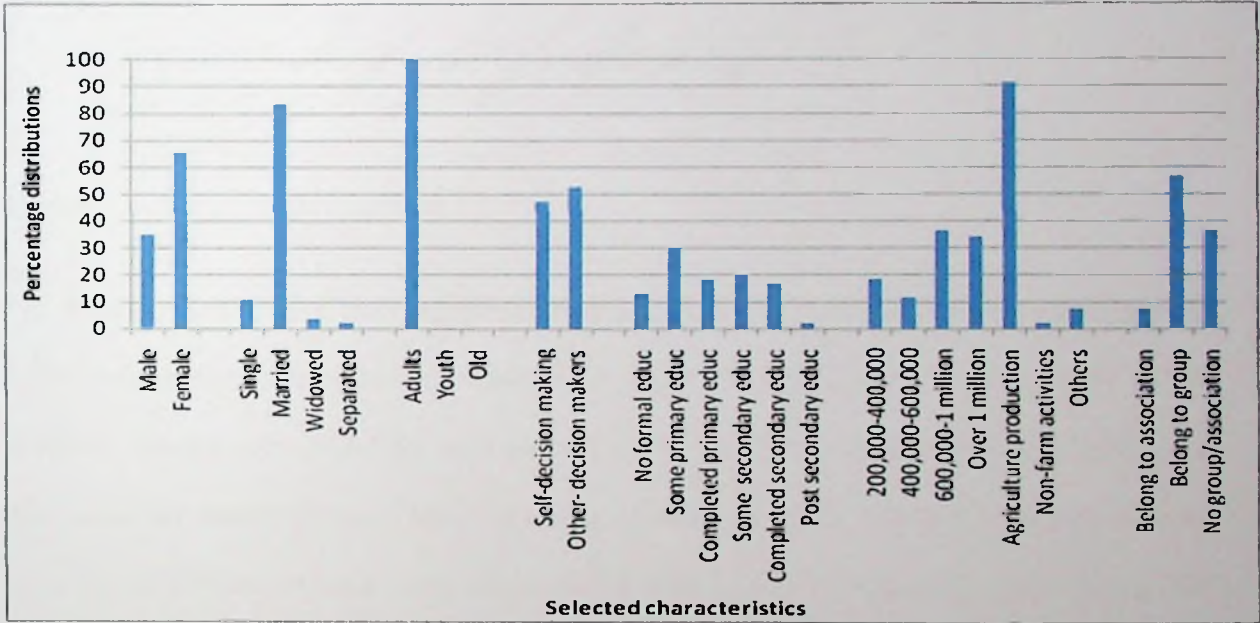


Figure 3: Household characteristics of the farmers.

The findings in figure 3 revealed that all the farmers were adults. 36% of the farmers earned at least 600,000 - 1 million Ugshs/year and yet the primary activity of 91% was agricultural production. 53% of farmers had other decision makers and belonged to a farmer group (56%).

4.2 Communication channels employed in dissemination of OFSP to farmers in Gulu district

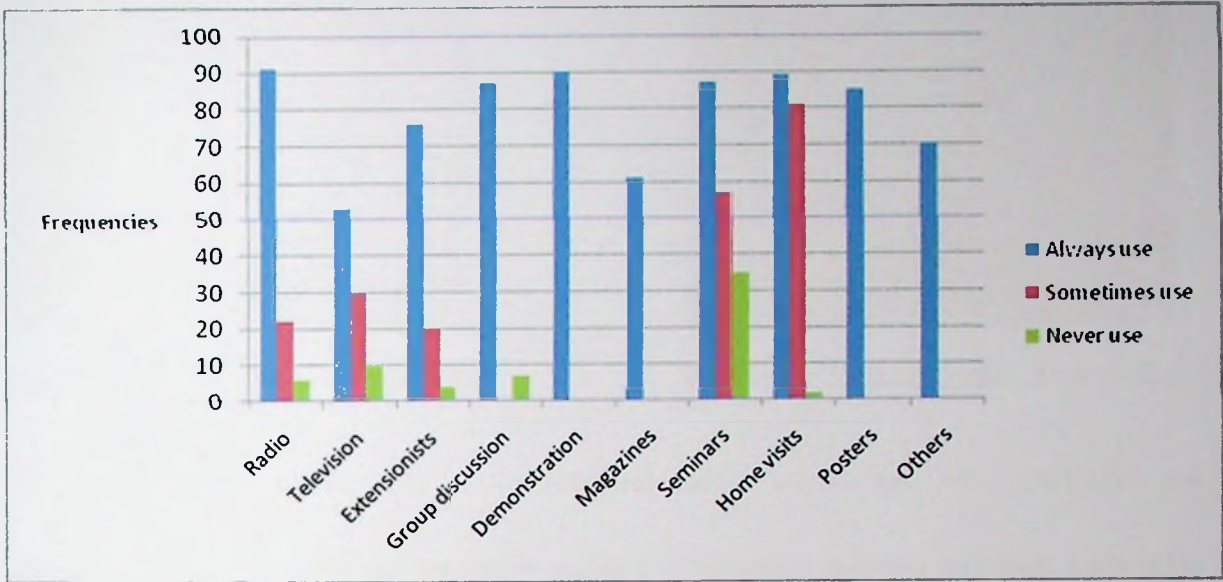


Figure 4: Key informats channels

Fig. 4 shows that 91% of the respondents report always using radio as their main channel of OFSP information dissemination, while 52% report always using television. 76% of the institutes always use extension workers and 87% use Group discussions as channels of dissemination. Demonstrations are always used by 90%, magazines by 61%, and seminars by 87%. About 89% always use home visits and 85% posters. Other channels consisting of folk media (songs, stories, community dramas), phones (short messaging services-sms) and visual media(calendars, brochures, fliers, banners, T-shirts, uptake pathways (branding on vehicles, market stalls, schools, health clinics, hospitals, churches), umbrellas, rain coats, eprons, bags, caps and pens) with OFSP messages and promotional materials are always used by 70% of the institutes.

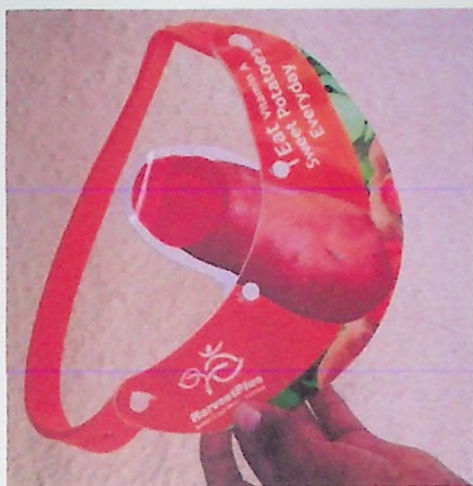


Figure 5: An OFSP dissemination cap.



Figure 6: A farmer in an OFSP T-shirt

The study established that 22% of institutes sometimes use radios, 30% sometimes use television, 20% sometimes use extension workers, 57% sometimes use seminars while 81% sometimes use home visits.

Farmers' perception on OFSP dissemination channels

The findings in fig. 8 revealed that (at least 70%) of the respondents indicated that; radio, demonstrations, home visits, seminars, posters and others channel were always used for OFSP information dissemination to farmers with only 61% by magazines and 52% by television. However, majority of the farmers gave a different assertion about the use of channels as low as 10% by radio, home visits by 4% and extension workers by 2% except for farm demonstration which was always used by 88% of the farmers. Magazines and posters were never used by farmers.



Figure 7: A variety of OFSP farm demonstration at a trade fair

Fig. 8 further indicates that magazines and posters are never used by farmers due language constraints because 52% respondents indicated speaking of the local language (Luo) well, and reading 44% as shown in Table 3 below, and yet they are always used as dissemination channels.

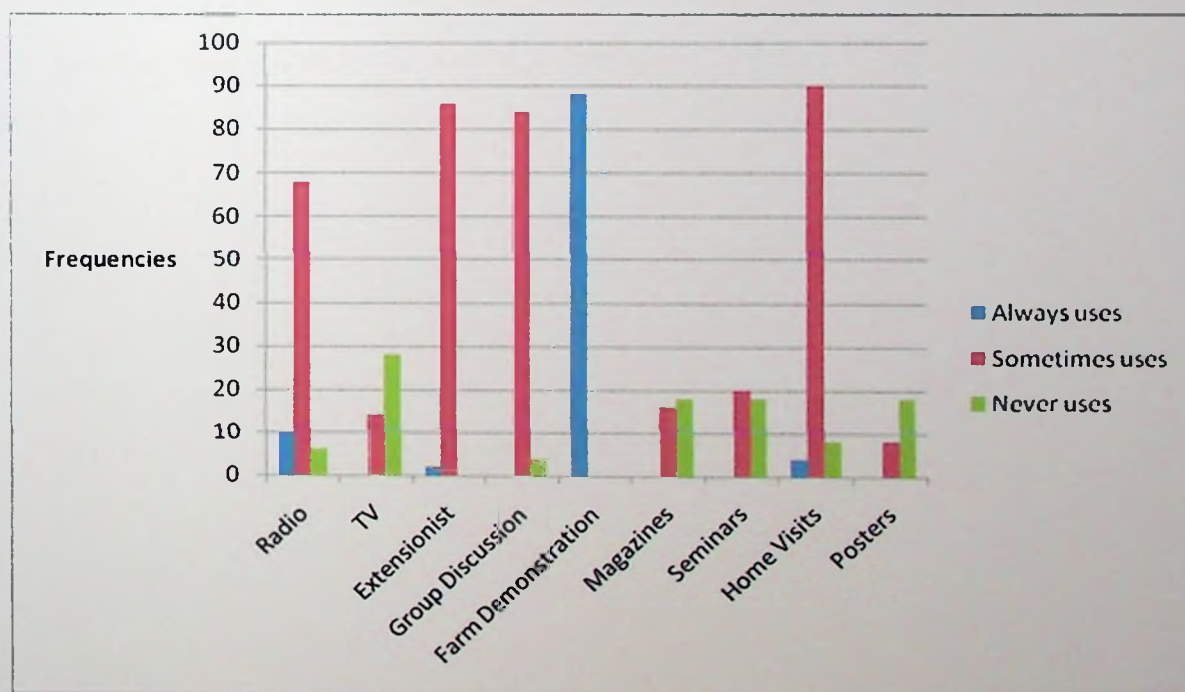


Figure 8: Communication channels used by farmers.

Table 3: Respondents perception on languages

LANGUAGES	Percentages		
	Read Well (N= 100)	Write well (N= 98)	Speak well (N= 108)
Acholi & English	2	2	3
Acholi & Langi	2	2	
English, Acholi &Langi	2	2	2
Luo	44	49	52
Luo & English	42	39	35
Luo & Kiswahili	2		2
Luo, English &Luganda	2	2	2
Luo,Luganda &kiswahil	2	2	2
N/A	2	2	2
Total	100	100	100

Table 3 indicates that 52% of the respondents spoke the local language (Luo) well, and 49% wrote Luo well and 44% read Luo well, and 35% spoke Luo/English, 39% wrote Luo/English well, and 42% read Luo/English. Other languages (Acholi, Langi, Kiswahili) were read well, spoken well and written by 2-3% of OFSP farmers.

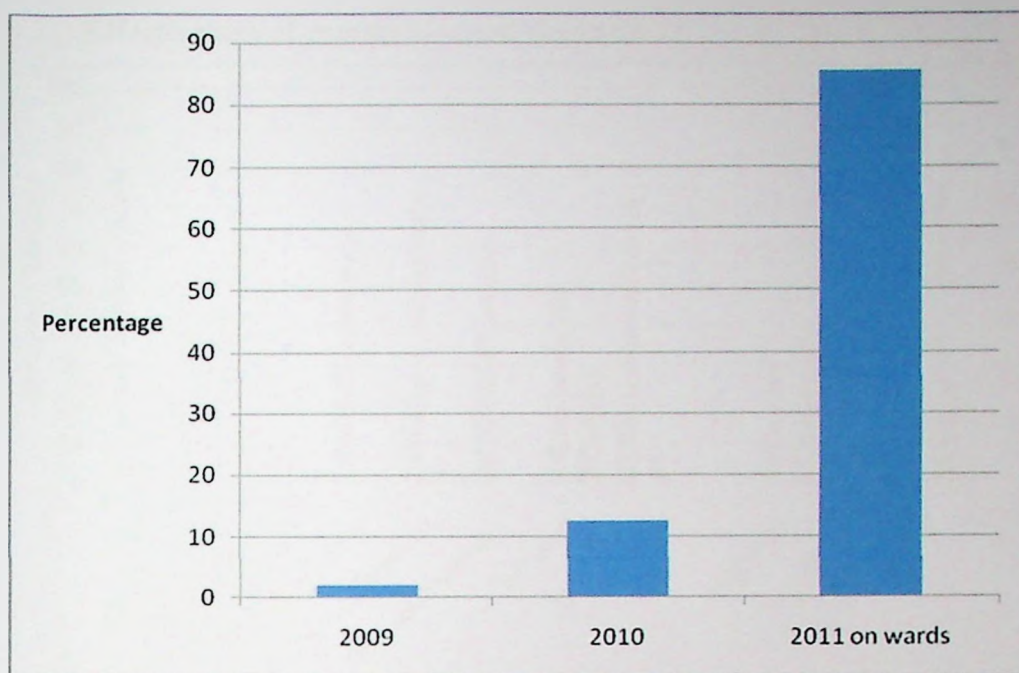


Figure 9: Response for the year of first time use of OFSP.

Legend: Note the minimal usage by 2009 the apparent increased usage by 2011.

Fig. 9 indicates that in the first year (2009), farmers (2%) used OFSP in Gulu district. Then in 2010 there was an increase in OFSP adoption by 13% in 2011 onwards, there was a tremendous increase of OFSP adoption by 85%.

4.3 Effectiveness of communication channels

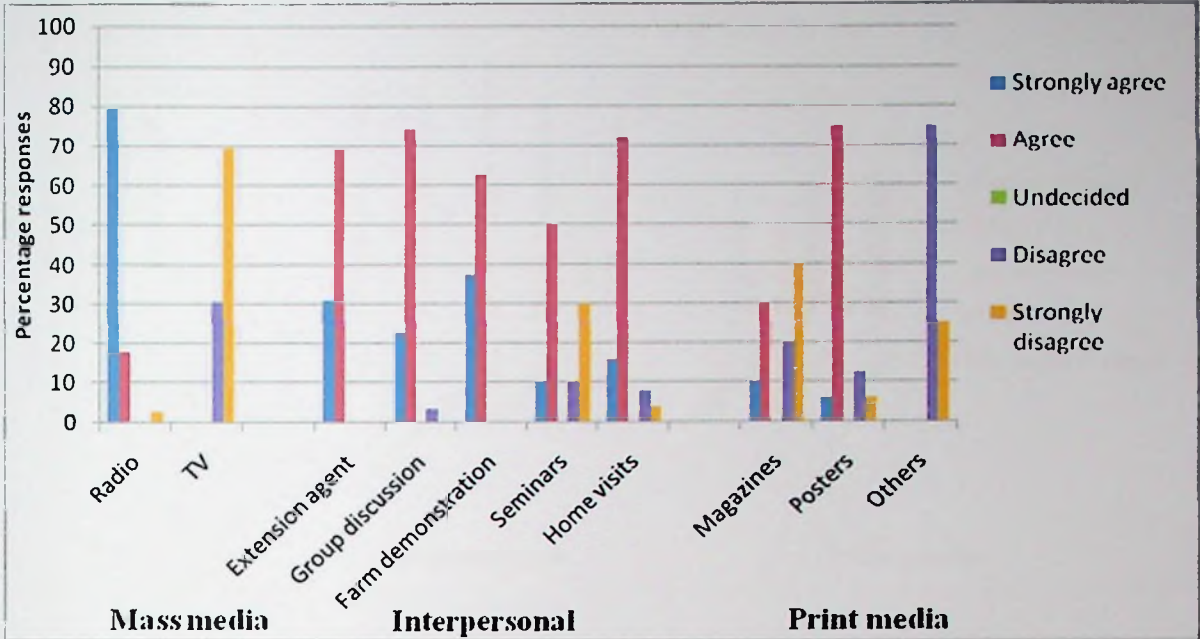


Figure 10: Coverage capacity of channels for OFSP dissemination

The findings in fig. 10 revealed that 80% of the respondents strongly agreed that radio was used for its coverage capacity for OFSP communication followed by farm demonstrations (38%), extension agents (31%), group discussion (24%), home visits (15%), magazines (10%), seminars (10%) and posters (4%). Fig. 10 also shows that at least 50-72% of the respondents agreed that posters, group discussions, home visits, extension agents, farm demonstrations, seminars were used because of the coverage capacity and magazine (30%), followed by radio (8%). 70% strongly disagreed that television was used because of its coverage capacity followed by magazine (40%), seminars (30%), others-print media (25%), posters (8%) and home visits (2%) while 75% disagreed with others-print media, television (30%), magazines at 20%, seminars, posters (10%), home visits (8%) and group discussion at 2%.

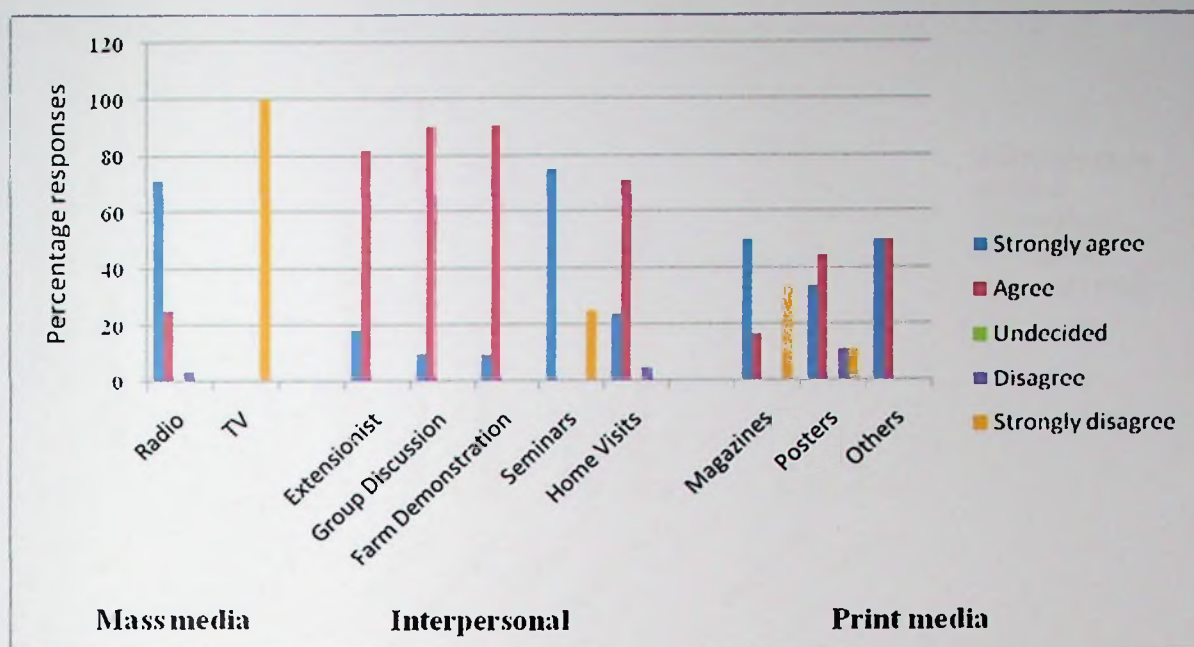


Figure 11: Accessibility of channels for OFSP dissemination

The findings in Fig. 11 revealed that 70% of the respondents strongly agreed that seminars, radio (68%), magazine (50%), posters (30%), home visits (23%), extension workers (18%), Group discussion (5%), farm demonstration (4%) were they were accessible for OFSP communication. 85% agreed that they accessed farm demonstration, group discussion, followed by extension agents (80%), home visits (70%), others (50%), posters (42%), radio (22%) and magazine (18%). 98% strongly disagree that television is accessibly, followed by magazines (30%), seminar (23%), posters (5%) while 5% disagree for posters. None of the respondents was undecided.

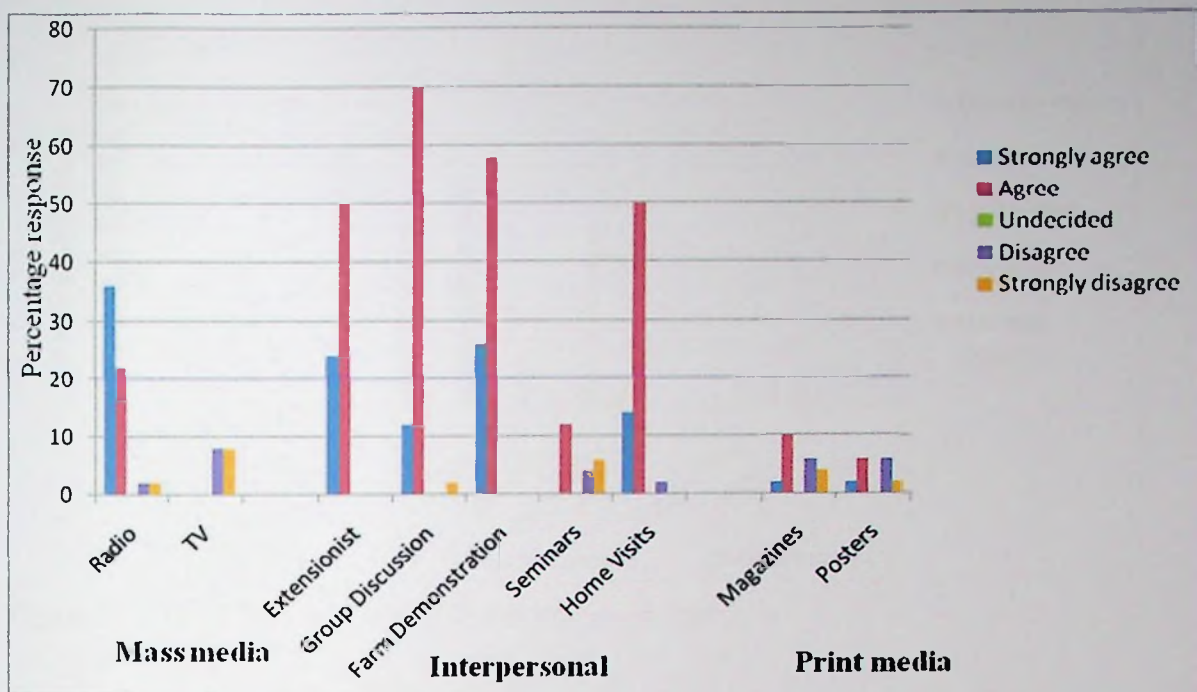


Figure 12: Frequency use of a channel for OFSP dissemination

The findings in Fig. 12 revealed that 36% of the respondents strongly agreed that radio, was frequently used, followed by farm demonstration (26%), extension agents (24%), home visits (14%), group discussion (12%) posters (2%) and magazines (2%). 70% agreed that group discussion was frequently used, followed by farm demonstration (58%), extension agents/home visits (50%), radio (22%), seminars (12%), magazine (10%), posters (6%). 8% of the respondents strongly disagreed that television, followed by magazines/posters and other channels (6%), magazine (4%), group discussions/posters (2%) were frequently used. 8% disagreed that Television, posters magazine (6%), seminars (4%), home visits/radio (2%) were frequently used.

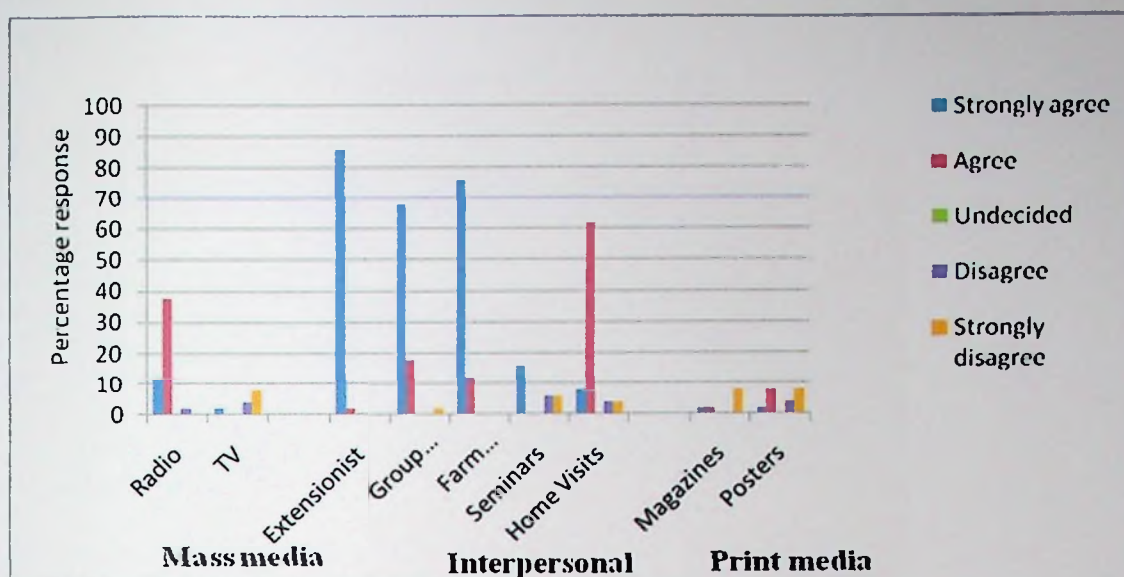


Figure 13: Informativeness of OFSP dissemination channels

The findings in fig. 13 revealed that 86% of the respondents strongly agreed that extension agents, followed by farm demonstrations (76%), group discussions (68%), seminars (16%), radio (12%), home visits (8%) and television/magazine/posters (2%) were informative in dissemination of OFSP. 62% agreed that home visits, radio (38%) were informative, followed by group discussion (18%), farm demos (12%), posters (8%), magazine (2%) and extension agents (2%). 6% strongly disagreed that seminars were informative, followed by television/home visits/posters (4%) and radio (2%). 8% of the respondents disagreed that television/magazines/posters followed by seminars (6%), home visits and others (4%) were informative.



Figure 14: Extension agents disseminating OFSP



Figure 15: OFSP varieties displayed at an FDG event

4.3.1 The relationship between communication channels and adoption of OFSP.

A correlation analysis was performed to establish the relationship between communication channels, their effectiveness (independent) and the adoption (dependent) of OFSP.

For this study Chi-square which is a versatile statistical test for examining the significance of relationships between two (or more) nominal-level variables was used as shown below;

4.3.2 Types of communication channels and adoption

Table 4: Extension agents for OFSP adoption using Chi-square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.755 ^a	2	.000***
Likelihood Ratio	15.341	2	.000
N of Valid Cases	109		

(level of significance 10%*, 5% **, 1% * **)

Table 4 shows that there was a significant difference between the chi square =53.755, p = .000).

Table 5: Group discussion for OFSP adoption using Chi-square tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.499 ^a	2	.000***
Likelihood Ratio	9.892	2	.007
N of Valid Cases	109		

(level of significance 10%*, 5% **, 1% * **)

Table 5 indicates that there is a significant difference between the chi square =25.499, p = .000).

Table 9: Seminar for OFSP adoption using Chi-square test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.249 ^a	3	.010***
Likelihood Ratio	6.113	3	.106
N of Valid Cases	109		

(level of significance 10%*, 5% **, 1% * **)

Table 9 shows that there was a significant difference between the chi square =11.249, p = .010).

Table 10: Magazine for OFSP adoption using Chi-square test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.993 ^a	2	.000***
Likelihood Ratio	15.222	2	.000
N of Valid Cases	109		

(level of significance 10%*, 5% **, 1% * **)

Table 10 shows that there was a significant difference between the chi square =20.993, p = .000).

4.3.3 Effectiveness of a communication channel

Table 11: Effect of extension agent for its coverage capacity on adoption of OFSP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.993 ^a	2	.000***
Likelihood Ratio	15.222	2	.000
N of Valid Cases	109		

(level of significance 10%*, 5% **, 1% * **)

Table 11 shows that there was a significant difference between the chi square =20.993, p = .000).

Table 12: Effect of radio for its coverage capacity on adoption of OFSP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.298 ^a	4	.121
Likelihood Ratio	6.222	4	.183
N of Valid Cases	109		

Table 12 shows that there is no significant difference between the chi square =7.293, p = .121).

Table 13: Effect of radio for its informativeness on adoption of OFSP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.785 ^a	3	.123
Likelihood Ratio	5.204	3	.157
N of Valid Cases	109		

Results in Table 13 show that there is no significant difference between the chi square =5.785, p = .123).

Table 14: Frequent use of radio for adoption of OFSP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.390 ^a	4	.356
Likelihood Ratio	4.439	4	.350
N of Valid Cases	109		

Table 14 indicates that there is no significant difference between the chi square =4.390, p = .356).

Table 15: Effect of Television for its informativeness on adoption of OFSP

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.612 ^a	3	.894
Likelihood Ratio	1.122	3	.772
N of Valid Cases	109		

Results in Table 14 indicate that there is no significant difference between the chi square =6.12, $p = .894$).

Table 15: Frequent use of extension agents for adoption of OFSP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.563 ^a	2	.001***
Likelihood Ratio	11.353	2	.003
N of Valid Cases	109		

(Level of significance 10%*, 5% **, 1% * **)

Table 15 shows that there is a significant difference between the chi square =13.563., $p = .001$).

Table 16: Frequent use of Television for adoption of OFSP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.279 ^a	2	.000***
Likelihood Ratio	15.343	2	.000
N of Valid Cases	109		

(Level of significance 10%*, 5% **, 1% * **)

Table 16 shows that there was a significant difference between the chi square =29.279, $p = .000$).

Table 17: Accessibility of seminars for adoption of OFSP

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.964 ^a	4	.003***
Likelihood Ratio	7.472	4	.113
N of Valid Cases	109		

(level of significance 10%*, 5% **, 1% * **)

Table 17 shows that there was a significant difference between the chi square =15.964, p = .003).

CHAPTER FIVE: DISCUSSION

5.1 Discussion

In the discussion, the study notes the following;

Key informants were represented by more males compared to females because most females were out of offices for field work activities. They participated in the study to provide background information on OFSP, most especially the techniques used in dissemination of OFSP.

The high percentage of adults was attributed to the changing trends from analogy to digital technology such as computers, phones which are not always used in rural settings and yet attract youth's attention to improve on their involvement in agricultural activities. Absence of youth members was also because they did not own land for OFSP production, and they were involved in other activities like construction, restaurant businesses, motorcycle and bicycle driving, milling, teaching, studying and retail shop businesses. Umar, et al (2009), on adoption of improved rice production technologies among youth farmers in Gbako Local Government Area, Niger State revealed that low adoption meant that the respondents had not known their relevance to their production or it could just be a matter of choice, without tangible reasons attached to it.

Majority of the OFSP farmers were females and married (84%). This might be because most of the women were housewives depending on agriculture while most men are involved in professional associate work as observed by Gulu District Local Government (2013). Harvest plus (2012), confirms that a higher percentage (75%) of nutrition promoters were typically women because they were involved in most of the activities such as cooking demonstrations and child feeding practices. 30%, had some primary education, which indicates a high level of literacy among OFSP farmers who could read, write and listen to OFSP information most

especially in English. This might be attributed to the percentage of male respondents in the study.

A total of 36% farmers earned at least 600,000 - 1 million Ugshs/year and yet their primary activity of 91% was agricultural production. This might mean that families use OFSP for home consumption and also sell to other consumers to be able to afford mass media communication channels such as buying batteries for radio. This finding is related to Okwu, (2011) in the study on characterizing farmer users and nonusers of mass media as channels of agricultural information in Benue State, Nigeria.

Fifty three percent of farmers had other decision makers and belonged to a farmer group (56%). This insinuates that farmers who relied on other decision makers were constrained with chooses of adopting OFSP, as they had limited authority over resources such as land, capital, accessing OFSP information and belonging to a farmer group. Harvest plus (2012), reported that men control family resources and are key decision makers regarding allocation of land and crops, however, 60% of farmers' group members were women who played a vital role in crop diffusion. Those belonging to a group or association had more access to OFSP information and had a chance to be easily communicated to in case of any newly developed innovation in Gulu district. This finding is similar to the study of Umar, et al (2009), which revealed that membership of cooperative association is expected to influence farmer's desire to adopt innovations.

Key informants reported always using radio as the main channel of OFSP information dissemination, followed by farm demonstrations. This finding is contrary to the study on assessment of extension gents' knowledge in the use of communication channels for agricultural information dissemination in Ogun State, Nigeria, by Akinbile and Otitolaye (2008) which showed that farm visits and radio were the most common communication

channels used by respondents. Mayanja and McEwan, 2013 in their study on innovation platforms reported that 115,145 stakeholders were reached directly and 515,000 were reached indirectly through radio.

The high response to radio as a dissemination channel was because it increased the speed and quality of information to rural communities. Some respondents also confirmed that they used radio mega F.M to disseminate OFSP but they did not use the television channel especially in Gulu district. This disagrees with the findings of Akinbile and Otitolaye (2008), which showed that the level of knowledge about television as a medium of agricultural information dissemination was high compared to other media, because of its audio-visual nature to several senses. This can explain its attraction to the less interested people in OFSP technologies like youths. Umar, et al (2009), found out that the adoption decisions of youths were mainly based on the attractiveness and cleanliness of grains qualities.

Farmers reported that they did not use television and radio because they required electricity and batteries which they could not afford. Radio is equally one of the fastest means of communicating with generality of farmers (Jirgi et al, 2009). This disagrees with the findings of Yanggen and Nagujja (2006), who found out that radio, was the seventh source of OFSP information after interpersonal channels such as NGOs, fellow farmers, Gov't and extension workers. The insignificant impact of seminars, group discussion and extension workers, was expected because interpersonal channels can be used concurrently with those mass media channels highly rated unlike the mass media (television and radio) which were due to cost effects.

Magazines and posters were never used by farmers due language constraints because 52% respondents spoke the local language (luo) well, 44% read it well. 35% spoke Luo/English. 39% wrote Luo/English well, and 42% read luo/English well yet these communication

sources were disseminated in english.

Interpersonal channels specifically extension agents, group discussions, farm demonstration, seminars, home visit, television, posters and magazines were significant when it came to OFSP adoption. However, radio was not significant, although Adolwa et al, (2012), found a significant difference with the use of radio. This might be because people own radios but listen to other radio programs instead of programs with OFSP messages.

In relation to coverage capacity, informativeness, frequency of use and accessibility of communication channels, interpersonal channels were significant especially extension agents, seminars, home visits, farm demonstrations. This is because interpersonal channels involved face to face meetings with illustrations of technologies and hands on trainings. This is in agreement with Nonaka and Takeuchi (1995), who found out that the preferred way of transferring any information was through using voice and body language (socialization). The high significance of extension agents could have been attributed to trust by the community among which they lived.

2009 was the first year when the Innovation Platform for Technology Adoption (IPTA) coordinated by the NARIs in the respective countries/DONATA OFSP project sites introduced OFSP technologies. The IPTA actors were drawn along the sweet potato value chain (farmers/farmers' association, processors, researchers, NGOs/public extension, BDS). (ASARECA, 2011).

In 2009 farmers adopted OFSP by 2% in Gulu district. This could be attributed to the fact that few farmers among the IPTA actors might have tried out the OFSP technology in few villages with inadequate vines and they sluggishly communicated or did not communicate to others. Few channels were used at the beginning of the OFSP project. The increased adoption of OFSP by 13% in 2010 was attributed to the increased dissemination channels (Interpersonal,

mass media, and print media) used by institutes as other farmers gained courage from earlier adapters' neighboring farms (Interpersonal). In 2011 onwards, there was a tremendous increase of OFSP adoption by 85% and this was attributed to the time factor, because farmers reported that they required time (2009-2011) to observe, understand the repercussions before taking up the new idea of OFSP.

The adoption rate also confirms that with time OFSP messages spread through multiple information sources such as researcher to farmer, farmer-farmer and radio (interpersonal and mass media) in more villages. Therefore, the time and channels affected OFSP adoption rates because respondents did not adopt at the same time. This study was contrary to the findings of Onasanya et al (2006) which showed that 57.6% of the farmers did not adopt the innovations, 37.1% fully adopted the innovation, 3.7% and 1.6% of the farmers partially adopted, and discontinued use respectively in the study of communication factors affecting the adoption of innovation at the grassroots level in Ogun State, Nigeria. Hailu (2008), in the study on the adoption of improved tef and wheat production technologies in crop livestock mixed systems in northern and western Shewa zones of Ethiopia, found out that diffusion of any innovation is not a one step process as it took time for individuals to adoption it.

Rogers, (1995) in the Diffusion of Innovation, found out that this theory originated from communication to explain how, over time, an idea or product gains momentum and diffuses through a specific population or social system. Rogers, (1995) further notes adoption does not occur simultaneously in a social system but it is a process whereby some people are more apt to adopt the innovation than others. Each of the main factors that influence adoption of an innovation, such as relative advantage, compatibility, complexity, triability and observability plays a role in five adopter categories of: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards.

Effectiveness of communication channels was defined in terms of frequency of use, coverage capacity, informativeness and accessibility in relation to the type of channel. The effectiveness of communication channels was ranked and then compared against corresponding values on a 5-point scale of strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD) for 11 perception statements. Data on this objective was analyzed under the question “what the effectiveness of communication channels employed in the dissemination of Orange Fleshed Sweet potato are?”

The findings revealed that 80% of the respondents strongly agreed that radio was used for its coverage capacity for OFSP communication. Harvest Plus (2012), confirms that Uganda has a high radio coverage and listenership in the country report on dissemination of OFSP. At least 52-72% of the respondents agreed that posters, group discussions, home visits, extension agents, farm demonstrations, seminars were used because of the coverage capacity and magazine (30%), followed by radio (8%). The low rating of radio was because of poor network. Harvest plus (2012), confirms that there is audience fragmentation because of the large number of radio stations. 70% strongly disagreed that television was used because of its coverage capacity followed by magazine (40%), seminars (30%), others-print media (25%), posters (8%) and home visits (2%) while 75% disagreed with others-print media, television (30%), magazines at 20%, seminars, posters (10%), home visits (8%) and group discussion at 2%. This may be attributed to the fact that OFSP posters, magazines and other print media were displayed in the trading center and not in remote villages of Gulu district. The finding is similar to that of Akinbile and Otitolaye (2008) who found out that radio followed by farm demons were perceived to be the most effective communication channel in coverage capacity. All the respondents made a decision on accessibility.

The high response to seminar might be attributed to the fact that seminar are organized near the respondents homes for easy accessibility. The high response to both seminars/radio might be attributed to the fact that farmers hear about OFSP upcoming seminars from radios. 85% agreed that they accessed farm demonstration, group discussion, followed by extension agents (80%), home visits (70%), others (50%), posters (42%), radio (22%) and magazine (18%). This was because the interpersonal demonstrations were accompanied by distribution of print media on OFSP information. The high response to inaccessibility of television was because it is a prerequisite to pay a monthly fee to service providers for accessibility.

The use of television was rejected because farmers cannot afford television services in rural areas. However, farmers could view farming programmes from community televisions in the trading centers. According to Harvest plus (2010), in the study on dissemination of OFSP in other project districts, community theater was also used to reinforce messages from the trainings and address barriers to behavior change in the community, as well as at the sub-county and parish levels.

The high response to frequent use of radio was because there are radio programmes on Mega fm which farmers listen to, at a given time for values of vitamin A and give feedback on OFSP technology. This finding is similar to Harvest plus (2012), who found out that radio spots were aired two or three times a day for a month during specific planting and harvesting seasons. The study found out that the high response to the frequent use of interpersonal communication specifically community trainers under others, was because they live among the respondents. These included messages on the importance of vitamin A and an encouragement to grow OFSP.

The low response to radio could be that few programmes were aired on OFSP or farmers do not have radios. This disagrees with the findings of Jirgi et al (2009), which confirmed that

the high response to radio, was because most farmers had radio or were able to listen to farming programs. All respondents strongly disagreed that other channels (print media, drama) were frequently used. The low response to group discussions and seminars could be that it is hard to meet farmers as a group were information on OFSP through print media, drama could easily be communicated.

Respondents strongly agreed that extension agents (86%), followed by farm demonstration (76%), group discussions (68%), seminars (16%), radio (12%) and television/magazine/posters (2%) were more informative in dissemination of OFSP. 6% strongly disagreed that seminars were informative, followed by television/home visits/posters (4%) and radio (2%). The high response to interpersonal channels was because it involved face to face meetings for clear explanations. 8% of the respondents disagreed that television/magazines/posters followed by seminars (6%), home visits and others (4%) were informative. The high response to magazine, television, posters and seminars was because they don't involve hands on trainings.

The study also shows that farmers in Gulu were aware of the OFSP technology. According to Rogers (2003), mass media was mainly important for dissemination of knowledge while interpersonal was for convincing farmers to adopt the technology. It is against this background that the conclusions and recommendations below were made. Despite its limitations, this study should be useful to organizations as they plan for dissemination of technologies to farmers.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

From the study, the following were concluded;

- The main sources of information were radio and field demonstrations.
- In relation to accessibility, coverage capacity, frequency of use and informativeness of communication channels, interpersonal channels were significant and mass media channels specifically radio was insignificant.
- The study concludes that Interpersonal channels are most suitable for conveying OFSP information and knowledge to farmers. Radio, folk media, print media and visual media communication channels which have been used widely by institutions have their benefits and should continue to be promoted in dissemination of OFSP. Extension and even research organizations should liaise with mobile service providers to offer information services to farmers, e.g., via SMS, at subsidized rates (Adolwa et al. 2012).
- Farmer asset endowment was noted as a factor significantly influencing access to information and knowledge, and the subsequent uptake of ISFM. (Adolwa et al. 2012). Farmers involved in OFSP production and other activities had additional income to afford and access more communication channels.

6.2 RECOMMENDATIONS

1. The study indicated that communication channels are a significant factor in OFSP adoption rates. It must therefore be taken into consideration while developing a communication strategy and seeking ways to effectively disseminating OFSP information to farmers.
2. The study recommends that institutes need to use multiple communication channels (Interpersonal, Mass media, Print media) concurrently because the efforts of communication might not be fully achieved if only radio is preferred.
3. There is need for researchers and policy-makers to consider exploiting the use of phones databases (short messaging services-sms) to deal directly with the farmers' challenges despite the numerous advantages of radio in Gulu district.
4. Adult literacy programmes should be promoted in Gulu district to encourage uneducated farmers to at least pursue formal education at primary level. This is in consideration of the fact that there is free primary and secondary education initiated by the government of Uganda to reduce on illiteracy rates. The government should also improve on the farmers' knowledge through availability of free information center facilities such as libraries in rural areas. Education will be of importance to farmers in understanding ICT interrelated dissemination channels.
5. Youth should be encouraged by existing farmer groups to join OFSP technology. This could also be boosted by using digital migration techniques in dissemination of OFSP.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

Basing on the findings of this study, the researcher suggests that future research can be undertaken basing on another crop and the extension agents knowledge and use of communication channels in rural areas.

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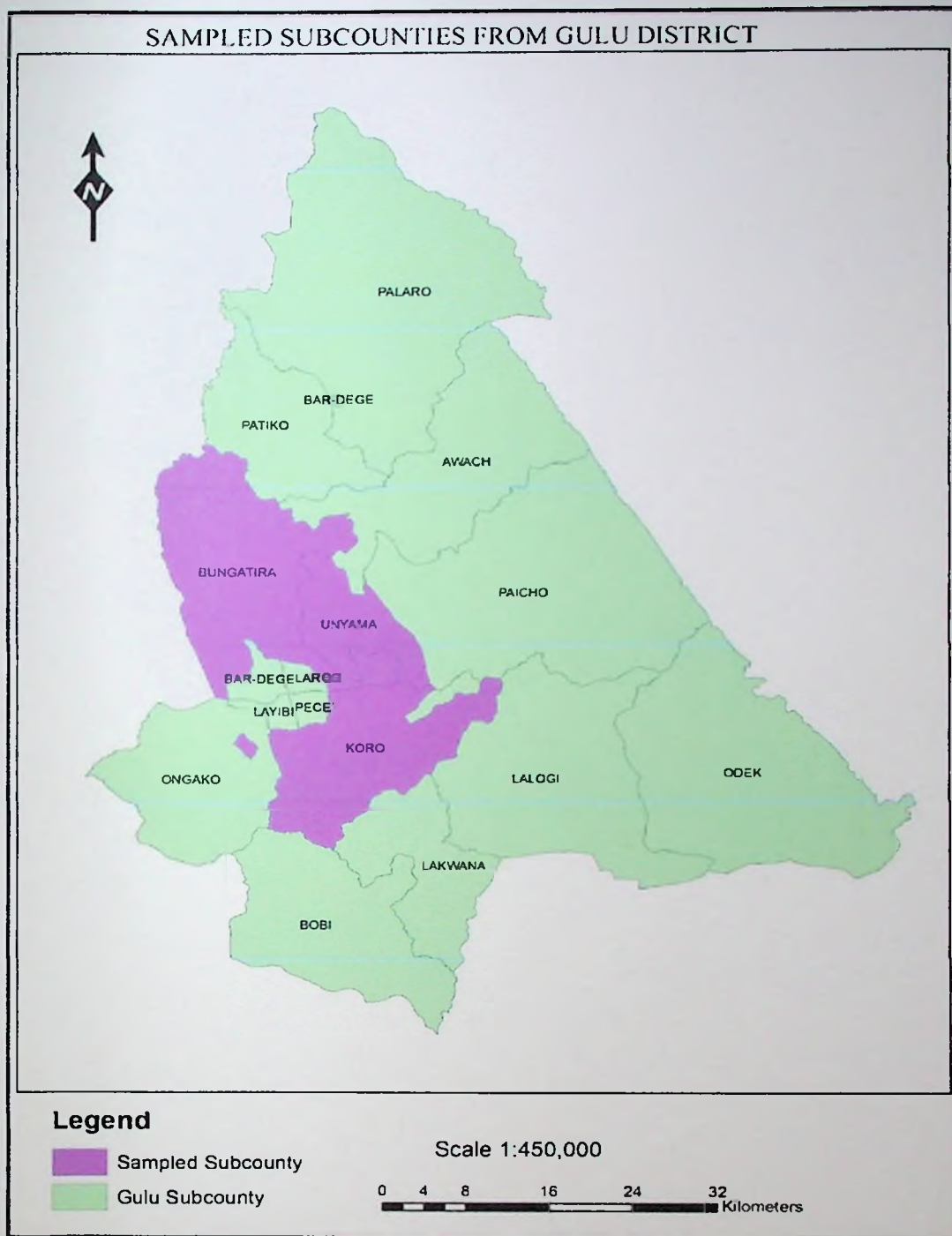


Figure 17: Gulu sub counties. Source: Researcher's map (Namulondo Brenda, 2014)

7.0 APPENDICES

APPENDIX 1: INTERVIEW GUIDE

Dear sir or madam,

In partial fulfillment of the requirements of the degree of Master's Degree in Agricultural Information and Communication Management of University of Nairobi, a student is required to undertake research and submit one's findings. You are kindly requested to assist the researcher to obtain information about the Effect of Communication Channels in the Adoption of Orange Fleshed Sweetpotatoes (OFSP) in Uganda: A Case Study of Gulu District. You have been identified as a knowledgeable person in the above area. The information you will provide will be purely for academic purposes and may benefit the project and the adoption of OFSP in general. The information given shall be treated with confidentiality.

SECTION A:

1. Type of business.....
2. Age of the respondent.....
3. Gender.....
4. Marital status.....
5. Education level.....
6. County.....
7. Sub-county.....
8. Village.....

SECTION B:

1. What types of communication channels are you aware of?
2. How often do you use these channels of communication?
3. Have you noticed any improvement in your performance resulting from their usage?
4. Name the grown OFSP cultivars you are aware of?
5. Are the cultivars/cultivar grown by many or few households on large or small areas?
6. What do you think is the impact of these communication channels?
7. What types of communication channels do you think are mostly employed in the adoption of OFSP?
8. Are you satisfied or dissatisfied with these communication channels? Why?

APPENDIX 2: HOUSEHOLD QUESTIONNAIRE

Dear sir or madam

In partial fulfillment of the requirements of the degree of Master's Degree in Agricultural Information and Communication Management of University of Nairobi, a student is required to undertake research and submit one's findings. You are kindly requested to assist the researcher (Brenda Namulondo) to obtain information about the Effect of Communication Channels in the Adoption of Orange Fleshed Sweet potatoes (OFSP) in Uganda: A Case Study of Gulu District. You have been identified as a knowledgeable person in the above area. The information you will provide will be purely for academic purposes and may benefit the project and the adoption of OFSP in general. The information given shall be treated with confidentiality.

Enumerator Details:

Enumerator name: Date of interview:

Household No:

SURVEY QUESTIONNAIRE

Farmer Name:

District: County: Sub county:

Village:

A. GENERAL INFORMATION

SECTION A.1: Household Characteristic (Establish the following information)

Variable Codes

A.1 Gender

A.2 Age of household head:

A.3 Marital status 1= Single; 2= Married; widowed = 3; separated = 4.....

A.4 Decision maker [1= Self, 2= other (specify).....

A.5 Education level of household head 1=no formal education, 2=some primary education.

3=completed primary education, 4=some secondary education. 5=completed secondary education.

6=postsecondary Education.....

A.6 Income for the household: 1=200000 – 400000; 2= 400000-600000; 3=600000-1Million; 4= Over 1Million per year.

A.7 Primary activity: 1=agricultural production, 2=non-farm activities

A.8 Do you belong to a farmers group or association (This can be an interesting source of information)

If yes, what is the name of the group?

Section B.1

B.1.1 What language(s) do you read well.....

B.1.2 Write well.....

B.1.3 And speak well?.....

B.2. Communication channels used to disseminate OFSP information.

Activity	
B.2.1 How did you know about OFSP?	1=NARO;2=IPTA;3=CIP;4=OTHERS
B.2.2 Year of first time use of OFSP	1=2008, 2=2009, 3=2010, 4=2011 on wards
B.2.3 What types of communication channels are you aware of?	1=Radio;2=TV;3=Extensionist;4=Group discussion;5=Demonstrations;6=Magazines;7=Others
B.2.4 What communication channels were used at the beginning of the OFSP project?	1=Radio;2=TV;3=Extensionist;4=Group discussion;5=Demonstrations;6=Magazines;7=Others
B.2.5 Did you adopt the OFSP technology at that time?	1=Yes;2=No;3=Later
B.2.6 How long ago did you receive any information on OFSP?	1=2011;2=2012;3=2013;4=2014
B.2.7 Which channel did you use to adopt OFSP?	1=Radio;2=TV;3=Extensionist;4=Group discussion;5=Demonstrations;6=Magazines;7=Others
B.2.8 How often do you use these channels? (tick option on the side)	Radio: 1=always uses;2=sometimes uses;3=never uses TV: 1=always uses;2=sometimes uses;3=never uses Extensionist: 1=always uses;2=sometimes uses;3=never uses Groupdiscussion: 1=always uses;2=sometimes uses;3=never uses Farm Demonstrations: 1=always uses;2=sometimes uses;3=never uses Magazines: 1=always uses;2=sometimes uses;3=never uses Seminars /Workshop: 1=always uses;2=sometimes uses;3=never uses Home visits: 1=always uses;2=sometimes uses;3=never uses Posters: 1=always uses;2=sometimes uses;3=never uses
B.2.9 Are you satisfied or dissatisfied with the communication channels used to disseminate OFSP?	
B.2.10 Reason for using or not using the channels.	
B.2.11 Used now?	Yes=1, No=2

C.3 Effectiveness of communication channels

C.3.1 I like to use this channel all the time because of its coverage capacity. (C.C)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

C.3.2 I understand the messages from this channel better than any other media (informative)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

C.3.4 I like to use this channel because messages can be relayed (communicated) several times (frequency of use)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

C.3.5 This channel communicates in my local language and I understand (informative)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines/Print	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

C.3.5 This channel is a good reminder of message (informative)

C.3.8 This channel is better because it can be shown to others in the process of dissemination. (Accessibility)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

C.3.9 I prefer this channel because it utilizes all the human senses. (informative)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

C.3.10 Procedures and methods are clearly seen and understood while using this channel (informative)

Channel	Variable codes
1. Radio	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Television	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
2. Face-to-face contact	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
3. Group discussion	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
4. Farm Demonstrations	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
5. Magazines	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
6. Seminars /Workshop	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
7. Home visits	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
8. Posters	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)
9. Others name them	1=strongly agree (SA);2=agree (A);3=undecided (U);4=disagree (D);5=strongly disagree (SD)

Comments and Observations

D.1 What are the challenges, constraints or problems faced in receiving OFSP messages? Explain

.....

D.2 What is the major contribution of OFSP on people's welfare?

.....

D.3 General Comments, observations on OFSP and specific project approach in technology dissemination

.....
D.4 Was mass media or interpersonal channel a good method of disseminating OFSP, explain
.....

D.7 Where did mass media or interpersonal channel fail or what were its disadvantages?
.....

Thank You for the participation.

APPENDIX 3: INTERVIEW GUIDE FOR KEY INFORMANTS

Dear sir or madam,

In partial fulfillment of the requirements of the degree of Master's Degree in Agricultural Information and Communication Management of University of Nairobi, a student is required to undertake research and submit one's findings. You are kindly requested to assist the researcher to obtain information about the Effect of Communication Channels in the Adoption of Orange Fleshed Sweet potatoes (OFSP) in Uganda: A Case Study of Gulu District. You have been identified as a knowledgeable person in the above area. The information you will provide will be purely for academic purposes and may benefit the project and the adoption of OFSP in general. The information given shall be treated with confidentiality.

Enumerator Details:

Enumerator name..... Date of interview.....

Household No:

SURVEY QUESTIONNAIRE

Farmer Name:

District: County: Sub county:.....

Village:

Interview guide for Key Informants

1. ISSUES ABOUT OFSP

What were the tools and techniques used to disseminate OFSP?

What do you think is the effect of these communication channels of OFSP?

Positive impacts

Negative impacts

Explain?

2. LIVELIHOOD STRATEGIES

HasOFSP improved food security in your area? IF YES how?

HasOFSP improved your farm house-hold income in your area? IF YES
how?

HasOFSP improved on your health or vulnerability in your area? IF YES
how?

HasOFSP improved on interactive community groups in your area? IF YES
how?

What are the major problems faced in growing, storage and processing and selling of OFSP in your area?

Growing

Storage

Processing

Selling or marketing

What do you think is the best way of communicating the above problems?

3. Comments and Observations

Compare OFSP and ordinary Sweet potatoes

OFSP
Sweet potatoes

Ordinary

Give your general Comments, observations on OFSP

What are your general comments on OFSP communicators?

Thank You for the participation.

Dear sir or madam,

In partial fulfillment of the requirements of the degree of Master's Degree in Agricultural Information and Communication Management of University of Nairobi, a student is required to undertake research and submit one's findings. You are kindly requested to assist the researcher to obtain information about the Effect of Communication Channels in the Adoption of Orange Fleshed Sweet potatoes (OFSP) in Uganda: A Case Study of Gulu District. You have been identified as a knowledgeable person in the above area. The information you will provide will be purely for academic purposes and may benefit the project and the adoption of OFSP in general. The information given shall be treated with confidentiality.

Enumerator Details:

Enumerator name..... Date of interview.....
Household No:

SURVEY QUESTIONNAIRE

Farmer Name:
District: County:Sub county:.....
Village:

APPENDIX 4: FOCUS DISCUSSION GUIDE

FOCUS DISCUSSION GUIDE

Farmer Group Name.....

1. GROUP IDENTIFICATION

District

Sub-county

Parish

Village

Group Name

1.1. Year formed

1.2. Number of members now

2. BACKGROUND INFORMATION ON ENTERPRISES:

2.1. What areas does this group focus on?

2.3. For each of the enterprises (above), what production practices and technologies do you use now that you were not using in 2008?

Production practices and technologies attained	Number of group members who use the practice on their own farmlands	Reason for use of the new practice	Source of information / knowledge on practice or technology used

3. ACCESS TO OFSP SERVICES

3.1 Have you benefited from OFSP services, how and what services did they provide? And how many times were you visited?

3.2. In your view, how good were the methods/approaches used to give you advice on OFSP in the past four years (since 2008)?

Perception on methods/approaches used

Perception on usefulness of advice

Timeliness of service provision

Compare OFSP communication channels to ordinary channels, what was done better?

4.1 Technologies and tools used

4.2 How did you know about OFSP varieties?

4.3 What were the tools and techniques used to disseminate OFSP?

4.4 What technologies were disseminated through it and which ones were adopted?

5. Changes in livelihoods associated with OFSP

E.1. For the OFSP service received, list three most important benefits in your community since 2007

Benefits

1

2

3

6.1 List three most important drawbacks / hindrances of OFSP.

7.1 Give the 3 most important factors/conditions contributing to realization of benefits of OFSP in order of importance

8. GROUP PARTICIPATION (requirements, roles and responsibilities)

8.1. What is required of group members?

8.2. How are members communicated to in order to fulfill their roles and responsibilities?

8.3 What are the three most important factors contributing to achieving the goals and objectives of the group?

8.4 What were the three most critical problems facing the group? How have these problems been?
Solved or attempted to be solved?

9.1 LIVELIHOOD STRATEGIES

9.2 Do you buy or produce OFSP you eat?

9.3 If both, what is the proportion of each (percentage?)

9.4 How many meals of OFSP (on average) do your HH members have per day during the last 1 month?

9.5 Number of months the family's OFSP food stock last /in a good year (2008-2012)?

9.6 How many months during the last year did you not have enough OFSP to meet your HH needs and why?

9.7 Which months did your Household face OFSP shortage?

10. Comments and Observations

10.1 What are the challenges, constraints or problems faced in production of OFSP?

10.2 Has OFSP technology Dissemination got any impacts of on the agro ecosystem or the environment?
Mention them

10.3 If you are given a choice to choose a crop to grow, would you choose OFSP. give reasons for both positive and negative?

10.4 Comparing communication channels of OFSP and local sweet potatoes varieties.

OFSP

Radio

TV

Extensionist

Group discussion

Farm Demonstrations

Magazines

Seminars /Workshop

Home visits

Posters

local sweet potatoes

10.5 General Comments, observations on OFSP technologies.

Thank You for the participation.